

# EXHIBIT C

*Nantworks, LLC v. Bank of America Corporation*  
Central District of California, No. 2:20-cv-7872  
Invalidity Chart for U.S. Patent 9,324,004 based on  
U.S. Patent U.S. Patent Publication No. US2002/004786 to Mault et al. (“Mault”)

#### **Exhibit A-4**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, Mault was filed on September 7, 2001, claiming the priority date of September 7, 2000. Mault published at least as of April 25, 2002, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Mault anticipates asserted claims 1, 6, and 18 of the ’004 Patent. To the extent Mault is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Mault is found not to anticipate any asserted claims or claim elements of the ’004 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s “Preliminary” Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ “Preliminary” Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Claim Element	'004 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for processing a video stream, comprising:	<p>Mault discloses a method for processing a video stream.</p> <p>Mault at [0057]</p> <ul style="list-style-type: none"> <li>• “Embodiments of the invention can also be implemented using recorded video images. The person can view recorded videos at a convenient later time, so as to assist the person create a diet log.”</li> </ul> <p>Mault at [0089]</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 16: IR lens <b>402</b> is used as part of an IR data communications system enabling watch <b>400</b> to communicate with other devices; camera lens <b>404</b> forms part of an image sensor; shutter button <b>406</b> is pressed to capture an image or video using the image sensor; mode button <b>408</b> changes the operating mode of the device (modes may include some or all of the following: image recording, image display, video recording, video display, television, wireless, timepiece, calculator, personal organizer, wireless phone, video phone, Internet access device, diet log, activity sensor, physiological sensor (e.g. blood glucose), and any other useful function); and set button <b>410</b>, reverse button <b>412</b>, change button <b>414</b>, forward button <b>416</b> are used in e.g. data entry and image review processes.”</li> </ul>
[1A]	analyzing, via a mobile device, a scene represented by the video stream for at least on object;	<p>Mault discloses analyzing, via a mobile device, a scene represented by the video stream for at least on object</p> <p>Mault at [0006]</p> <ul style="list-style-type: none"> <li>• “A method of creating a record of foods consumed, or diet log, comprises recording images corresponding to the foods consumed. An image</li> </ul>

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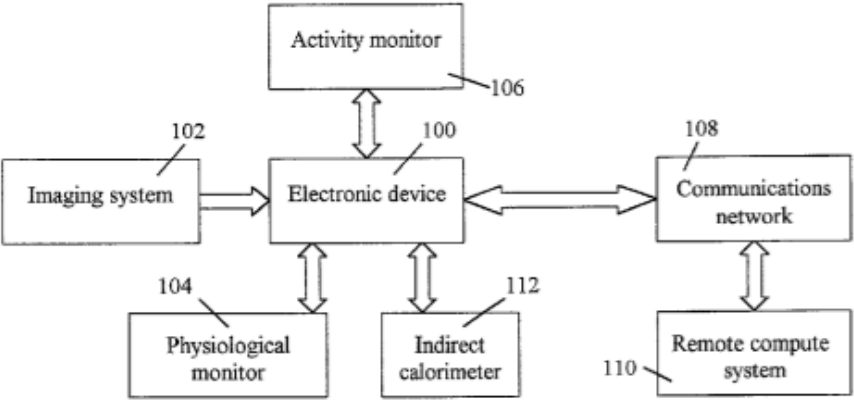
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		<p>corresponding to a food item consumed can comprise an image of the food, food package, label, menu listing, barcode (such as a Universal Product Code or UPC), food serving on a plate, food serving in a restaurant package, package containing multiple food servings, alphanumeric codes, receipts, printed data (such as nutritional information conventionally found on food packages), notes written or typed about the food, and the like.”</p> <p>Mault at [0009]</p> <ul style="list-style-type: none"> <li>• “After recording the image, at a convenient later time the person can retrieve a stored image and view the image on a display. The display can be part of the imaging device, or other device such as a personal digital assistant, personal computer, Internet appliance, WebTV, e-book, tablet computer, pager, cell phone, interactive TV, spectacle mounted display, visor, and the like. An electronic device having a display used to view an image may be in communication with a separate device used to create the image, for example using wireless or cable-based links.”</li> </ul> <p>Mault at [0011]</p> <ul style="list-style-type: none"> <li>• “The imaging device, used to create an image of foods consumed, can be a digital camera, device having the functionality of a camera, such as a personal digital assistant (PDA), cell phone, electronic book, pager, calculator, or other consumer electronics device. The imaging device can also be an ornamental component, clothing item, or other functional or decorative item having image creation capabilities, such as spectacles, buttons, a pen, cutlery item, key ring, keys, belt, cigarette-like object, ring, body ornament, or jewelry.”</li> </ul> <p>Mault at [0016]</p> <ul style="list-style-type: none"> <li>• “The food image can be recorded in a memory of the electronic device, or any other memory accessible to the electronic device, such as a memory module, remote database, and the like. The food item name can be selected</li> </ul>



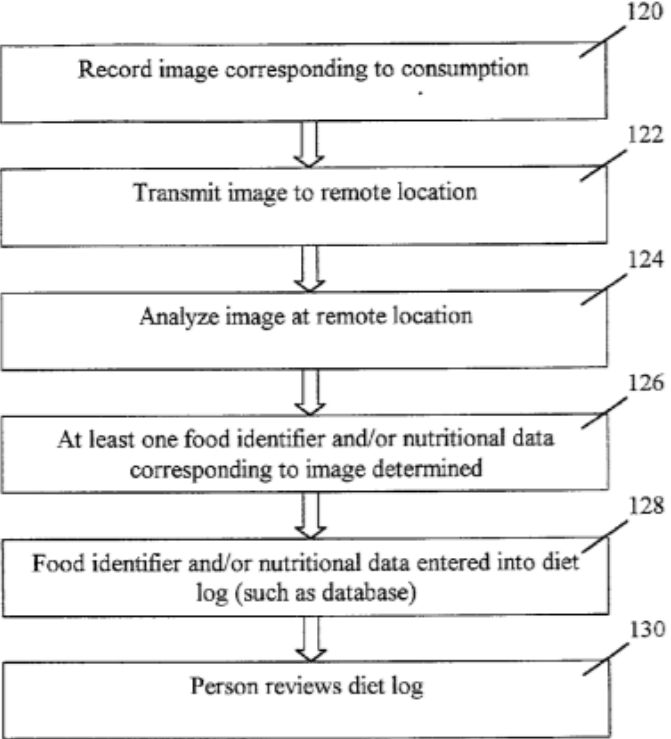
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		<p>from one or more lists of food item names presented on the display of the electronic device, for example from one or more menus presented on the display.”</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li> </ul> <p>Mault at [0018].</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network such as the internet, receiving food identification data from the remote computer system (which may be generated by a software running on the remote computer system, a computer expert system, an image analysis system, a human operative in communication with the remote computer system, or some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• “FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging system 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote</li> </ul>

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		<p>computer system (such as a server system) 110.”</p> <p>Mault at Fig. 5.</p>  <p style="text-align: center;">Figure 5</p> <p>Mault at [0049]</p> <ul style="list-style-type: none"> <li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “FIG. 6 is a flow chart of a method for diet logging. Box 120 corresponds to recording an image of food. Box 122 corresponds to transmission of the image to a remote location, Such as a remote computer System. . . . Box 124</li> </ul>

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		<p>corresponds to analysis of the image of the remote location.”</p> <p>Mault at Fig. 6.</p>  <pre> graph TD     120[Record image corresponding to consumption] --&gt; 122[Transmit image to remote location]     122 --&gt; 124[Analyze image at remote location]     124 --&gt; 126[At least one food identifier and/or nutritional data corresponding to image determined]     126 --&gt; 128[Food identifier and/or nutritional data entered into diet log (such as database)]     128 --&gt; 130[Person reviews diet log]     </pre> <p>Figure 6</p> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of</li> </ul>

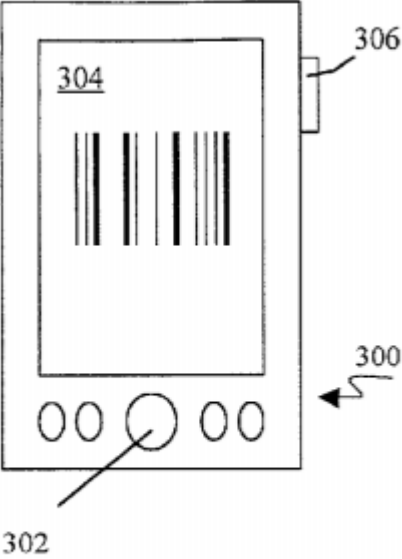
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		<p>a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image Sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network Such as the Internet.”</p> <p>Mault at [0047]</p> <ul style="list-style-type: none"> <li>• “The step corresponding to box <b>88</b> can be omitted, and corresponding nutritional data can be identified after the food identifier is stored in memory. The food item identifier can be a food name, product code, barcode, and the like.”</li> </ul> <p>Mault at [0074]</p> <ul style="list-style-type: none"> <li>• “Fig. 11 shows a PDA <b>280</b> with display <b>284</b>, buttons <b>282</b>, and imaging device 286 directed at a can of pickles <b>288</b>. The display <b>284</b> can be used to indicate the image to be captured. A button such as 282 may be pressed to record the image. The display <b>184</b> can be used to view captured images of foods stored in the memory of the PDA, for assisting the person in creating a diet log.”</li> </ul> <p>Mault at [0080]</p> <ul style="list-style-type: none"> <li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code Scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode (e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer System (remote in this context meaning a computer System not carried by the person, for example a commercial Server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the</li> </ul>

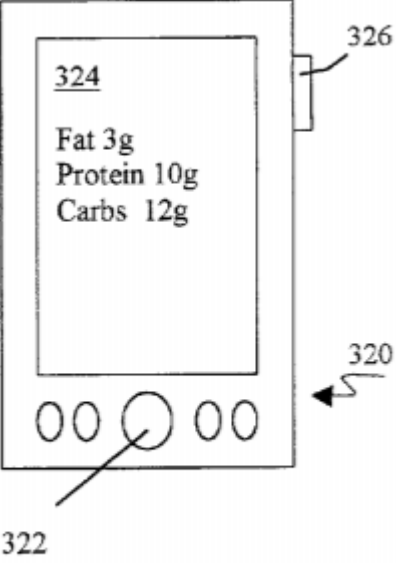
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		<p>database.”</p> <p>Mault at [0081]</p> <ul style="list-style-type: none"><li>• “FIG. 12 shows an image of a barcode presented on the display 304 of PDA 300 (the PDA having data entry buttons 302, and an image sensor 306). Image analysis software can be used to analyze the image of the barcode, So as to determine UPC, product name, nutritional data, and the like. Alternatively, a barcode Scanner can be used to read the barcode, or an accessory device which in communication with the PDA may be used as a barcode scanner.”</li></ul> <p>Mault at Fig. 12</p>

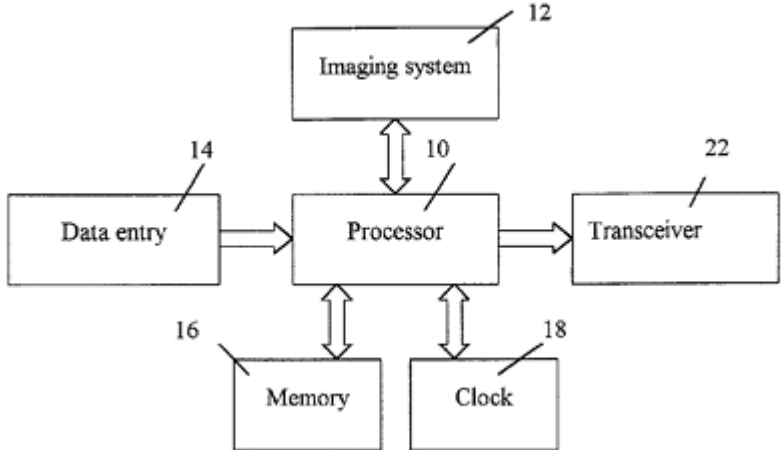
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		 <p style="text-align: center;">Figure 12</p> <p>Mault at [0082]</p> <ul style="list-style-type: none"> <li>“FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image Sensor <b>326</b>. Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”</li> </ul> <p>Mault at Fig. 13</p>

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		 <p>Figure 13</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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[1B]	deriving at least one characteristic of the video stream;	<p>Mault discloses deriving at least on characteristic of the video stream.</p> <p>Mault [0021]</p> <ul style="list-style-type: none"> <li>“An imaging sensor having a two-dimensional array of sensor elements can capture an image by having the array exposed to the image, so as to create an electronic data set or file corresponding to the spatial distribution of intensity (and color, if required) of the image.”</li> </ul> <p>Mault at Figure 1A:</p>  <pre>                     graph TD                         12[Imaging system 12] &lt;--&gt; 10[Processor 10]                         14[Data entry 14] --&gt; 10                         10 --&gt; 22[Transceiver 22]                         10 &lt;--&gt; 16[Memory 16]                         10 &lt;--&gt; 18[Clock 18]                     </pre> <p>Mault at [0041]</p> <ul style="list-style-type: none"> <li>“FIG. 1A, other components of the electronic device are omitted for clarity. On receiving a signal from the external control or from the processor, the controller 24 initiates the capture of an image by sensor 28, and may store the</li> </ul>



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		<p>image in memory <b>30</b> along with a time stamp provided by clock <b>32.</b>”</p> <p>Mault at [0047]</p> <ul style="list-style-type: none"> <li>• “The time and location that the image was recorded can also be recorded in memory and displayed, so as to assist diet logging.”</li> </ul> <p>Mault at [0076–77]</p> <ul style="list-style-type: none"> <li>• “For non-packaged foods, e.g. restaurant meals, image analysis may also be used in identifying the food items. Imaging at a number of wavelengths, followed by false color image generation, can be used to help identify image components. Spectroscopic imaging can be used in computer-assisted food recognition.</li> </ul> <p>Image processing, image recognition, and pattern recognition algorithms are useful in analyzing stored images so as to create a diet log. Algorithms may be applied to color images, or images recorded at a number of different wavelengths (e.g. in the IR, optical, and UV) which may assist identification. Stored images can be identified by comparison with previously stored images that the person has identified, using a software learning mechanism such as a neural network.”</p> <p>Mault at [0090]</p> <ul style="list-style-type: none"> <li>• “A person can record images of medicines taken, such as tablets consumed, and these images can be used to create a medical log using embodiments of the present invention. Colors, shapes, printed codes, and fluorescent markers of tablets can be used to assist identification, either by a person or an software image analysis program.”</li> </ul> <p>Mault at [0091]</p>

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		<ul style="list-style-type: none"> <li>“Images can be recorded at intervals by a device carried by the person, and the images used to create a lifestyle log for the person. This can include analysis of images of meals consumed, so as to create a diet log. Images can be recorded automatically, for example at time intervals, so as to spare the person the effort of remembering to record images of foods consumed. Image creation can be triggered by events, such as physiological parameters which change during eating, position (such as using a global positioning system), voice commands, wireless transmission from a remote device, such as a food vending machine, and the like.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristics of the video stream;	<p>Mault discloses recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristics of the video stream.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>“A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of</li> </ul>

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		<p>the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</p> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on the remote computer System, a computer expert system, an image analysis system, a human operative in communication with the remote computer system, or some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</li> </ul> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet. Other options include receiving transmissions such as wireless data transmissions from food vendors or food vending devices, viewing the recorded diet log, editing the diet log, or analyzing previously recorded images.”</li> </ul>

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		<p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>“Box 124 corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert System, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images.”</li> </ul> <p>Mault at [0075–76]</p> <ul style="list-style-type: none"> <li>“Image processing techniques can be used to identify food items from images. For packaged foods, optical character recognition may be used to record and identify nutritional information and/or identify the item consumed. Computer analysis of images may be carried out on the PDA or using another computer system in communication with the PDA. For example, an image of food packaging may be used to identify the food contained. An image of the nutritional content information panel provided by the manufacturer on the package may also be recorded. Optical character recognition may be used to obtain information from the image for storage in a diet log. An image of a box of corn flakes may be recognized by a computer as such, and used to generate a corn flake serving record in a diet log.</li> </ul> <p>For non-packaged foods, e.g. restaurant meals, image analysis may also be used in identifying the food items. Imaging at a number of wavelengths, followed by false color image generation, can be used to help identify image components. Spectroscopic imaging can be used in computer-assisted food recognition.”</p> <p>Mault at [0077]</p>

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Claim Element	'004 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “Image processing, image recognition, and pattern recognition algorithms are useful in analyzing stored images so as to create a diet log. Algorithms may be applied to color images, or images recorded at a number of different wavelengths (e.g. in the IR, optical, and UV) which may assist identification. Stored images can be identified by comparison with previously stored images that the person has identified, using a software learning mechanism such as a neural network.”</li> </ul> <p>Mault at [0080]</p> <ul style="list-style-type: none"> <li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code Scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode (e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer System (remote in this context meaning a computer System not carried by the person, for example a commercial Server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the database.”</li> </ul> <p>Mault at [0081]</p> <ul style="list-style-type: none"> <li>• “FIG. 12 shows an image of a barcode presented on the display <b>304</b> of PDA <b>300</b> (the PDA having data entry buttons <b>302</b>, and an image sensor <b>306</b>). Image analysis software can be used to analyze the image of the barcode, so as to determine UPC, product name, nutritional data, and the like.”</li> </ul> <p>Mault at [0082]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image Sensor <b>326</b>.”</li> </ul>

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Claim Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”</p> <p>Mault at [0090]</p> <ul style="list-style-type: none"> <li>• “Colors, shapes, printed codes, and fluorescent markers of tablets can be used to assist identification, either by a person or an [sic] software image analysis program.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>providing an indication upon recognizing the at least one object as the target object; and</p>	<p>Mault discloses providing an indication upon recognizing the at least one object as the target object.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item</li> </ul>

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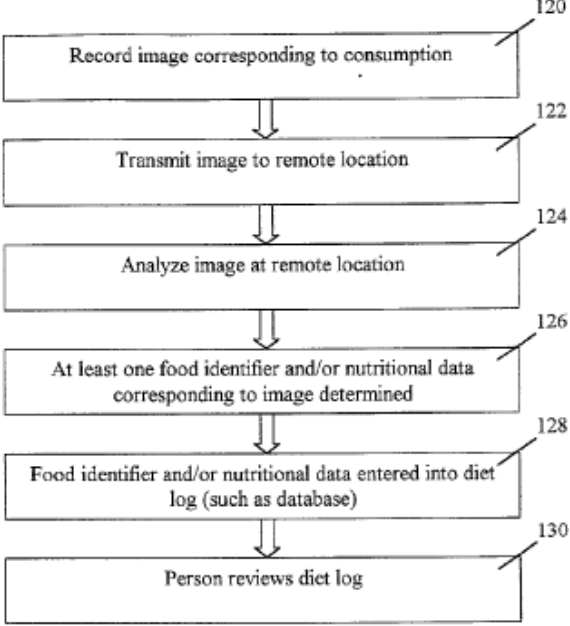
Claim Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</p> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “Box <b>124</b> corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert system, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images. Box <b>126</b> corresponds to determining food identity and/or nutritional content of the food within the image.”</li> </ul> <p>Mault at [0052]</p> <ul style="list-style-type: none"> <li>• “A diet log channel, generated by remote server (or other remote computer systems, or other content provider) <b>176</b>, and received by the set top box over communications network <b>178</b>, can be selected for display on the interactive television <b>160</b>. A display of food item identifiers, such as food names in a menu format, can be displayed on the display <b>162</b> of the interactive TV <b>160</b>. An image stored in the local memory <b>172</b> can be added to the diet log channel signal, using techniques known in the art, so that the person views the diet log channel with an embedded image of the food consumed. The person then selects items corresponding to the food consumed from the displayed menu. Selection data is generated with user input <b>146</b> (for example a keyboard) and transmitted to the set top box and to the remote server. The display is changed appropriately on receipt of the selection data by the content provider and the selection is added to the diet log of the person, which is stored in a database</li> </ul>

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		<p>associated with or otherwise accessible by the remote server <b>176.</b>”</p> <p>Mault at [0059]</p> <ul style="list-style-type: none"> <li>“For example, a person can sit down to a meal and record an image of the meal using the electronic device. The image is transmitted to a remote location where it is analyzed and converted into a caloric value. The caloric value can be transmitted back to the person, allowing the person to decide whether to eat the meal, choose another meal, or eat some portion of the meal consistent with reaching a calorie balance goal.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	presenting to a user, via an address, content information associated with the target object.	<p>Mault discloses presenting to a user, via an address, content information associated with the target object.</p> <p>Mault at Fig. 6</p>



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Claim Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 6</p> <p>Mault at [0009]</p> <ul style="list-style-type: none"> <li>“After recording the image, at a convenient later time the person can retrieve a stored image and view the image on a display. The display can be part of the imaging device, or other device such as a personal digital assistant, personal computer, Internet appliance, WebTV, e-book, tablet computer, pager, cell phone, interactive TV, spectacle mounted display, visor, and the like.”</li> </ul> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>“The identity of food items consumed can be correlated with nutritional data, for example using a nutritional database, and the nutritional data can stored</li> </ul>

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		<p>in an electronic memory so as to create a nutritional record, for example as part of a diet log.”</p> <p>Mault at [0052]</p> <ul style="list-style-type: none"> <li>• “A diet log channel, generated by remote server (or other remote computer systems, or other content provider) <b>176</b>, and received by the set top box over communications network <b>178</b>, can be selected for display on the interactive television <b>160</b>. A display of food item identifiers, such as food names in a menu format, can be displayed on the display <b>162</b> of the interactive TV <b>160</b>. An image stored in the local memory <b>172</b> can be added to the diet log channel signal, using techniques known in the art, so that the person views the diet log channel with an embedded image of the food consumed. The person then selects items corresponding to the food consumed from the displayed menu. Selection data is generated with user input <b>146</b> (for example a keyboard) and transmitted to the set top box and to the remote server. The display is changed appropriately on receipt of the selection data by the content provider and the selection is added to the diet log of the person, which is stored in a database associated with or otherwise accessible by the remote server <b>176</b>.”</li> </ul> <p>Mault at [0059]</p> <ul style="list-style-type: none"> <li>• “For example, a person can sit down to a meal and record an image of the meal using the electronic device. The image is transmitted to a remote location where it is analyzed and converted into a caloric value. The caloric value can be transmitted back to the person, allowing the person to decide whether to eat the meal, choose another meal, or eat some portion of the meal consistent with reaching a calorie balance goal.”</li> </ul> <p>Mault at [0074]</p> <ul style="list-style-type: none"> <li>• “FIG. 11 shows a PDA <b>280</b> with display <b>284</b>, buttons <b>282</b>, and imaging device <b>286</b> directed at a can of pickles <b>288</b>. The display <b>284</b> can be used to</li> </ul>

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		<p>indicate the image to be captured. A button such as <b>282</b> may be pressed to record the image. The display <b>184</b> can be used to view captured images of foods stored in the memory of the PDA, for assisting the person in creating a diet log.”</p> <p>Mault at [0082–83]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image sensor <b>326</b>. Optical character recognition software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.</li> </ul> <p>Food item identities and nutritional information can also be received from food vendors, e.g. grocery stores, on-line retailers, restaurants, vending machines, diet food retailers, etc. The PDA may prompt the person to identify the source of the food being imaged, and this information can be used to help in identification.”</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**2. Claim 6**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
6	The method of claim 1, wherein the mobile device comprises a camera capable of at least one of image and video capture.	<p>Mault discloses the mobile device comprises a camera capable of at least one of image and video capture.</p> <p>Mault at [0052]</p> <ul style="list-style-type: none"> <li>• “FIG. 7 shows an electronic device <b>140</b> comprising a processor <b>142</b>, an image sensor <b>144</b>, data entry mechanism <b>146</b>, memory <b>148</b>, clock <b>150</b>, and wireless transmission unit <b>152</b>.”</li> <li>• “A diet log channel, generated by remote server (or other remote computer systems, or other content provider) <b>176</b>, and received by the set top box over communications network <b>178</b>, can be selected for display on the interactive television <b>160</b>. A display of food item identifiers, such as food names in a menu format, can be displayed on the display <b>162</b> of the interactive TV <b>160</b>. An image stored in the local memory <b>172</b> can be added to the diet log channel signal, using techniques known in the art, so that the person views the diet log channel with an embedded image of the food consumed. The person then selects items corresponding to the food consumed from the displayed menu. Selection data is generated with user input <b>146</b> (for example a keyboard) and transmitted to the set top box and to the remote server. The display is changed appropriately on receipt of the selection data by the content provider and the selection is added to the diet log of the person, which is stored in a database associated with or otherwise accessible by the remote server <b>176</b>.”</li> </ul>

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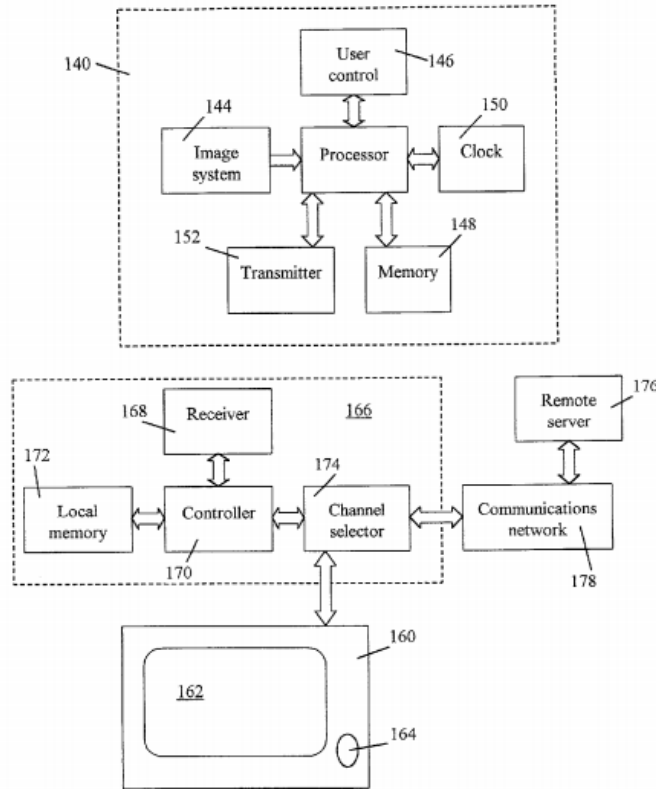


Figure 7

To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in

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		<p>the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 18**

<b>Claim</b>	<b>'004 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
18	<p>The method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.</p>	<p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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### **Exhibit A-5**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

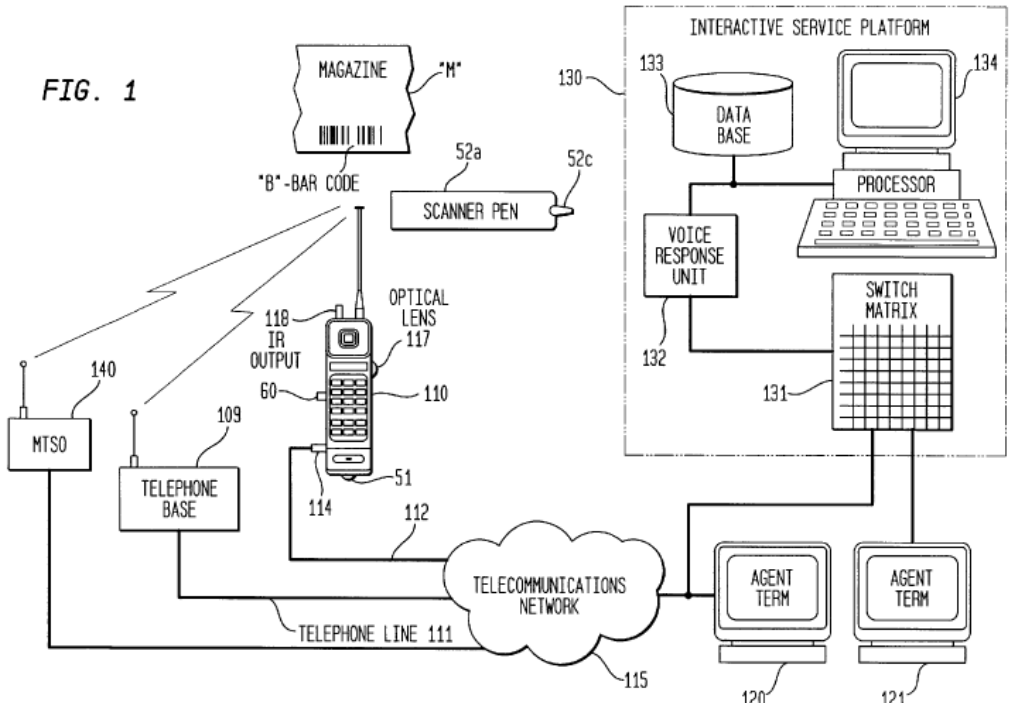
On information and belief, the application that matured into Sizer was filed on March 28, 1997. Sizer published at least as of March 14, 2000, and is available as prior art at least under 35 U.S.C. § 102(a), (b) and (e).

As shown in the chart below, Sizer anticipates asserted claims 1, 6, and 18 of the ’004 Patent. To the extent Sizer is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Sizer is found not to anticipate any asserted claims or claim elements of the ’004 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'004 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for processing a video stream, comprising:	<p>Sizer discloses a method for processing a video stream.</p> <p>Sizer at FIG. 1</p> 
[1A]	analyzing, via a mobile device, a scene represented by the video stream for at least one object;	Sizer discloses analyzing, via a mobile device, a scene represented by the video stream for at least one object.



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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at FIG. 1</p> <p>FIG. 1</p> <p>Sizer at FIG. 2</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 2</b></p> <p>Sizer at 5:3-20</p> <ul style="list-style-type: none"> <li>“Briefly, it was found using a spectrum analyzer on a typical video signal, that there are comparatively large frequency components at the line rate and at the frame rate and its harmonics, but that between these frequencies, there are other frequency bands in which little information is carried. One such frequency band is between 15 and 30 kHz. By adding a low level carrier signal or tone at a frequency in this band, say 25 kHz, the video image is not degraded, but a properly tuned decoder can receive and decode the encoded information. In this way, digital information can be subliminally inserted in a video signal by adding to the video signal an amplitude shift</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>keyed (ASK) or frequency shift keyed (FSK) carrier signal, and the digital information can later be recovered using ASK or FSK decoding. Encoded data can also be inserted in a television signal and recovered by a receiver that responds to the picture displayed on the television, in the manner described in U.S. Pat. No. 4,807,031 cited above.”</p> <p>Sizer at 5:23-26</p> <ul style="list-style-type: none"> <li>• “If any non-discernible encoded data is part of a video signal, such sensing takes the form of light from display area being collected by an optical lens 117.”</li> </ul> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	deriving at least one characteristic of the video stream;	<p>Sizer discloses deriving at least one characteristic of the video stream.</p> <p>Sizer at 6:42-47</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</li> </ul> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream;	<p>Sizer discloses recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream.</p> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>Sizer at 11:11-15</p> <ul style="list-style-type: none"> <li>• In accordance with one optional arrangement of the present invention, when data is captured and stored in step 507, they newly collected data is compared with previously stored data. When a match is found, any duplicate data is dropped. In addition, the information in various fields is examined, to assure that the data captured is in the appropriate format. If an</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>error is detected in any data, the information may be deleted, and "new" data collected. This is accomplished by repeating capture step 507 several times.</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>providing an indication upon recognizing the at least one object as the target object; and</p>	<p>Sizer discloses providing an indication upon recognizing the at least one object as the target object.</p> <p>Sizer at 6:30-38</p> <ul style="list-style-type: none"> <li>• For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.</li> </ul> <p>Sizer at 7:12-15</p> <ul style="list-style-type: none"> <li>• “The captured data may also be displayed on a display 225, such as a liquid crystal display, so that a user will be aware of exactly what</li> </ul>



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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>information was captured.”</p> <p>Sizer at 7:42-46</p> <ul style="list-style-type: none"> <li>• “When the data has been captured, the microprocessor 220 may control the display 225 to actually display some or all of the data, so that the user can be aware of information that had been subliminal and indiscernible. The display can also indicate that the device is ‘aimed’ correctly.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	presenting to a user, via an address, content information associated with the target object.	<p>Sizer discloses presenting to a user, via an address, content information associated with the target object.</p> <p>Sizer at FIG. 1</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 1</b></p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>“If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</p> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"> <li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li> </ul> <p>Sizer at 10:59-63</p> <ul style="list-style-type: none"> <li>• After the call has been originated, a determination is made in step 515 that the call has been answered and that the SEND DATA button 243 has been pushed. (Until the SEND DATA button is activated, capture device 110 may be in a "wait state" 517.). When a positive result occurs in step 515, information contained in fields 403-411 is transmitted to the called destination in step 519. As stated previously, from the point of view of the called party, the information received includes details concerning the advertised product, the identity of the caller, and other information associated with the item that was initially displayed or mentioned on the television program. Advantageously, the advertiser will know more about their customer that ever before. This is because the advertiser will be able to determine from the transmitted information which advertisement draw the business, how long it took the caller to respond to the ad, and the</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>geographic location of the callers, based upon ANI or called ID. It will be easy to tell which ads in a campaign are most successful.</p> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"> <li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to effectuate a transaction.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 6**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
6	The method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.	<p>Sizer discloses the at least one object is identified as the target object based at least in part on at least one user input.</p> <p>Sizer at 9:47-53</p> <ul style="list-style-type: none"> <li>• Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental</li> </ul>

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		<p>information may include credit card or other billing information pertaining to the user, as an example.</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"><li>• “In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li></ul> <p>Sizer at 10:38-49</p> <ul style="list-style-type: none"><li>• “The user of capture device 110 determines that the appropriate data has been captured by reviewing the information seen in display 225. After the captured data has been reviewed and determined to be correct, activation of the DIAL button 242 on the portable capture device 110 in step 509 initiates step 513, by which stored dialing and/or routing information, illustratively in field 401 of FIG. 4, is recalled from memory 221. A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130. The call may be a local or long distance call made using a "plain old telephone service" (POTS) line; alternatively, a toll-free call may be launched using an 800 number. Desirably, automatic number identification (ANI), called ID, and other features</li></ul>
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		<p>available in the telecommunications network may be used to provide additional information to the called party, in addition to the captured data that is transmitted in succeeding steps in the process. Until the DIAL button is activated, capture device 110 may be in a "wait state" 511.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 18**

<b>Claim</b>	<b>'004 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
18	The method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.	Sizer discloses communicating at least one of banking account information, user data and terminal specific data to a banking company.  Sizer at 9:33-53 <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information</li> </ul>

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		<p>needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 12:62-13:12</p> <ul style="list-style-type: none"><li>• In accordance with the present invention, a capture device now can initiate a transaction by capturing transaction data from marks contained on an object, such as a magazine advertisement, where the marks have embedded therein a code corresponding to transaction data for initiating a transaction. The capture device includes a scanner, operable by a user, for reading marks contained on the object and a controller for interpreting the marks and retrieving transaction data embedded in the marks. Through associated apparatus as described above, a telephone call can be originated by information contained in the transaction data in at least a portion of the transaction data transferred to a desired destination for initiating a transaction. As a result, it is now possible now for magazines, newspapers, printed media and many other objects to contain marks relating to an advertisement or solicitation which can be easily scanned and a transaction completed to the vendor of the advertisement or solicitation. This saves much time and allows easier access to services and products.</li></ul>
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		<p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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### **Exhibit A-6**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Harris was filed on July 18, 2000. Harris published at least as of December 23, 2003, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Harris anticipates asserted claims 1, 2, 3, 6, 11, 15, 18 of the ’004 Patent. To the extent Harris is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Harris is found not to anticipate any asserted claims or claim elements of the ’004 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

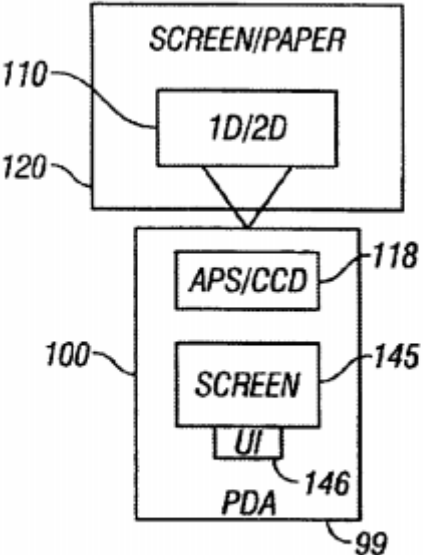
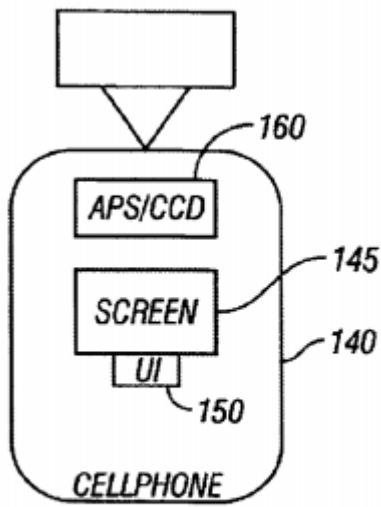
The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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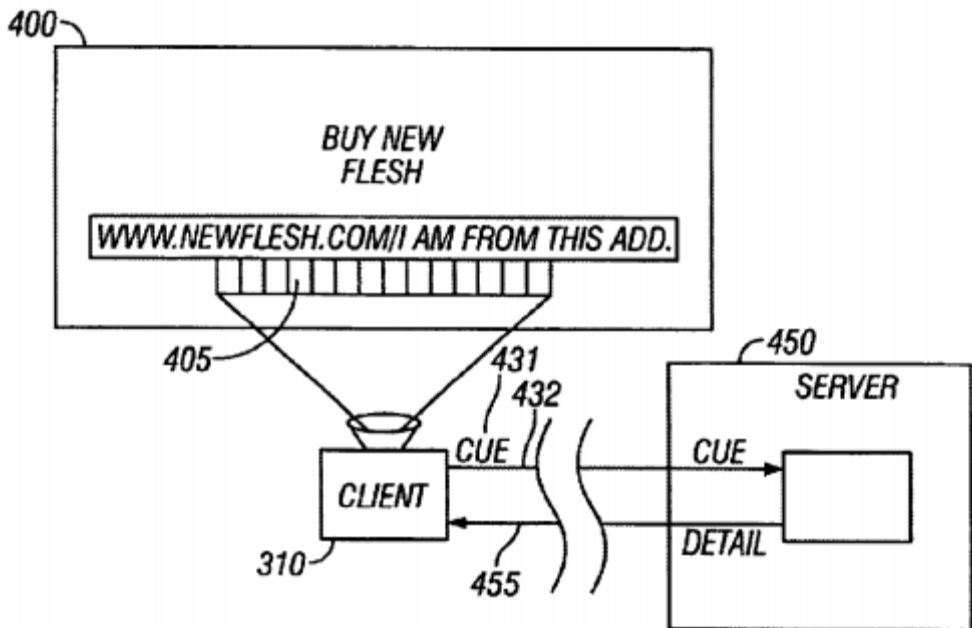
**1. Claim 1**

Element	'004 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for processing a video stream, comprising:	Harris discloses a method:  Harris at 2: 3-14 “The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using a personal digital assistant 100 as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99.”
[1A]	analyzing, via a mobile device, a scene represented by the video stream for at least one object;	Harris discloses analyzing, via a mobile device, a scene represented by the video stream for at least one object.  Harris at FIG. 1A and FIG. 1B

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> </div> <p>Harris at 2: 3-14</p> <ul style="list-style-type: none"> <li>“The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using a personal digital assistant 100 as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99.”</li> </ul> <p>Harris at FIG. 4</p>

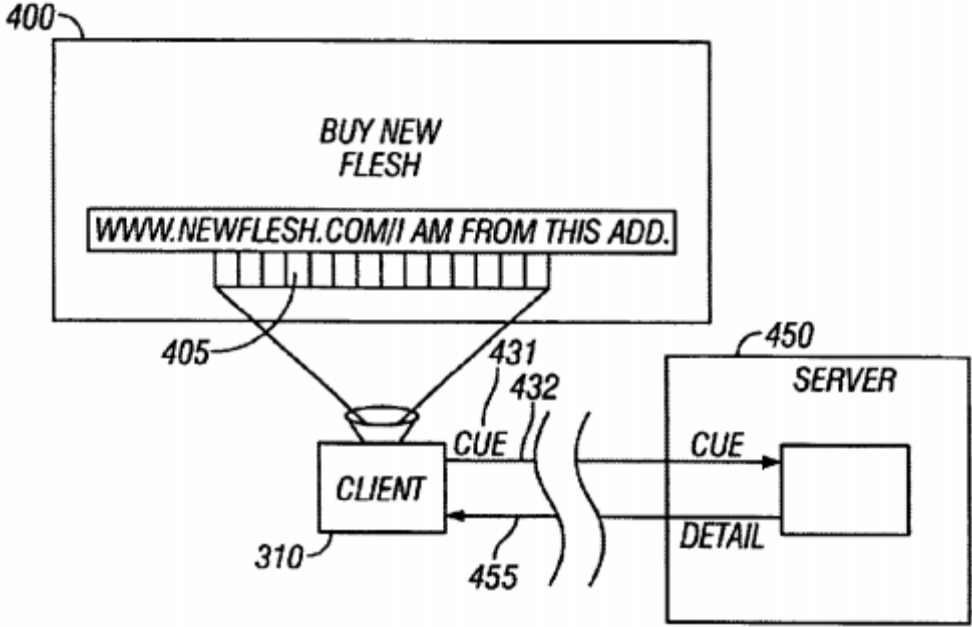
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4: 9-15</p> <ul style="list-style-type: none"> <li>“Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here an advertisement. The advertisement can be a print advertisement, a television advertisement, or an Internet advertisement for example.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate</p>

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		this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B]	deriving at least one characteristic of the video stream;	Harris discloses deriving at least one characteristic of the video stream.  Harris at FIG. 4

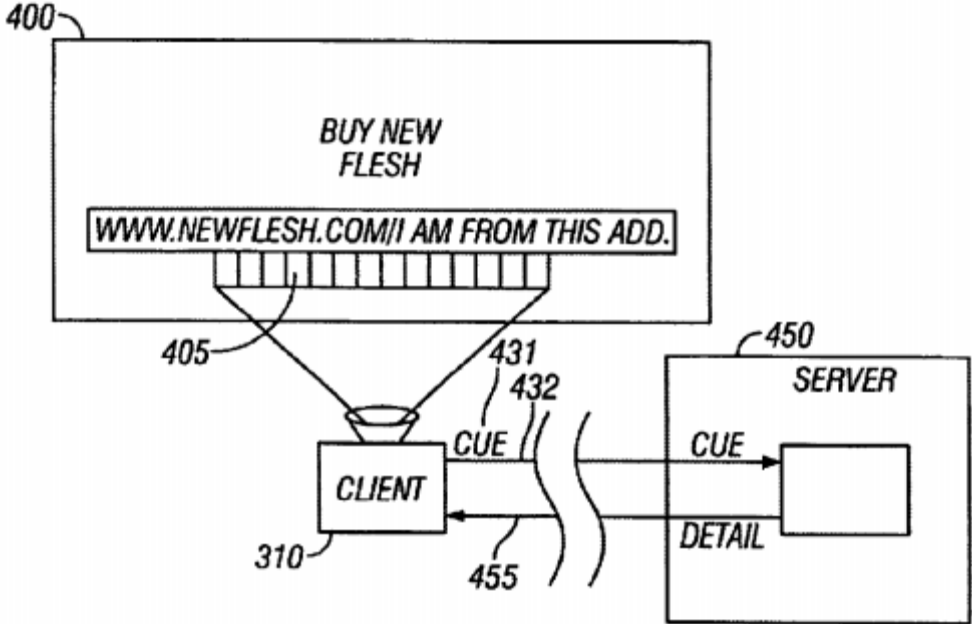
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>“The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement. In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream;	<p>Harris discloses recognizing at least one object in the scene as a target object based at least in part on the at least on characteristic of the video stream.</p> <p>Harris at FIG. 4</p>

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 Central District of California, No. 2:20-cv-7872  
 Invalidity Chart for U.S. Patent 9,324,004 based on  
 U.S. Patent No. 6,666,377 to Harris (“Harris”)

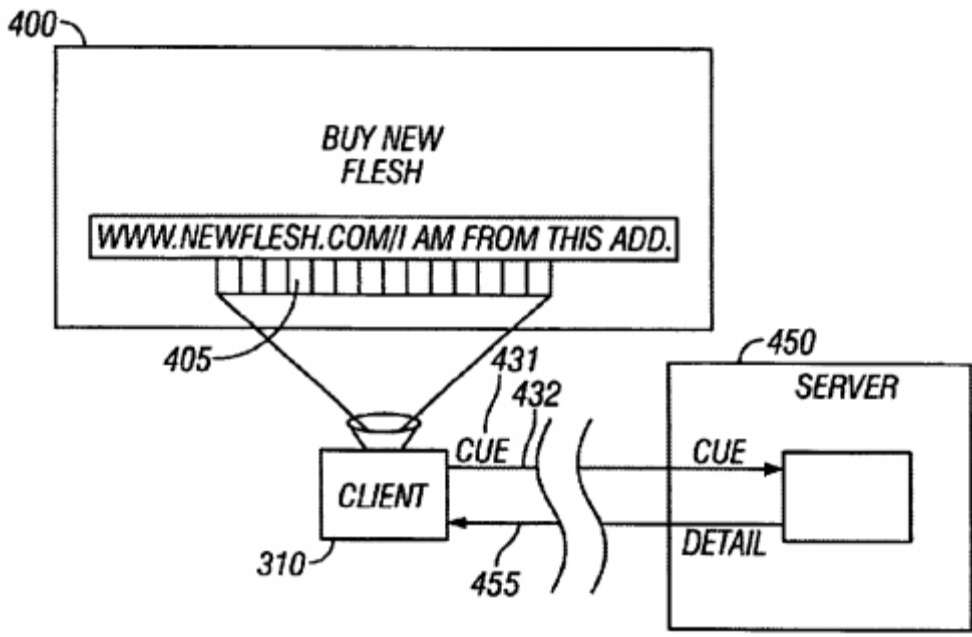
Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>“The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement. In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent</li> </ul>



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		<p>ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>providing an indication upon recognizing the at least one object as the target object; and</p>	<p>Harris discloses providing an indication upon recognizing the at least one object as the target object.</p> <p>Harris at FIG. 4</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:30-40</p> <ul style="list-style-type: none"> <li>“The contents are automatically input into the client. The contents can directly represent that information, in which case the information is input into the client. For example, the information can directly represent the ASCII information indicating the website. Alternatively, the information can represent a pointer to a database, e.g. a publicly available database. This database can later be accessed as part of an information transfer. For example, Palm systems enable a hot sync where the portable computer is synced with another computer that is running hot sync software.”</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	<p>presenting to a user, via an address, content information associated with the target object.</p>	<p>Harris discloses presenting to a user, via an address, content information associated with the target object.</p> <p>Harris at FIG. 4</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate</p>

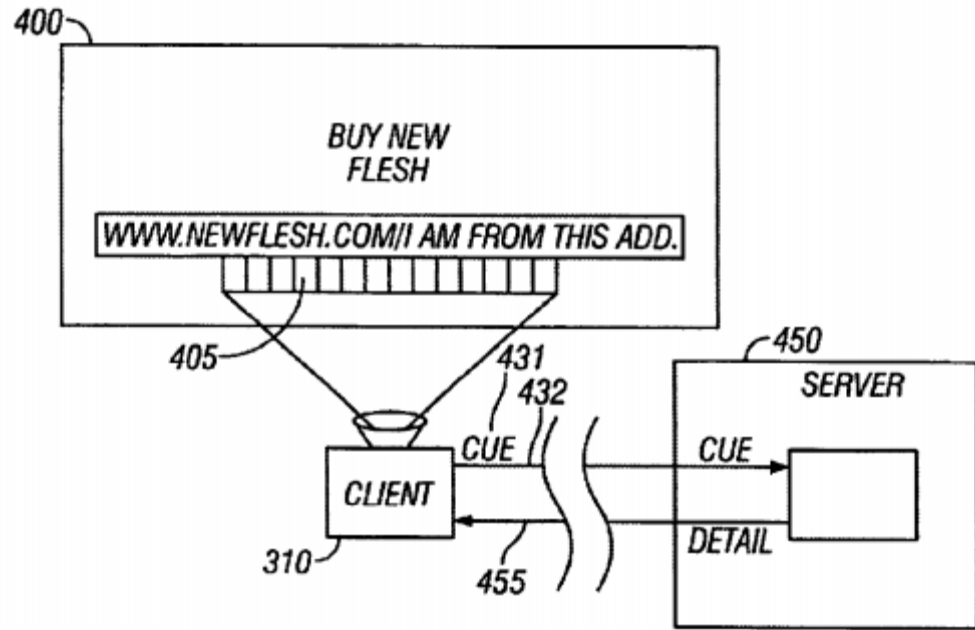
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

**2. Claim 6**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
6	The method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.	Harris discloses the method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.  Harris at FIG. 4

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**FIG. 4**

Harris at 4:15-30

- “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.  
In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a

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		<p>zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 18**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
18	The method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.	To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit A-11**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Ehrhart was filed on July 13, 2001, claiming the priority date of July 13, 2001. Ehrhart published at least as of April 20, 2004, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Ehrhart anticipates asserted claims 1, 6, 18 of the ’004 Patent. To the extent Ehrhart is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Ehrhart is found not to anticipate any asserted claims or claim elements of the ’004 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.



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**1. Claim 1**

Element	'004 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for processing a video stream, comprising:	Ehrhart discloses a method for processing a video stream.  Ehrhart at Abstract. <ul style="list-style-type: none"> <li>• “The present invention relates to an optical reader that includes a color imaging assembly that generates color imaging data. An image analysis circuit determines if the acquired image should be characterized as a color photograph or as including a graphical symbol. A processing circuit processes the imaging data based on the image analysis circuit's determination of whether the image is a graphical symbol or a color photograph. The present invention allows a user to acquire and process both color images and graphical symbols, such as bar codes, text, OCR symbols or signatures. The optical reader of the present invention is also configured to associate an acquired image with at least one other acquired image.”</li> </ul> Ehrhart at 2:62-64. <ul style="list-style-type: none"> <li>• “In another aspect, the present invention includes a method for acquiring an image of an object with an optical reader.”</li> </ul>
[1A]	analyzing, via a mobile device, a scene represented by the video stream for at least one object;	Ehrhart discloses analyzing, via a mobile device, a scene represented by the video stream for at least one object.  <i>Id.</i> at [1Pre].  Ehrhart at 1:57-2:16.

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “The optical reader of the present invention automatically, or through manual Selection, determines whether a captured image is a color photographic image or, a color image that includes a graphical Symbol. Subsequently, the optical reader of the present invention processes the acquired imaging data in accordance with that determination. The optical reader of the present invention is operative to acquire and associate a plurality of acquired images.</li> </ul> <p>One aspect of the present invention is an optical reader. The optical reader includes a color imaging assembly for acquiring an image of an object, the color imaging assembly generating imaging data corresponding to the image. An image analysis circuit is coupled to the color imaging assembly. The image analysis circuit being configured to determine if the color imaging data includes at least one graphical Symbol. The image is classified as a graphical Symbol, or the image is classified as a color photograph if the color imaging data does not include at least one graphical Symbol. A processing circuit is coupled to the image analysis circuit. The processing circuit is operative to process the imaging data based on the determination.</p> <p>In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for converting the image of the object into color digital data corresponding to the image.”</p> <p>Ehrhart at 11:46-12:18</p> <ul style="list-style-type: none"> <li>• “As embodied herein and depicted in FIG. 8, a flow chart showing a method for performing the 1D autodiscrimination of step 702 in FIG. 7 is disclosed. In step 800 processor 40 calculates the activities of selected image data elements. The activity is defined as a measure of the rate of change of the image data over a small two-dimensional portion of the region surrounding the selected data element. In one embodiment, the activity is calculated along any two arbitrarily selected directions which are orthogonal one to the other. Two</li> </ul>

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		<p>mutually perpendicular directions are used because the orientation of the symbol is unknown. In step 802, processor 40 looks for “high activity” regions. These high activity regions are referred to as candidate symbol regions(CSRs). A high activity region indicates a transition from a black region to a white region, or vice-versa. If there is more than one CSR, it may indicate the presence of more than one bar code symbol. In step 804, processor 40 selects the largest CSR. In step 806, processor 40 calculates the centroid of the largest CSR. Subsequently, processor 40 finds the direction of the highest activity in the largest CSR. In a 1D bar code, this will be the direction perpendicular to the direction of the bars. In steps 810 and 812, processor defines the initial scan line(SC=0), as being the scan line bisecting the centroid of the bar code. Processor calculates the brightness values of sampling points along the initial scan line. These brightness values are converted to digital data in step 816. In decoding step 818, processor 40 applies one 1D decoding program after another. If decoding is unsuccessful, processor 40 checks if the entire CSR has been scanned. If not, it establishes a new scan line, and repeats the decoding process. If in step 822, the entire CSR has been scanned, and there are no CSRs remaining to be decoded, processor 40 exits the routine. If in step 820, 1D decoding is successful, processor 40 determines if the symbol is a 1D stacked symbol. If it is a 1D stacked symbol, processor 40 scans and decodes the remaining CSRs in the stacked symbol. If it is not a stacked symbol, the decoded 1D data is stored or output to display 60 in step 830. In step 838, processor 40 determines if there any unexamined regions. If there are unexamined regions, the decoding process is repeated. Otherwise, processor 40 exits the routine.”</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>deriving at least one characteristic of the video stream;</p>	<p>Ehrhart discloses deriving at least one characteristic of the video stream.</p> <p><i>Id.</i> at [1Pre-A].</p> <p>Ehrhart at 2:26-42:</p> <ul style="list-style-type: none"> <li>• “In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for capturing the image as color imaging data. A classification circuit is coupled to the color imaging assembly, the classification circuit being configured to process at least a portion of the color imaging data to thereby Select one of a plurality of classifications, whereby the image is classified as a color photographic image, or as an image that includes at least one graphical Symbol. An automatic mode Selector is coupled to the classification circuit, the automatic mode Selector being configured to Select an optical reader mode in accordance with the Selected classification. A processor is coupled to the classification circuit, the processor being programmed to process the color imaging data in accordance with the optical reader mode Selected by the automatic mode Selector.”</li> </ul> <p>Ehrhart at 5:36-50:</p> <ul style="list-style-type: none"> <li>• “In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image</li> </ul>

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		<p>includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.”</p> <p>Ehrhart at 11:46-12:18.</p> <ul style="list-style-type: none"> <li>• “As embodied herein and depicted in FIG. 8, a flow chart showing a method for performing the 1D autodiscrimination of step 702 in FIG. 7 is disclosed. In step 800 processor 40 calculates the activities of selected image data elements. The activity is defined as a measure of the rate of change of the image data over a small two-dimensional portion of the region surrounding the selected data element. In one embodiment, the activity is calculated along any two arbitrarily selected directions which are orthogonal one to the other. Two mutually perpendicular directions are used because the orientation of the symbol is unknown. In step 802, processor 40 looks for “high activity” regions. These high activity regions are referred to as candidate symbol regions(CSRs). A high activity region indicates a transition from a black region to a white region, or vice-versa. If there is more than one CSR, it may indicate the presence of more than one bar code symbol. In step 804, processor 40 selects the largest CSR. In step 806, processor 40 calculates the centroid of the largest CSR. Subsequently, processor 40 finds the direction of the highest activity in the largest CSR. In a 1D bar code, this will be the direction perpendicular to the direction of the bars. In steps 810 and 812, processor defines the initial scan line(SC=0), as being the scan line bisecting the centroid of the bar code. Processor calculates the brightness values of sampling points along the initial scan line. These brightness values are converted to digital data in step 816. In decoding step 818, processor 40 applies one 1D decoding program after another. If decoding is unsuccessful, processor 40 checks if the entire CSR has</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>been scanned. If not, it establishes a new scan line, and repeats the decoding process. If in step 822, the entire CSR has been scanned, and there are no CSRs remaining to be decoded, processor 40 exits the routine. If in step 820, 1D decoding is successful, processor 40 determines if the symbol is a 1D stacked symbol. If it is a 1D stacked symbol, processor 40 scans and decodes the remaining CSRs in the stacked symbol. If it is not a stacked symbol, the decoded 1D data is stored or output to display 60 in step 830. In step 838, processor 40 determines if there any unexamined regions. If there are unexamined regions, the decoding process is repeated. Otherwise, processor 40 exits the routine.”</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream;	<p>Ehrhart discloses recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristics of the video stream.</p> <p><i>Id.</i> at [1Pre-B].</p> <p>Ehrhart at 8:36-49.</p> <ul style="list-style-type: none"> <li>• “In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.”</p> <p>Ehrhart at 10:5-20.</p> <ul style="list-style-type: none"> <li>• “If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.”</li> </ul> <p>Ehrhart at 11:46-12:18.</p> <ul style="list-style-type: none"> <li>• “As embodied herein and depicted in FIG. 8, a flow chart showing a method for performing the 1D autodiscrimination of step 702 in FIG. 7 is disclosed. In step 800 processor 40 calculates the activities of selected image data elements. The activity is defined as a measure of the rate of change of the image data over a small two-dimensional portion of the region surrounding the selected</li> </ul>

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		<p>data element. In one embodiment, the activity is calculated along any two arbitrarily selected directions which are orthogonal one to the other. Two mutually perpendicular directions are used because the orientation of the symbol is unknown. In step 802, processor 40 looks for “high activity” regions. These high activity regions are referred to as candidate symbol regions(CSRs). A high activity region indicates a transition from a black region to a white region, or vice-versa. If there is more than one CSR, it may indicate the presence of more than one bar code symbol. In step 804, processor 40 selects the largest CSR. In step 806, processor 40 calculates the centroid of the largest CSR. Subsequently, processor 40 finds the direction of the highest activity in the largest CSR. In a 1D bar code, this will be the direction perpendicular to the direction of the bars. In steps 810 and 812, processor defines the initial scan line(SC=0), as being the scan line bisecting the centroid of the bar code. Processor calculates the brightness values of sampling points along the initial scan line. These brightness values are converted to digital data in step 816. In decoding step 818, processor 40 applies one 1D decoding program after another. If decoding is unsuccessful, processor 40 checks if the entire CSR has been scanned. If not, it establishes a new scan line, and repeats the decoding process. If in step 822, the entire CSR has been scanned, and there are no CSRs remaining to be decoded, processor 40 exits the routine. If in step 820, 1D decoding is successful, processor 40 determines if the symbol is a 1D stacked symbol. If it is a 1D stacked symbol, processor 40 scans and decodes the remaining CSRs in the stacked symbol. If it is not a stacked symbol, the decoded 1D data is stored or output to display 60 in step 830. In step 838, processor 40 determines if there any unexamined regions. If there are unexamined regions, the decoding process is repeated. Otherwise, processor 40 exits the routine.”</p> <p>Ehrhart at 13:1-9.</p> <ul style="list-style-type: none"> <li>• “As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present</li> </ul>



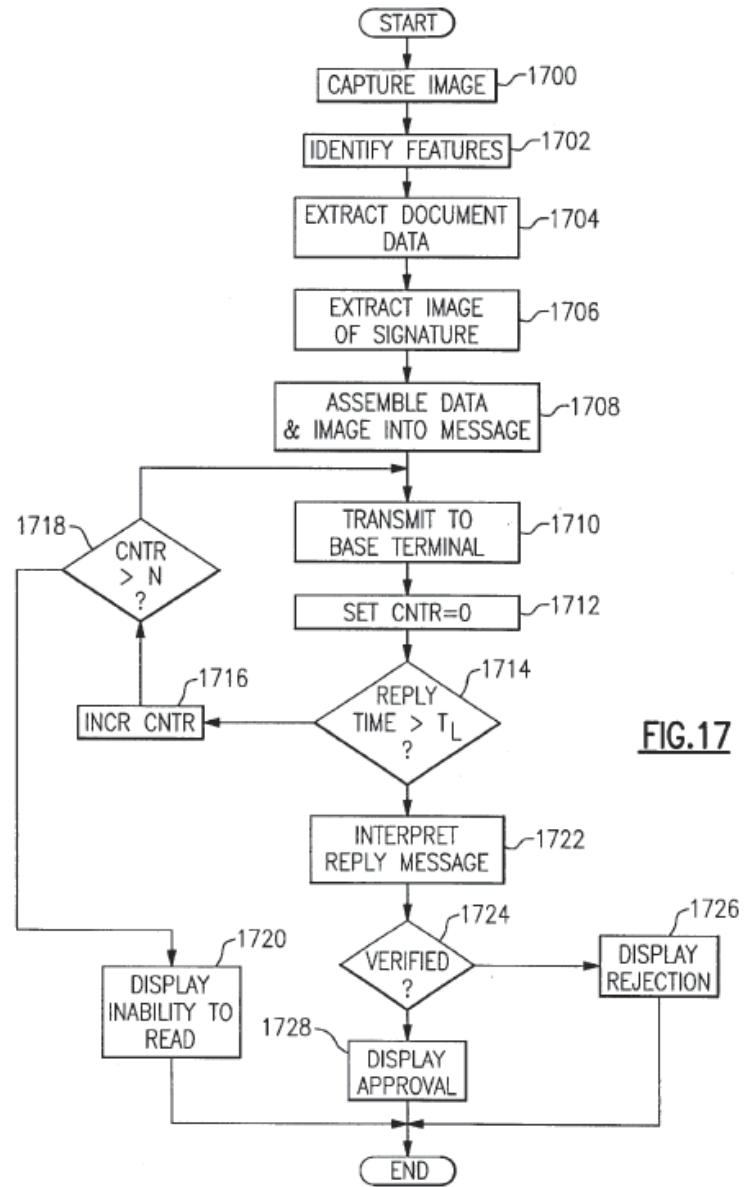
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.”</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>providing an indication upon recognizing the at least one object as the target object; and</p>	<p>Ehrhart discloses providing an indication upon recognizing the at least on object as the target object.</p> <p><i>Id.</i> at [1Pre-C].</p> <p>Ehrhart at 8:58-62:</p> <ul style="list-style-type: none"> <li>• “The user may also click on OCR/Text icon 660. Clicking icon 660 provides the user with a check validation mode, a text scanning mode, or a bi-tonal image capture mode. The check validation mode is performed in conjunction with network services.”</li> </ul> <p>Ehrhart at 8:64-9:10:</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"><li>• “In one embodiment, this mode includes a Signature verification program wherein the user may select between a Static verification or a dynamic verification. In the Static mode, the user captures the image of a Signature. The captured image is compared with a reference image Stored in a remote database. In the dynamic mode, optical reader 10 uses the Stylus and Signature block to capture the Signature. In this mode, Signature block 62 measures unique dynamic parameters, Such as applied pressure, direction and timing of movements, or a combination of these parameters. One of ordinary skill in the art will recognize that this list is not meant to be all-inclusive, but rather, is a representative example. The captured dynamic parameters are compared with a reference data Stored in a remote database.”</li></ul> <p>Ehrhart at Fig. 17.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	<p>presenting to a user, via an address, content information associated with the target object.</p>	<p>Ehrhart discloses presenting to a user, via an address, content information associated with the target object.</p> <p><i>Id.</i> at [1Pre-D].</p> <p>Ehrhart at 13:27-43.</p> <ul style="list-style-type: none"> <li>• “As embodied herein and depicted in FIG. 13, an example of image association in accordance with the present invention is disclosed. One or ordinary skill in the art will recognize that associated images 1300 can be disposed on paper, displayed electronically on display 60, or displayed electronically sing other electronic means, such as a computer monitor. In this example, the first image captured is color photograph 1302 which shows a damaged parcel. The second image captured is bar code 1304 affixed to the side of the damaged parcel. Processor 40 decodes bar code 1304 and associates decoded bar code data 1306 with color photograph 1302. In this example, the user elected to associate a third image, signature 1308. Thus, personnel viewing record 1300 may reasonably conclude that a damaged parcel was delivered to Company XYZ, </li> </ul>

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		<p>and that the person signing for the parcel delivery was someone named John W. Smith.”</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**2. Claim 6**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
6	<p>The method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.</p>	<p>Ehrhart discloses the method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.</p> <p><i>Id.</i> at [1].</p> <p>Ehrhart at 10:40-50.</p> <ul style="list-style-type: none"> <li>• “In steps 520, 522, 526, and 532, the user is given the opportunity to select the type of graphical imaging that is to be performed. The method for performing OCR, text capture, and signature capture and/or verification are discussed above in the automatic mode description with one difference. In the semi-automatic mode, the user is asked in step 538 if he desires to associate the processed image with a subsequent captured image. If so, process flow is directed back to step 508 and another image is captured and displayed. The association feature can be used several times to associate multiple images.”</li> </ul> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**3. Claim 18**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
18	<p>The method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.</p>	<p>Ehrhart discloses the method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.</p> <p><i>Id.</i> at [1].</p> <p>Ehrhart at 15:1-21.</p> <ul style="list-style-type: none"> <li>• “As embodied herein and depicted in FIG. 17, a flow chart showing a method for performing signature verification is disclosed. In step 1700, optical reader 10 captures the image of the document to thereby generate a bit-map of the image. One of ordinary skill in the art will recognize that in the automatic mode or semi-automatic mode, processor 40 determines that the image object is a graphical symbol in a subsequent step. Step 1202 is similar to steps 1002 and 1004 of FIG. 10. The image is sampled by analyzing every Nth scan line of the bit mapped image. As discussed above, the image must be scanned in such a way so as to provide sufficient resolution to locate and classify the various regions on the document. In the case of a check, the location of the various fields on the instrument are relatively standard. Check sizes may differ somewhat, but the check number, bank code, account number, date, signature block, and etc. are in the same relative locations from check to check. In step 1704, document data such as the name, check number, bank code, account number, and date, are extracted from the document using any OCR program and stored in memory. In step 1706, the image of the hand writing in the signature block is captured.”</li> </ul> <p>Ehrhart at 16:19-31.</p> <ul style="list-style-type: none"> <li>• “PAN 1850 includes at least one color optical reader 10 coupled to point-of-sale (POS) terminal 1854. POS terminal 1854 is coupled to network 1810 via interface 182. POS terminal 1854 includes a credit card reader and a</li> </ul>

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		<p>signature capture block. In the scenario depicted in FIG. 18, a merchant user of POS terminal 1854 transmits an associated customer credit card number, signature, and in one embodiment, a color image of the customer, to Center 1830. Authentication module 1840 is used to authenticate the credit card and signature verification module is used to authenticate the signature. In another embodiment, database 1836 is used to store the customer's image, credit card number, and signature for verification purposes.”</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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### **Exhibit A-18**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Krouse was filed on June 13, 1997, claiming the priority date of June 13, 1997. Krouse published at least as of August 1, 2000, and is available as prior art at least under 35 U.S.C. § 102(a).

As shown in the chart below, Krouse anticipates asserted claims 1, 2, 3, 6, 11, 15, 18 of the ’004 Patent. To the extent Krouse is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Krouse is found not to anticipate any asserted claims or claim elements of the ’004 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'004 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for processing a video stream, comprising:	<p>Krouse discloses a method for processing a video stream.</p> <p>Krouse at 1:4-12:</p> <ul style="list-style-type: none"> <li>• “The present invention relates generally to financial transaction processing Systems and methods, and more. Specifically, to Such Systems and methods wherein at least one document containing financial transaction-related information is optically Scanned to generate at least one computer-readable image from which the information may be extracted for use in processing the transaction.</li> </ul> <p>Krouse at 6:4-34:</p> <ul style="list-style-type: none"> <li>• “Each of the terminals 18, 20, 22 includes an optical Scanner 34 for Scanning negotiable instrument documents, (exemplified by check 110 shown in FIG. 6) tendered at point of Sale in payment for goods or Services provided by the merchant or retailer associated with that point of Sale, to generate respective computer-readable Scanned images of the documents. Preferably, Scanner 34 comprises a conventional monotonal image Scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor 40 to scan one or both sides of a document 110 placed in the scanner 34.</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been</p>

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		motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1A]	analyzing, via a mobile device, a scene represented by the video stream for at least one object;	Krouse discloses analyzing, via a mobile device, a scene represented by the video stream for at least one object.  <i>Id.</i> at [1Pre].  Krouse at 1:4-12: <ul style="list-style-type: none"> <li>• “The present invention relates generally to financial transaction processing Systems and methods, and more. Specifically, to Such Systems and methods wherein at least one document containing financial transaction-related information is optically Scanned to generate at least one computer-readable image from which the information may be extracted for use in processing the transaction.</li> </ul> Krouse at 6:4-34: <ul style="list-style-type: none"> <li>• “Each of the terminals 18, 20, 22 includes an optical Scanner 34 for Scanning negotiable instrument documents, (exemplified by check 110 shown in FIG. 6) tendered at point of Sale in payment for goods or Services provided by the merchant or retailer associated with that point of Sale, to generate respective computer-readable Scanned images of the documents. Preferably, Scanner 34 comprises a conventional monotonal image Scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor 40 to scan one or both sides of a document 110 placed in the scanner 34.</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>deriving at least one characteristic of the video stream;</p>	<p>Krouse discloses deriving at least one characteristic of the video stream.</p> <p>Krouse at 1:4-12:</p> <ul style="list-style-type: none"> <li>• “The present invention relates generally to financial transaction processing Systems and methods, and more. Specifically, to Such Systems and methods wherein at least one document containing financial transaction-related information is optically Scanned to generate at least one computer-readable image from which the information may be extracted for use in processing the transaction.</li> </ul> <p>Krouse at 4:27-39:</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of the second aspect of the present invention includes an optical Scanner for generating a Scanned image of at least a portion of the document containing the Visual representation. An image characterization generator is provided for generating recognition characteristics from the Scanned image, and a recognition characteristic comparitor is provided for comparing the recognition characteristics to respective Sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and</li> </ul>

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		<p>for determining therefrom whether the particular format of the Visual data on the Scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the Scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the Visual data. OCR is then applied by an image processor to this location to generate the Visual data for use in processing the transaction.”</p> <p>Krouse at 4:40-57:</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the method according to the Second aspect of the present invention includes generating an optically Scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the Scanned image and are compared to respective Sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When Such a match is found to exist, location is determined of a field in the Scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the Visual data. Optical character recognition is then utilized to generate Said Visual data from Said location.”</li> </ul> <p>Krouse at 6:4-34:</p> <ul style="list-style-type: none"> <li>• “Each of the terminals 18, 20, 22 includes an optical Scanner 34 for Scanning negotiable instrument documents, (exemplified by check 110 shown in FIG. 6) tendered at point of Sale in payment for goods or Services provided by the merchant or retailer associated with that point of Sale, to generate respective</li> </ul>

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		<p>computer-readable Scanned images of the documents. Preferably, Scanner 34 comprises a conventional monotonal image Scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor 40 to scan one or both sides of a document 110 placed in the scanner 34.</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream;	<p>Krouse discloses recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream.</p> <p><i>Id.</i> at [1Pre-B].</p> <p>Krouse at 1:4-12:</p> <ul style="list-style-type: none"> <li>• “The present invention relates generally to financial transaction processing Systems and methods, and more. Specifically, to Such Systems and methods wherein at least one document containing financial transaction-related information is optically Scanned to generate at least one computer-readable image from which the information may be extracted for use in processing the transaction.</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Krouse at 4:27-39:</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of the second aspect of the present invention includes an optical Scanner for generating a Scanned image of at least a portion of the document containing the Visual representation. An image characterization generator is provided for generating recognition characteristics from the Scanned image, and a recognition characteristic comparitor is provided for comparing the recognition characteristics to respective Sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the Visual data on the Scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the Scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the Visual data. OCR is then applied by an image processor to this location to generate the Visual data for use in processing the transaction.”</li> </ul> <p>Krouse at 4:40-57:</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the method according to the Second aspect of the present invention includes generating an optically Scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the Scanned image and are compared to respective Sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When Such a match is found to exist, location is determined of a field in the Scanned image to which optical character recognition may be applied to generate therefrom the</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>information, based upon the respective format found to match the particular format of the Visual data. Optical character recognition is then utilized to generate Said Visual data from Said location.”</p> <p>Krouse at 6:4-34:                      “Each of the terminals 18, 20, 22 includes an optical Scanner 34 for Scanning negotiable instrument documents, (exemplified by check 110 shown in FIG. 6) tendered at point of Sale in payment for goods or Services provided by the merchant or retailer associated with that point of Sale, to generate respective computer-readable Scanned images of the documents. Preferably, Scanner 34 comprises a conventional monotonal image Scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor 40 to scan one or both sides of a document 110 placed in the scanner 34.</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	providing an indication upon recognizing the at least one object as the target object; and	<p>Krouse discloses providing an indication upon recognizing the at least one object as the target object.</p> <p>Krouse at 3:43–4:12</p>



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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</li> </ul> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Krouse at 7:7–31</p> <ul style="list-style-type: none"> <li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</li> </ul> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other</li> </ul>

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		<p>than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</p> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>Krouse at 16:66-17:19:</p> <ul style="list-style-type: none"> <li>• “The generator 224 then causes display 206 to display this information and to prompt via the display 206 for the user/customer at the display 206 to indicate via the user interface 206 whether the displayed information is correct. If the user/customer indicates that the displayed information is correct, the generator 224 then causes the display 206 to prompt the user/customer to provide means to pay the bill whose billing information is displayed on the display 206, otherwise the user/customer is prompted to input to the generator 224 the corrected billing information, which corrected information, once input, is displayed on the display with a request that the user verify correctness of Same. Once the user/customer indicates that the billing information displayed on the display 206 is</li> </ul>

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		<p>correct, the generator 224 causes the display 206 to request that the user/customer indicate to the system 200 via the user interface 206 how the user/customer wishes to make payment based upon the displayed billing information. Interface 206 may comprise a conventional point of Sale debit card reading/transaction mechanism (not shown) to permit the user/customer to accomplish this.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	presenting to a user, via an address, content information associated with the target object.	<p>Krouse discloses presenting to a user, via an address, content information associated with the target object.</p> <p>Krouse at 7:7–31</p> <ul style="list-style-type: none"> <li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire</li> </ul>

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		<p>side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</p> <p>Krouse at 8:44–64</p> <ul style="list-style-type: none"> <li>• “Each transaction record <b>70</b> also includes a portion <b>78</b> which specifies the date and time of processing of the transaction, a portion <b>76</b> specifying the terminal identification number of the terminal processing the transaction, and a transaction data section <b>82</b> specifying the numerical transaction data generated from the scanned image. Each transaction record <b>70</b> also contains a unique transaction identification number generated by the generator <b>38</b> by concatenating a 5-digit form of the terminal identification number to the time and date of the transaction in numerically expressed in the form YYYYMMDDHHMM (wherein YYYY represents the year, the left most MM represents the month, DD represents the day of the month, HH represents the hour in said day, and the right most MM represents the minutes in said hour of the transaction) and to a system-wide, unique 5-digit daily transaction sequence number (which is reset system-wide, periodically, e.g., once per day), and a tendering party assent portion <b>84</b> for receiving a signature <b>72</b> from the tendering party or other authorized representative thereof for signifying assent by the tendering party to the terms and conditions specified in the record <b>70</b>.”</li> </ul>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 6**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
6	<p>The method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.</p>	<p>Krouse discloses the method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.</p> <p><i>Id.</i> at [1].</p> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon</li> </ul>

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		<p>the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</p> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 7:7–31</p> <ul style="list-style-type: none"><li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In</li></ul>
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		<p>response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"><li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li></ul> <p>Based upon the standardized location, size, style, etc. of the MICR line</p>
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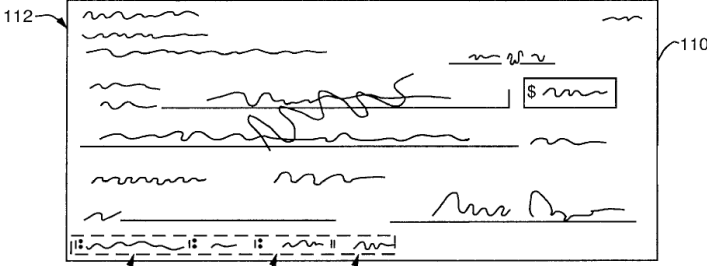
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		<p><b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 18**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
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18	<p>The method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.</p>	<p>Krouse discloses the method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.</p> <p><i>Id.</i> at [1].</p> <p>Krouse at Fig. 6</p>  <p>FIG. 6</p> <p>Krouse at 7:43–53</p> <ul style="list-style-type: none"><li>• “Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).”</li></ul> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"><li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the</li></ul>
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		<p>check <b>110</b> and in check <b>110</b>, includes three fields <b>114, 116, 118</b> of printed digits separated by special control characters. Fields <b>114, 116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</p> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified</p>
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		in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

### Exhibit A-23

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidation Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. A statement of reasons and good cause for each supplement in this chart is identified in the cover pleading.

QBIC was known or used by others in the United States and publicly used or on sale in the United States by November 5, 2000. *See generally* W. Niblack et al., *The QBIC Project: Querying Images By Content Using Color, Texture, and Shape*, SPIE Vol. 1908 (1993), pp. 173–187 (IBM0002390–404); M. Flickner et al., *Query by Image and Video Content: The QBIC System (“QBIC”)*, IEEE Sept. 1995, pp. 23–32 (IBM0000893–902); W. Niblack et al., *Updates to the QBIC System*, SPIE Vol. 3312 (1997), pp. 150–161 (IBM 0002419–430); and *Query By Image Content QBIC Demonstration Program*, IBM Research, Sept. 1998 (IBM000747). QBIC is available as prior art at least under 35 U.S.C. § 102(a), (b), and (g), having been known or used by others in the United States and publicly used or on sale in the United States by at least 1995 and certainly by November 5, 2000, including, for example, at <http://libra.uc.davis.edu> through the Art History Department at U.C. Davis; at [www.thinker.org/imagebase/indox-2.htm3](http://www.thinker.org/imagebase/indox-2.htm3) through the Fine Arts Museum of San Francisco; through demos at <http://www.qbic.almaden.ibm.com>; and through IBM’s commercial products, including in IBM’s *Ultimedia Manager*, the DB2 series of products such as the *Image Extender* in DB2 Universal Database, and the *Enterprise Information Portal*. *See generally* Deposition of IBM Corporate Representative Myron Flickner, *Nantworks, LLC and Nant Holdings IP, LLC v. Bank of America Corporation and Bank of America, N.A.*, 2:20-cv-07872-GW-PVC (C.D.C.A. 2020) (“Flickner 8/29/23 Depo”) at e.g., 32–33, 39–40, 44, 62–63, 66–67, 72–74, 103–107, 110–112, 127, 163–174, 183–189, 191–195, 215, 219–220, 241, 307–309, 311–317, Exs. 3–13; *see also* Deposition of IBM Corporate Representative Myron Flickner, *Network-1 Technologies, Inc., v. Google LLC and Youtube LLC*, 1:14-cv-09558-PGG (S.D.N.Y. 2019) (“Flickner Depo”), including, e.g., at 13, 14, 15–18, 29–30, 34, 36, 37, 43–46, 48, 58, 60, 61–62, 67–69, 72, 74–76, 84–86, 88–89, 98–100, 102, 106, 113, 125, 135, 152–154, 160–161, 170–172, 180–181, 194, 198–201, 203–205, 215–216, 220–221, and Exs. 1–16.

As shown in the chart below, QBIC anticipates asserted claims 1, 6, and 18 of the ’004 Patent. The disclosures/exemplary citations for each element incorporate the disclosures citations of the proceeding limitations. To the extent QBIC is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent QBIC is found not to anticipate any asserted claims or claim elements of the ’004 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidation Contentions, for the reasons identified in the cited references and/or in the cover pleading. These Invalidation Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass

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Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

the accused products, the claims must also be construed to have that same scope when considering whether they are invalid. The following chart incorporates by reference the analysis from Exhibit A-21 for each limitation.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'004 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for processing a video stream, comprising:	<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images' content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 3</p> <p>Querying image databases by their image content is an active area of research. Some examples include the system in [2], which has been used to retrieve images of electrical components and MRI images, the system in [3] which retrieves images based on a sketch or other image example, or by “sense retrieval” (e.g. “retrieve clear, bright and clean images”), [4] which retrieves images based on their color content, and [5] which retrieves MRI images based on the sizes and relative positions of multiple objects in the images. The QBIC system which we are developing allows images to be retrieved by a variety of image content descriptors including color, texture, and shape.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p> <p>“We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p>

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		<p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>



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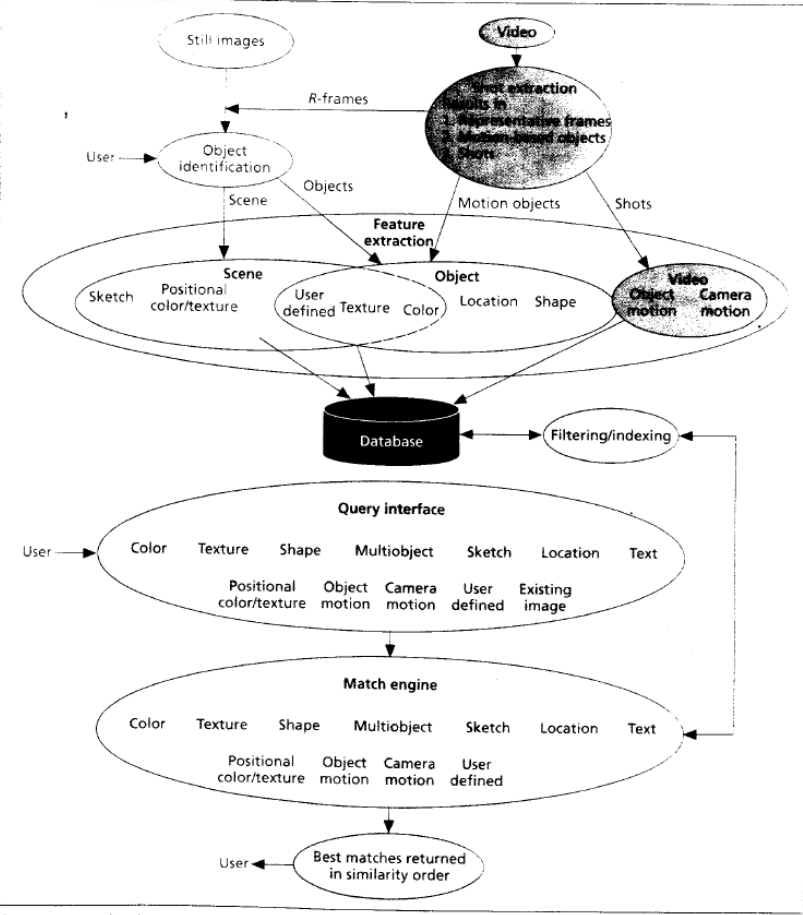
Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>The diagram illustrates the QBIC system architecture, divided into two main parts: database population (top) and query (bottom).</p> <p><b>Database Population (Top):</b> This section shows the process of extracting features from video and still images. It starts with 'Still images' and 'Video' inputs. 'Video' undergoes 'Feature extraction' to produce 'Representative frames', 'Motion objects', and 'Shots'. 'Motion objects' are further processed into 'Motion objects' and 'Shots'. 'Still images' are processed into 'R-frames'. 'User' input goes to 'Object identification', which outputs 'Objects' and 'Scene'. 'Objects' and 'Scene' are processed through 'Feature extraction' to produce 'Scene' (Sketch, Positional color/texture) and 'Object' (User defined Texture, Color, Location, Shape). 'Motion objects' and 'Shots' are processed through 'Feature extraction' to produce 'Video Camera motion' (Object motion, Camera motion). All these outputs are stored in a 'Database'. 'Filtering/indexing' is applied to the database.</p> <p><b>Query (Bottom):</b> This section shows the process of querying the database. A 'User' interacts with a 'Query interface' which provides various search criteria: Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, User defined, and Existing image. The 'Query interface' sends data to a 'Match engine' which also uses the same search criteria. The 'Match engine' sends data to 'Filtering/indexing', which then returns 'Best matches returned in similarity order' to the 'User'.</p>

Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.

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		<div> <h1>Query by Image and Video Content: The QBIC System</h1> </div> <div> <p>Myron Flickner, Harpreet Sawhney, Wayne Niblack, Jonathan Ashley, Qian Huang, Byron Dom, Monika Gorkani, Jim Hafner, Denis Lee, Dragutin Petkovic, David Steele, and Peter Yanker</p> </div> <div> <p>IBM Almaden Research Center</p> </div> <div> <p><b>QBIC* lets users find pictorial information in large image and video databases based on color, shape, texture, and sketches. QBIC technology is part of several IBM products.</b></p> </div> <div> <p><small>*To run an interactive query, visit the QBIC Web server at <a href="http://www.qbic.almaden.ibm.com/">http://www.qbic.almaden.ibm.com/</a>.</small></p> </div> <div> <p><b>P</b>icture yourself as a fashion designer needing images of fabrics with a particular mixture of colors, a museum cataloger looking for artifacts of a particular shape and textured pattern, or a movie producer needing a video clip of a red car-like object moving from right to left with the camera zooming. How do you find these images? Even though today’s technology enables us to acquire, manipulate, transmit, and store vast on-line image and video collections, the search methodologies used to find pictorial information are still limited due to difficult research problems (see “Semantic versus nonsemantic” sidebar). Typically, these methodologies depend on file IDs, keywords, or text associated with the images. And, although powerful, they</p> </div> <div> <ul style="list-style-type: none"> <li>• don’t allow queries based directly on the visual properties of the images,</li> <li>• are dependent on the particular vocabulary used, and</li> <li>• don’t provide queries for images similar to a given image.</li> </ul> </div> <div> <p>Research on ways to extend and improve query methods for image databases is widespread, and results have been presented in workshops, conferences,<sup>1,2</sup> and surveys.</p> </div> <div> <p>We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on</p> </div> <div> <ul style="list-style-type: none"> <li>• example images,</li> <li>• user-constructed sketches and drawings,</li> <li>• selected color and texture patterns,</li> </ul> </div> <div> <p>IBM0000893 at 893</p> </div>

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		<p><b>QBIC SYSTEM OVERVIEW</b>                      Figure 1 illustrates a typical QBIC query.*                      The left side shows the query specification, where the user painted a large magenta circular area on a green background using standard drawing tools. Query results are shown on the right: an ordered list of “hits” similar to the query. The order of the results is top to bottom, then left to right, to support horizontal scrolling. In general, all queries follow this model in that the query is specified by using graphical means—drawing, selecting from a color wheel, selecting a sample image, and so on—and results are displayed as an ordered set of images.</p> <p>To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content—colors, textures, shapes, and camera and object motion—and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.</p> <p><b>Data model</b>                      For both population and query, the QBIC data model has</p> <ul style="list-style-type: none"> <li>• still images or scenes (full images) that contain objects (subsets of an image), and</li> <li>• video shots that consist of sets of contiguous frames and contain motion objects.</li> </ul> <p>For still images, the QBIC data model distinguishes between “scenes” (or images) and “objects.” A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative</p> <p>text at top. Tools in row are polygon outliner, rectangle outliner, ellipse outliner, paintbrush, eraser, line drawing, object translation, flood fill, and snake outliner.</p> <p>frames, or <i>r</i>-frames, are generated for each extracted shot. <i>R</i>-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen.</p> <p>Queries are allowed on objects (“Find images with a red, round object”), scenes (“Find images that have approximately 30-percent red and 15-percent blue colors”), shots (“Find all shots panning from left to right”), or any combination (“Find images that have 30 percent red and contain a blue textured object”).</p> <p>In QBIC, similarity queries are done against the database of pre-extracted features using distance functions between the features. These functions are intended to mimic human perception to approximate a perceptual ordering of the database. Figure 2 shows the match engine, the collection of all distance functions. The match engine interacts with a filtering/indexing module (see “Fast searching and indexing” sidebar, next page) to support fast searching methodologies such as indexing. Users interact with the query interface to generate a query specification, resulting in the features that define the query.</p> <p><b>DATABASE POPULATION</b>                      In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like “baby on beach,” can be associated with an outlined object or with the scene as a whole.</p> <p>IBM0000893 at 895</p>


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		<p><b>REPRESENTATIVE FRAME GENERATION.</b>                      Once the shot boundaries have been detected, each shot is represented using an <i>r</i>-frame. <i>R</i>-frames are used for several purposes. First, during database population, <i>r</i>-frames are treated as still images in which objects can be identified by using the previously described methods. Secondly, during query, they are the basic units initially returned in a video query. For example, in a query for shots that are dominantly red, a set of <i>r</i>-frames will be displayed. To see the actual video shot, the user clicks on the displayed <i>r</i>-frame icon.</p> <p>The choice of an <i>r</i>-frame could be as simple as a particular frame in the shot: the</p> <p>IBM0000893 at 898</p> <p>WE HAVE DESCRIBED A PROTOTYPE SYSTEM that uses image and video content as the basis for retrievals. Technology from this prototype has already moved into a commercial stand-alone product, IBM's Ultimedia Manager, and is part</p> <p>of IBM's Digital Library and DB2 series of products. Other companies are beginning to offer products with similar capabilities. Key challenges remain in making this technology pervasive and useful.</p> <p>IBM0000893 at 900</p> <p>QBIC Demo (IBM000747)</p>

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		 <p>Flickner Depo at 38-41</p>

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		<p>1 project at this time?                  2 A. I don't know that.                  3 Q. Okay. Would reviewing -- let's see.                  4 Let's turn to page -- let's turn to page -- this                  5 one is Bates-stamped, so the page ending in                  6 Network1_007316.                  7 Would reviewing this page refresh your                  8 recollection as to whether --                  9 A. Yes.                  10 Q. Okay. Perfect. Feel free.                  11 MR. DeCLERCK: Just give him a chance to                  12 finish his question before you respond.                  13 MR. DANG: Thank you.                  14 THE DEPONENT: Is there a question                  15 standing?                  16 Q. (By Mr. Dang) Sure. Yeah.                  17 So was there any video search                  18 functionality included as part of the QBIC system                  19 at this time?                  20 A. Evidently, yes.                  21 Q. Okay. And how did that video search                  22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using                  2 those images.                  3 Q. Okay. Could you take as -- as you did in                  4 the query by image search system, could you just                  5 search a video using this system?                  6 A. You could search for a key frame and that                  7 could point you to a video.                  8 Q. As an input into the system, could you                  9 search -- could you input a whole video and then                  10 the system would extract the key frames and then --                  11 A. Yes.                  12 Q. -- search that using that?                  13 A. If I recall correctly, yes.                  14 Q. Okay. And the way -- the method by which                  15 it did so, as you mentioned, was -- would it                  16 extract key frames from the video, extract features                  17 from those key frames, and then search those                  18 features; is that right?                  19 A. Correct.                  20 Q. Okay. Other than the use of shots and                  21 key frames, is there any difference between the                  22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>
		<p>1 A. You detect shots in -- transitions in                  2 video and then treat -- treat those as still images                  3 in the QBIC system.                  4 Q. So to break that down, you -- what do you                  5 mean by detecting shots?                  6 A. You try to find some key frame in a video                  7 sequence or multiple key frames in a video                  8 sequence, to give you a summarization of the video.                  9 Q. And how would you detect those key                  10 frames?                  11 A. There were algorithms to do it. I didn't                  12 personally work on any of those algorithms.                  13 Q. Are you otherwise aware of any of those                  14 algorithms?                  15 A. Well, they used histogram methodologies.                  16 I remember that.                  17 Q. Okay. So you would take -- you would use                  18 a histogram methodology to extract key frames from                  19 the video; is that what -- is that right?                  20 A. That's one way to do it.                  21 Q. Okay. And then what would you do with                  22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?                  2 A. There may have been.                  3 Q. Can you think of any now?                  4 A. No.                  5 Q. When you searched for -- or when you                  6 searched a video using this system, what would                  7 the -- or what would the system return?                  8 A. I don't remember if we returned the                  9 stills or a small -- small video clip.                  10 Q. Say it returned the stills, could you use                  11 those stills to point you to a video?                  12 A. Yeah.                  13 Q. And how would you do that?                  14 A. Well, the -- each -- each key frame                  15 typically represents a frame in the video. So                  16 there's a -- the key frame is -- is one frame of                  17 the video so you just seek to that point.                  18 Q. So if I'm understanding this right, you                  19 could take a query video, the system would extract                  20 frames, which would then extract features from it,                  21 and then the system would return either shot clips                  22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>

Flickner Depo at 209-210



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		<p>13 Q. Okay. Let me ask -- let me ask that                      14 question using -- using an example.                      15 Say I had a file that -- that was a                      16 snippet of a Star Wars movie.                      17 Could the CueVideo system take that                      18 snippet of the -- of a Star Wars movie and indicate                      19 to the user what Star Wars movie that snippet is                      20 from?                      21 A. Most likely, yes.                      22 Q. And how do you know that?                      1 A. Based on my knowledge in content-based                      2 imagery -- content-based retrieval, in general,                      3 that would be one of the first things you would try                      4 to implement in a video search system.</p> <p>Flickner Depo at 201</p> <p>5 Q. Now, to search a video by content using                      6 CueVideo, how would the features be extracted from                      7 the video?                      8 MS. HAYDEN: Objection. Foundation.                      9 THE DEPONENT: You typically would                      10 extract -- you -- you try to find key frames and                      11 then you populate the image database with key                      12 frames.                      13 Q. (By Mr. Dang) And how would you search                      14 for those key frames in the image data?                      15 A. You could use a QBIC-like engine.                      16 Q. And by QBIC-like engine, what do you                      17 mean?                      18 A. Some image content-based retrieval                      19 system.                      20 Q. And what would the CueVideo system return                      21 in response to a video query?                      22 A. Typically, video snippets or videos</p> <p>Flickner Depo at 214-25</p>

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		<p>1 videos were indexed by shot boundaries?                  2 A. Correct -- well, the images of shot                  3 boundaries were indexed.                  4 Q. What do you mean by the images of shot                  5 boundaries were indexed?                  6 A. Each -- each shot -- the shot -- the shot                  7 boundary detection is trying to extract key frames                  8 or break the video into small subsec --                  9 subsections -- hang on. Let me think here a                  10 second.                  11 So the shot boundary here is different                  12 than key framing. So I'll -- I'll retract what I                  13 said earlier. This -- while similar, they're not                  14 the same.                  15 Q. What are the differences?                  16 A. Shot boundaries are typically detected at                  17 fade to black, and key frames are supposed to be a                  18 representative still image of the video segment.                  19 Q. How would a shot boundary index allow one                  20 to query a video by content?                  21 A. It gives you semantical information as                  22 related to what the -- that -- that -- that is a --</p> <p style="text-align: right;">Page 214</p> <p>1 a reasonable amount of return video. It's -- it's                  2 breaking it into small snippets.                  3 Q. Does it extract features from the key                  4 frames?                  5 A. If there are key frames extracted, it --                  6 it will reference key frames.                  7 Q. But how do you know that there are -- are                  8 other features extracted from the video --                  9 A. I'm sorry. It does -- it does represent                  10 key frames as well, because it says it's -- it's                  11 getting both the -- the boundaries as well as                  12 indi- -- indicative key frame.</p> <p>Flickner 8/29/23 Depo at 32–33</p>



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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p><i>Id.</i> at 34 – 35</p>

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		<p>10 Q. Okay. If I refer to "images," do you                      11 understand that is including both a still image or,                      12 for example, a frame of a video image?                      13 A. Sure.                      14 Q. Okay. So when I say "image," I'm                      15 including both in my questions from now on out.                      16 A. Okay.                      17 Q. Okay?                      18 A. Okay.                      19 Q. In terms of running analytics, that would                      20 include both extracting these characteristics from a                      21 query image and from an image that you're storing in                      22 a database; correct?                      23 A. Can you rephrase.                      24 Q. Yes. So the comparison that you're doing                      25 between two images; right, is it correct that that</p> <hr/> <p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                      2 querying image 1 to determine if there are images in                      3 the database that have similar features; is that                      4 right?                      5 A. Correct.                      6 Q. Okay. And the analytics that you're                      7 talking about, where you extract these characters                      8 from the image, that is -- those run on both the                      9 query image and the images that are stored in the                      10 database; is that right?                      11 A. Yeah. We call them features.                      12 Q. Features. Okay.                      13 So when you say "features," you're talking                      14 about the features that we talked about before:                      15 Color, texture, shape, sketch?                      16 A. For example.</p> <p><i>Id.</i> at 42</p>

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		<p>4 Q. So let's just start at a high level. Tell 5 me generally what is QBIC? 6 A. QBIC was a technology -- stands for query 7 by image content. It was a way of extracting 8 features of various types, putting those features in 9 a database and then searching the database to get 10 images that looked visually similar or semantically 11 similar. 12 Q. And when you say "semantically similar," 13 what do you mean? 14 A. You could query based on semantics. You 15 could ask for what does a microphone look like and 16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206</p>

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		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.</p> <p><i>Id.</i> at 65–66</p>

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		<p>23 Q. So let's take a look on the first page,                  24 which is Bates-numbered IBM 893. If you look on the                  25 kind of left side in the middle of the page, there's                  1 a -- kind of a black bar and underneath says "QBIC                  2 lets users."                  3 Do you see that?                  4 A. Yep.                  5 Q. It says, "QBIC lets users find pictorial                  6 information in large image and video databases."                  7 So at the time that this article was                  8 written in 1995, QBIC was able to query both image                  9 and video databases; is that correct?                  10 A. Yes.                  11 Q. And then below that it says, "QBIC                  12 technology is part of several IBM products."                  13 Is that right?                  14 A. I can't read that line.                  15 Yeah.</p> <p><i>Id.</i> at 68 – 72</p>

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Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>2 Q. Do you see that, "Videos are broken into"?</p> <p>3 A. "Clips called shots."</p> <p>4 Q. Yes. Well, it says, "Videos are broken</p> <p>5 into clips called shots. Representative frames, or</p> <p>6 r-frames, are generated for each extracted shot.</p> <p>7 R-frames are treated as still images, and features</p> <p>8 are extracted and stored in the database."</p> <p>9 Did I read that correctly?</p> <p>10 A. Um-hum.</p> <p>11 Q. Okay. So for purposes of database</p> <p>12 population and queries for video, r-frames were</p> <p>13 used, and those were treated as still images?</p> <p>14 A. Right.</p> <p>15 Q. So what would happen if I queried using an</p> <p>16 r-frame image? What results would I get back?</p> <p>17 Could I get back both still images and r-frames, or</p> <p>18 would it just return r-frame images back?</p> <p>19 A. You could get both back.</p> <p>20 Q. Say it again, louder.</p> <p>21 A. You could get both back.</p> <p>22 Q. Okay. And in what form would those</p> <p>23 results be displayed to me? For images would they</p> <p>24 be displayed as a thumbnail?</p> <p>25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those</p> <p>2 be displayed to you?</p> <p>3 A. It could be as a thumbnail or as a short</p> <p>4 video clip or as a single representative frame.</p> <p>5 Q. Okay. So they could be -- so for a video,</p> <p>6 there's a video that matched the image query of an</p> <p>7 r-frame, the results I could get back could include</p> <p>8 three things. It could be a still image, it could</p> <p>9 be a thumbnail, or it could be an r-frame</p> <p>10 representation?</p> <p>11 A. R-frame, I think, is representative frame.</p> <p>12 So it was a key frame in that video sequence,</p> <p>13 summary frame.</p> <p>14 Q. Once I ran a query on an r-frame; right?</p> <p>15 Well, let's stop there.</p> <p>16 If I run a query on still images,</p> <p>17 typically the results I would get back are</p> <p>18 thumbnails that are most similar to the</p> <p>19 characteristics which I queried from the query</p> <p>20 image; right?</p> <p>21 A. You could get thumbnails back. You could</p> <p>22 also get the full-sized image back.</p> <p>23 Q. Okay.</p> <p>24 A. Thumbnail is a tool for helping you return</p> <p>25 lots of results and quickly scan it.</p>

*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872

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		<table border="1"> <tr> <td> <p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I                  2 have to click on the thumbnail in order to bring up                  3 the full-sized image?                  4 A. You could.                  5 Q. Otherwise I could automatically receive                  6 the full-sized image as part of the result?                  7 A. You could.                  8 Q. Okay. So walk through that process if I'm                  9 using an r-frame of a video. If I do a -- if I run                  10 a query on an r-frame of a video as a -- an image                  11 query, how could I get the results back?                  12 MR. HANSEN: Objection; vague and ambiguous.                  13 BY MR. EDWARDS:                  14 Q. In what form would I get the results back?                  15 MR. 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"For example, in a query for shots that                  6 are dominantly red, a set of r-frames will be                  7 displayed. To see the actual video shot, the user                  8 clicks on the displayed r-frame icon."                  9 A. Yep.                  10 Q. And that was one of the ways you were                  11 describing that the results of a r-frame query would                  12 be returned to the user?                  13 A. Right.                  14 Q. Do you know if that was the preferred way                  15 that was used in demos in commercial applications?                  16 MR. HANSEN: Objection; vague and ambiguous,                  17 lacks foundation.                  18 MR. STRAUSSMAN: You can answer.                  19 THE WITNESS: I don't know.                  20 BY MR. EDWARDS:                  21 Q. 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Okay.                  3 A. -- there's an editorial process.                  4 Q. Say that last part?                  5 A. There's an editorial process. You submit                  6 it, they edit and make changes and eventually it                  7 appears.                  8 Q. Right. So what you're saying is there's                  9 some lag between the time that you wrote the article                  10 and the time it was published?                  11 A. Yeah.                  12 Q. So this article -- but this article                  13 represents the state of the QBIC technology at least                  14 as of September 1995?                  15 A. Yeah. Yes.                  16 Q. And then let's go to IBM 900.                  17 And take your time to orient yourself on                  18 that page, but what I really want to ask you about                  19 is the last paragraph on the left-hand column going                  20 up to the top of the right-hand column.                  21 A. Yep.                  22 Q. So it says this paper describes [as read],                  23 "a prototype system that uses image and video                  24 content as the basis for retrievals."                  25 Is that right?</p> </td> </tr> </table>	<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I                  2 have to click on the thumbnail in order to bring up                  3 the full-sized image?                  4 A. You could.                  5 Q. Otherwise I could automatically receive                  6 the full-sized image as part of the result?                  7 A. You could.                  8 Q. Okay. 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		<p><i>Id.</i> at 191–192</p> <p>13 Q. Okay. And then if you look in the -- if</p> <p>14 you keep going down that column, it talks about --</p> <p>15 it's the second to last paragraph on IBM 2264 on the</p> <p>16 right column. It says, "OS/2 and Windows clients."</p> <p>17 Do you see that paragraph?</p> <p>18 A. Yeah.</p> <p>19 Q. And then there's three bullet points. It</p> <p>20 says, "Visualizer Ultimedia Query provides users</p> <p>21 with the capability" --</p> <p>22 (Reporter seeks clarification.)</p> <p>23 Q. "Visualizer Ultimedia Query provides users</p> <p>24 with the capability to: Add multimedia columns</p> <p>25 (such as image, video, audio, and formatted text) to</p> <p>1 DB2 for OS/2 database tables."</p> <p>2 And point No. 2 is "Query and display</p> <p>3 images."</p> <p>4 Do you see that?</p> <p>5 A. Um-hum.</p> <p>6 Q. Does that -- does that indicate to you</p> <p>7 that Ultimedia Manager uses the query functionality</p> <p>8 that can store and query features of images, both</p> <p>9 still images and video frames?</p> <p>10 MR. HANSEN: Objection; lacks foundation.</p> <p>11 THE WITNESS: Correct.</p> <p><i>Id.</i> at 201</p>



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		<p>3 Q. And earlier we talked about JPEG and MPEG                      4 are formats that QBIC understood.                      5 A. Correct.                      6 Q. Among others; correct?                      7 A. Correct.                      8 Q. This doesn't list JPEG or MPEG. Do you                      9 take that -- what do you take that to mean?                      10 MR. HANSEN: Objection; lacks foundation.                      11 BY MR. EDWARDS:                      12 Q. Or do you know? Is this just a -- this is                      13 not an all-encompassing list?                      14 MR. HANSEN: Same objection.                      15 THE WITNESS: I don't remember what the status                      16 of JPEG was in '95.                      17 BY MR. EDWARDS:                      18 Q. Okay. But at some point QBIC was able to                      19 handle any types of image and video formats?                      20 A. Not any types but most types.                      21 Q. Most types. Including JPEG and MPEG?                      22 A. Yeah.</p> <p><i>Id.</i> at 314–316</p>

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		<p>10 Okay. On the first page that is</p> <p>11 Bates-labeled IBM 893, in the right-hand column --</p> <p>12 and as you're going down towards the bottom of the</p> <p>13 right-hand column, before you get to the line that</p> <p>14 crosses the middle of the page, there are three</p> <p>15 bullet points.</p> <p>16 Do you see those bullet points?</p> <p>17 A. Yeah.</p> <p>18 Q. It says, "QBIC allows queries on large</p> <p>19 image and video databases based on," bullet point</p> <p>20 one, "example images."</p> <p>21 Do you see that?</p> <p>22 A. Yeah.</p> <p>23 Q. Okay. And then also if you go to</p> <p>24 page 898.</p> <p>25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative</p> <p>2 Frame Generation."</p> <p>3 You see that?</p> <p>4 A. Yeah.</p> <p>5 Q. And for database population you can use</p> <p>6 r-frames of videos just as you can still image for</p> <p>7 both database population and for feature extraction</p> <p>8 for a input image; is that fair?</p> <p>9 MR. HANSEN: Objection; vague and ambiguous,</p> <p>10 lacks foundation.</p> <p>11 THE WITNESS: Yes.</p> <p>12 BY MR. EDWARDS:</p> <p>13 Q. Let's go to IBM 900. The bottom of the</p> <p>14 left-hand column to the top of the right-hand</p> <p>15 column. The bottom of the left-hand column starts,</p> <p>16 "We have described a prototype system."</p> <p>17 Do you see that?</p> <p>18 A. Yeah.</p> <p>19 Q. Okay. You keep going down, that paragraph</p> <p>20 refers to the technology described in this article</p> <p>21 [as read], "has been moved into a commercial</p> <p>22 standalone product, IBM's Ultimedia Manager, and is</p> <p>23 part of IBM's Digital Library and DB2 series of</p> <p>24 products."</p> <p>25 Do you agree with that?</p>

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		<p style="text-align: center;">1 A. Yeah.</p> <p>IBM0002263 at 2264-65:</p> <hr/> <p style="text-align: center;"><b>Product Positioning</b></p> <hr/> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are business professionals who need the advanced array of decision support database tools to view, query, and analyze data.</p> <p>The QBIC system was implemented in IBM commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender</p>

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		<p>in DB2 Universal Database, and the Enterprise Information Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. <i>See, e.g.</i>, Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1A]	analyzing, via a mobile device, a scene represented by the video stream for at least one object;	<p>QBIC uses still images and video (frames) for query and database population:</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p>

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		<p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects-for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and 15-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions-which we call objects-in the images. . . .</p>

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		<p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 88:</p> <p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.</p> <p>Flickner Depo at 89-90:</p> <p>11 Q. Was that used to the QBIC system publicly              12 available anywhere?              13 A. You mean was the Fine Arts demo              14 available?              15 Q. Yes.              16 A. I think it was on our site, but I can't              17 remember for...              18 Q. How did their system work to identify art              19 prints?              20 A. Art what?              21 Q. How would one identify an art print using              22 their system?</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>2 THE DEPONENT: Well, you had a picture --</p> <p>3 you could take a picture of a painting and then you</p> <p>4 could use that as a query content. And you could,</p> <p>5 for example, determine its -- its heritage or its</p> <p>6 lineage.</p> <p>7 Q. (By Mr. Dang) So you could identify</p> <p>8 image about -- or you could identify information</p> <p>9 about the painting using the system?</p> <p>10 A. Right.</p> <p>Flickner Depo at 39-40:</p> <p>17 Q. Okay. So you would take -- you would use</p> <p>18 a histogram methodology to extract key frames from</p> <p>19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with</p> <p>22 those key frames?</p>



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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>1           A. You just populate image database using</p> <p>2           those images.</p> <p>3           Q. Okay. Could you take as -- as you did in</p> <p>4           the query by image search system, could you just</p> <p>5           search a video using this system?</p> <p>6           A. You could search for a key frame and that</p> <p>7           could point you to a video.</p> <p>8           Q. As an input into the system, could you</p> <p>9           search -- could you input a whole video and then</p> <p>10          the system would extract the key frames and then --</p> <p>11          A. Yes.</p> <p>12          Q. -- search that using that?</p> <p>13          A. If I recall correctly, yes.</p> <p>14          Q. Okay. And the way -- the method by which</p> <p>15          it did so, as you mentioned, was -- would it</p> <p>16          extract key frames from the video, extract features</p> <p>17          from those key frames, and then search those</p> <p>18          features; is that right?</p> <p>19          A. Correct.</p> <p>Flickner Depo at 54-55:</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <p style="text-align: right;">Page 54</p> <hr/> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.</p> <p>QBIC could integrate with a camera, such as a portable camera; a user could take an image using a portable camera and submit that image to the QBIC system for query.</p> <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system):</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>

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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p> <p style="text-align: right;">Page 62</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right? 1 A. Right.</p> <p>Flickner 8/29/23 Depo at 34:</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>6 Earlier you talked about both still images                      7 and video were part of your responsibilities for                      8 these architecture interfaces; correct?                      9 A. Correct.                      10 Q. Okay. If I refer to "images," do you                      11 understand that is including both a still image or,                      12 for example, a frame of a video image?                      13 A. Sure.                      14 Q. Okay. So when I say "image," I'm                      15 including both in my questions from now on out.                      16 A. Okay.                      17 Q. Okay?                      18 A. Okay.</p> <p><i>Id.</i> at 53:</p> <p>4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      0 also add the image to the database, preparing a                      1 reduced thumbnail and adding any available text                      2 information to the database.                      3 A. Yep.                      4 Q. Is that correct?                      5 A. Yep.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 60–61:</p> <p>13 Q. Okay. Did you do that type of                      14 segmentation to differentiate foreground objects                      15 from the background in this database population                      16 step?                      17 A. We did research prototypes of it. I don't                      18 know what all went out.                      19 Q. You don't know whether those made it into                      20 a commercial product?                      21 A. I would say they probably didn't.                      22 Q. Okay. Were they in the -- were they used                      23 in the -- in demo applications that you referred to?                      24 A. They might have been.                      25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                      2 with those objects? Were they stored, for example,                      3 as a separate image or were they somehow linked to                      4 or associated with the image from which they were                      5 extracted?                      6 A. Typically they were linked.                      7 Q. They were linked to the source image?                      8 A. Yeah.</p> <p><i>Id.</i> at 32–33:</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p><i>Id.</i> at 74–75:</p>



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		<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 114:</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202:</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300:                  6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312:</p>


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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 312</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p>







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		<p>QBIC Demo (IBM000747) – showing compatibility with images captured by a mobile phone camera</p>  <p>Usage: <b>I</b>: Get Info <b>C</b>: Color Histogram <b>L</b>: Layout <b>T</b>: Texture <b>S</b>: Special Hybrid</p> <p><a href="#">How to Use QBIC</a></p> <p><a href="#">Back To Start Page</a></p> <p><b>Goto:</b>  <a href="#">Custom Color % Query</a>  <a href="#">Custom Paint Query</a>  <a href="#">Random Images</a>  <a href="#">Official QBIC Page</a></p> <p>(Use a Java-capable Web browser to enable additional functionality.)</p> <p><b>Query was:</b>          Example: =AS_test/check1.jpg          Query Type: Color Layout</p>

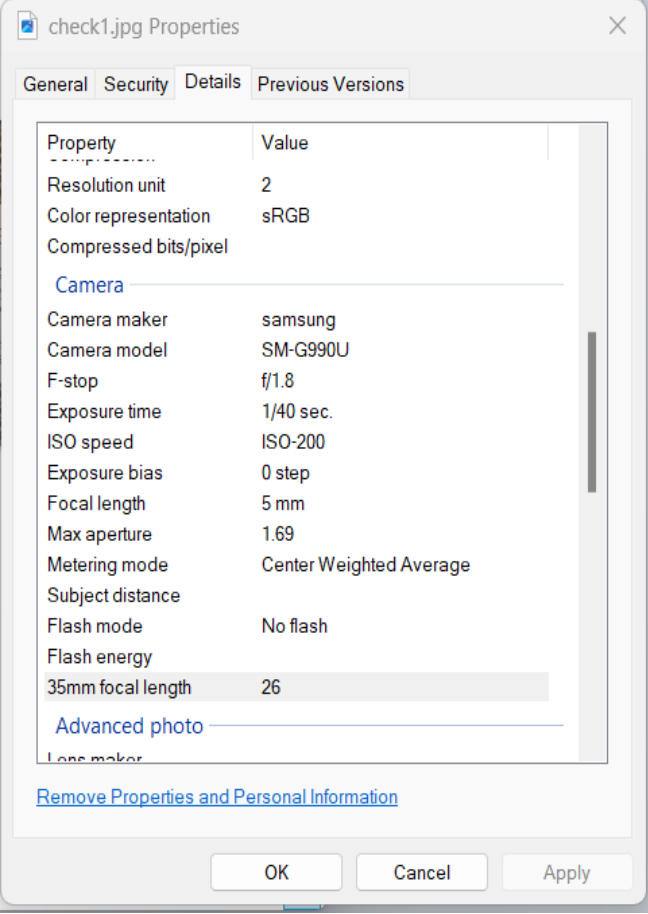
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>check1.jpg.thumb0.jpg</p> </div> <div style="text-align: center;">  <p>check2_orig.jpg.thumb0.jpg</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <p>check3.jpg.thumb0.jpg</p> </div> <div style="text-align: center;">  <p>check4.jpg.thumb0.jpg</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;">  <p>check5.jpg.thumb0.jpg</p> </div> <div style="text-align: center;">  <p>check5_rotate_crop_fix.jpg.thumb0.jpg</p> </div> </div>

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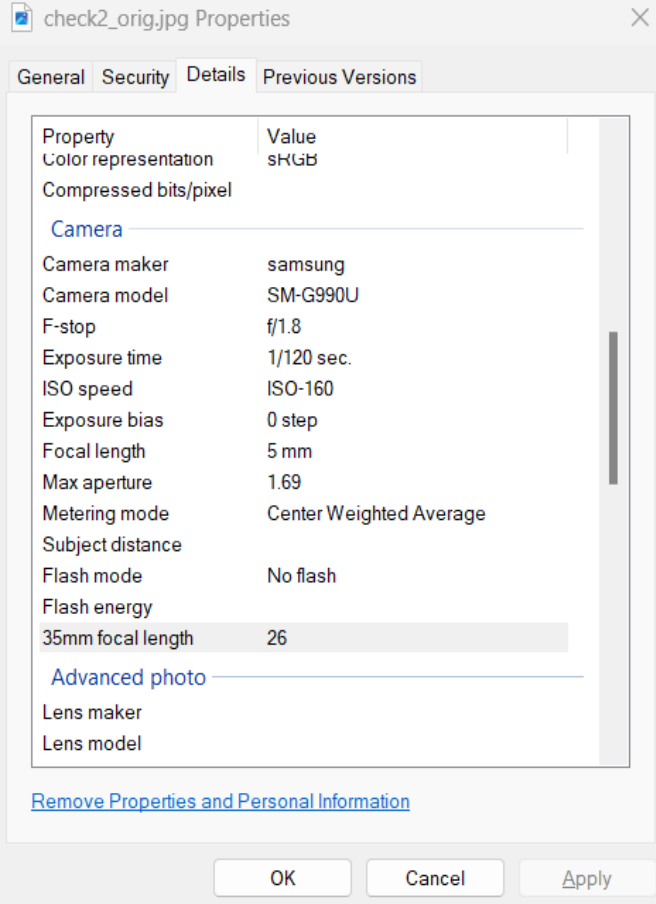
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		 <p>The screenshot shows the 'check1.jpg Properties' dialog box with the 'Details' tab selected. The 'Camera' section contains the following metadata:</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Resolution unit</td> <td>2</td> </tr> <tr> <td>Color representation</td> <td>sRGB</td> </tr> <tr> <td>Compressed bits/pixel</td> <td></td> </tr> <tr> <td colspan="2"><b>Camera</b></td> </tr> <tr> <td>Camera maker</td> <td>samsung</td> </tr> <tr> <td>Camera model</td> <td>SM-G990U</td> </tr> <tr> <td>F-stop</td> <td>f/1.8</td> </tr> <tr> <td>Exposure time</td> <td>1/40 sec.</td> </tr> <tr> <td>ISO speed</td> <td>ISO-200</td> </tr> <tr> <td>Exposure bias</td> <td>0 step</td> </tr> <tr> <td>Focal length</td> <td>5 mm</td> </tr> <tr> <td>Max aperture</td> <td>1.69</td> </tr> <tr> <td>Metering mode</td> <td>Center Weighted Average</td> </tr> <tr> <td>Subject distance</td> <td></td> </tr> <tr> <td>Flash mode</td> <td>No flash</td> </tr> <tr> <td>Flash energy</td> <td></td> </tr> <tr> <td>35mm focal length</td> <td>26</td> </tr> <tr> <td colspan="2"><b>Advanced photo</b></td> </tr> <tr> <td>Lens maker</td> <td></td> </tr> </tbody> </table> <p>At the bottom of the dialog box, there is a link: <a href="#">Remove Properties and Personal Information</a> and three buttons: OK, Cancel, and Apply.</p>	Property	Value	Resolution unit	2	Color representation	sRGB	Compressed bits/pixel		<b>Camera</b>		Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/40 sec.	ISO speed	ISO-200	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26	<b>Advanced photo</b>		Lens maker	
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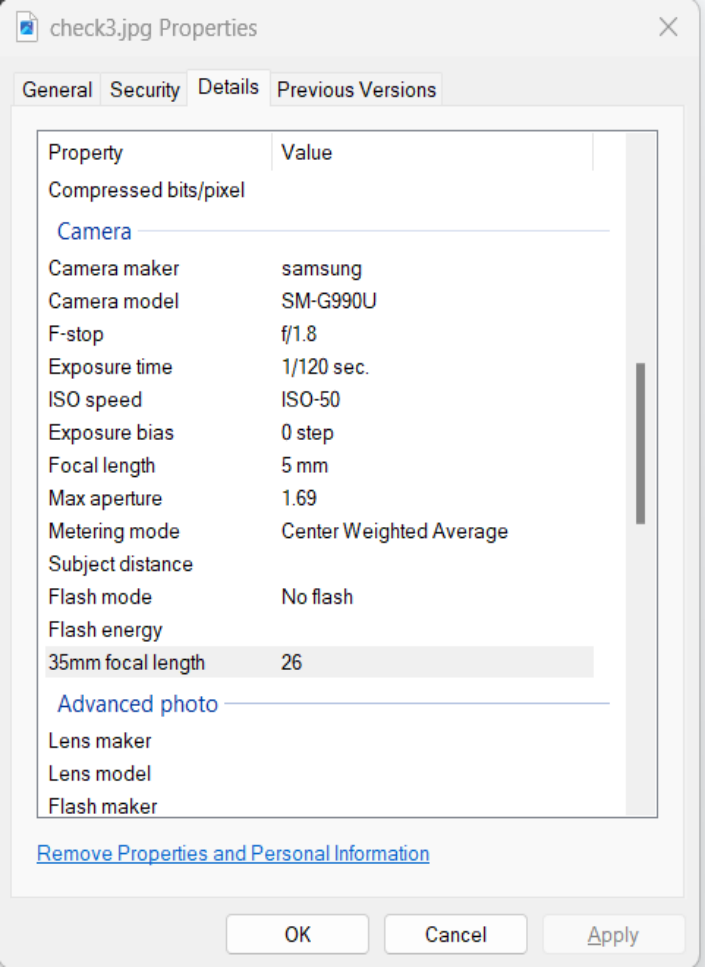
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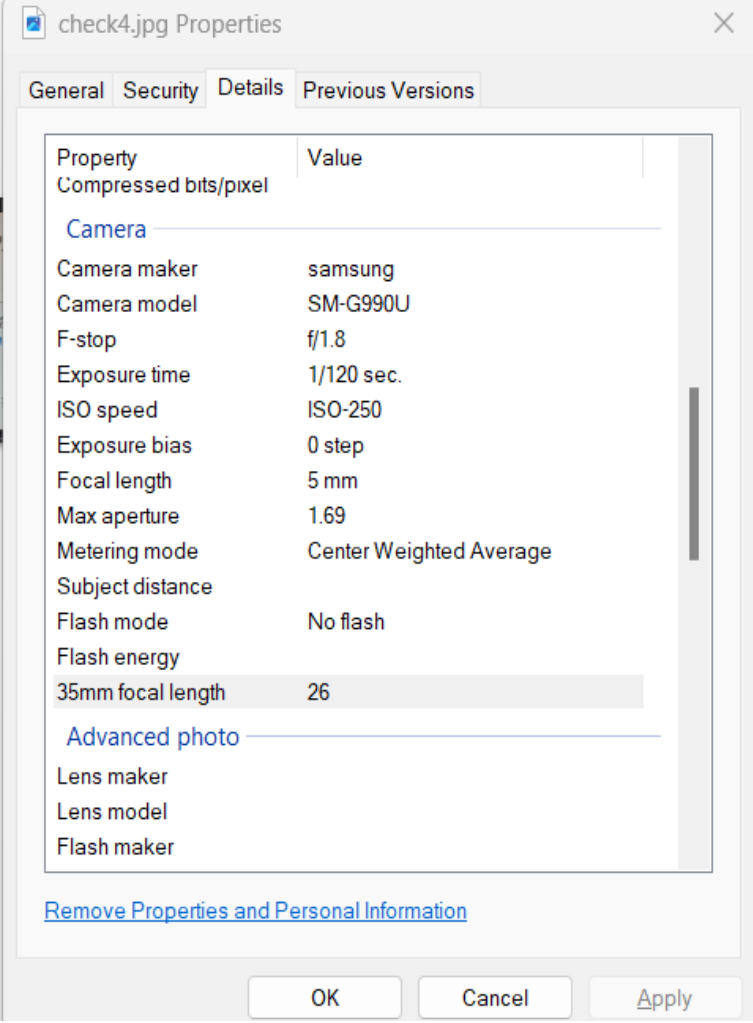
Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

Element	'004 Claim Recitation	Exemplary Citations in Reference																																								
		 <p>The screenshot shows the 'check3.jpg Properties' dialog box with the 'Details' tab selected. It displays EXIF metadata for a photo taken with a Samsung SM-G990U camera. The '35mm focal length' property is highlighted in the list.</p> <table border="1"><thead><tr><th>Property</th><th>Value</th></tr></thead><tbody><tr><td>Compressed bits/pixel</td><td></td></tr><tr><td colspan="2"><b>Camera</b></td></tr><tr><td>Camera maker</td><td>samsung</td></tr><tr><td>Camera model</td><td>SM-G990U</td></tr><tr><td>F-stop</td><td>f/1.8</td></tr><tr><td>Exposure time</td><td>1/120 sec.</td></tr><tr><td>ISO speed</td><td>ISO-50</td></tr><tr><td>Exposure bias</td><td>0 step</td></tr><tr><td>Focal length</td><td>5 mm</td></tr><tr><td>Max aperture</td><td>1.69</td></tr><tr><td>Metering mode</td><td>Center Weighted Average</td></tr><tr><td>Subject distance</td><td></td></tr><tr><td>Flash mode</td><td>No flash</td></tr><tr><td>Flash energy</td><td></td></tr><tr><td>35mm focal length</td><td>26</td></tr><tr><td colspan="2"><b>Advanced photo</b></td></tr><tr><td>Lens maker</td><td></td></tr><tr><td>Lens model</td><td></td></tr><tr><td>Flash maker</td><td></td></tr></tbody></table>	Property	Value	Compressed bits/pixel		<b>Camera</b>		Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/120 sec.	ISO speed	ISO-50	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26	<b>Advanced photo</b>		Lens maker		Lens model		Flash maker	
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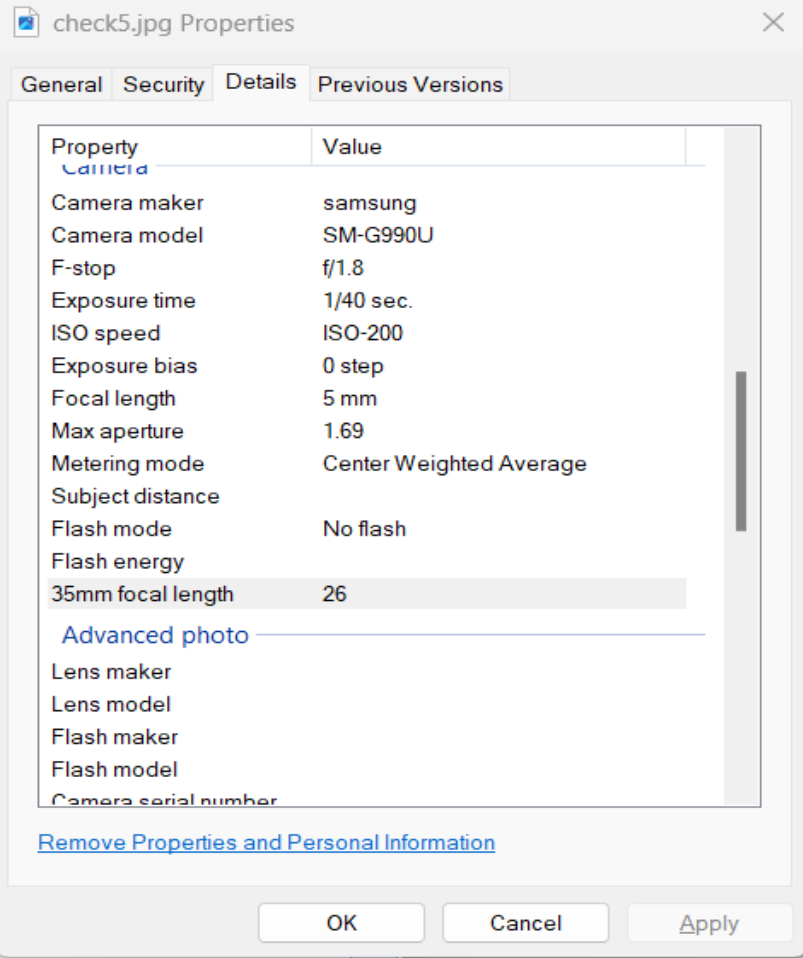
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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate</p>																												

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		<p>this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>deriving at least one characteristic of the video stream;</p>	<p>QBIC discloses the limitation.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 1</p> <p>and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 3</p> <p>Querying image databases by their image content is an active area of research. Some examples include the system in [2], which has been used to retrieve images of electrical components and MRI images, the system in [3] which retrieves images based on a sketch or other image example, or by “sense retrieval” (e.g. “retrieve clear, bright and clean images”), [4] which retrieves images based on their color content, and [5] which retrieves MRI images based on the sizes and relative positions of multiple objects in the images. The QBIC system which we are developing allows images to be retrieved by a variety of image content descriptors including color, texture, and shape.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 4–5</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots</p>

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		<p>that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“DATABASE POPULATION</b></p> <p>In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like ‘baby on beach,’ can be associated with an outlined object or with the scene as a whole.</p> <p><b>Object-outlining tools</b></p> <p>Ideally, object identification would be automatic, but this is generally difficult. The alternative—manual identification—is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised segmentation methods along with a</p>

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		<p>foreground/background model to identify objects in a restricted class of images. The images, typical of museums and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.</p> <p>We also provide semiautomatic tools for identifying objects. One is an enhanced flood-fill technique. Flood-fill methods, found in most photo-editing programs, start from a single object pixel and repeatedly add adjacent pixels whose values are within some given threshold of the original pixel. Selecting the threshold, which must change from image to image and object to object, is tedious. We automatically calculate a dynamic threshold by having the user click on background as well as object points. For reasonably uniform objects that are distinct from the background, this operation allows fast object identification without manually adjusting a threshold. The example in Figure 3 shows an object, a fox, identified by using only a few clicks.</p> <p>We designed another outlining tool to help users track object edges. This tool takes a user-drawn curve and automatically aligns it with nearby image edges. Based on the ‘snakes’ concept developed in recent computer vision research, the tool finds the curve that maximizes the image gradient magnitude along the curve.</p> <p>The spline snake formulation we use allows for smooth solutions to the resulting nonlinear minimization problem. The computation is done at interactive speeds so that, as the user draws a curve, it is ‘rubber-banded’ to lie along object boundaries. . . .</p> <p><b>Video data</b></p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p>



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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content. You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b></p> <p>The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b></p> <p>Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram</p>




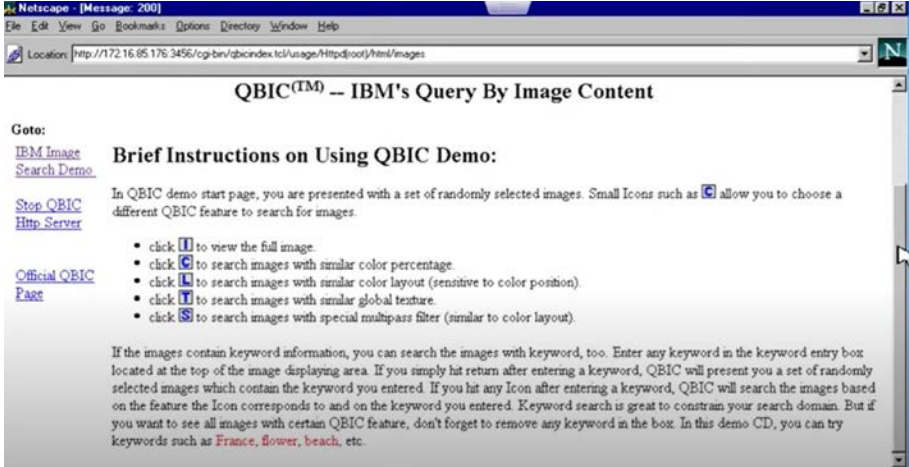
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		<p>color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b>                      The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b>                      Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747)</p>


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		 <p>Flickner Depo at 88-89</p>

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		<p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.              16 Q. (By Mr. Dang) Were there any              17 circumstances under which the system would not              18 compute the distance for every image in the              19 database during a search?              20 A. If there was a text filter on it, we              21 didn't.              22 Q. Did the Fine Arts Museum of San Francisco</p> <hr/> <p style="text-align: right;">Page 88</p> <p>1 similarly use the QBIC system?              2 A. They did.              3 Q. When did they use the QBIC system?              4 A. It was in the '90s, if I recall right.              5 Q. How did they use the QBIC system?              6 A. Similar to the way Davis did, as I              7 recall.              8 Q. What sorts of images were they including              9 in their database?              10 A. Paintings.</p> <p>Flickner Depo at 20</p>

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		<p>3 Q. Okay. And the steps that -- at least as</p> <p>4 I understand it -- is you'd have database</p> <p>5 population, feature calculation and image query; is</p> <p>6 that right?</p> <p>7 A. Uh-huh. Yes.</p> <p>8 Q. So let's -- let's start with database</p> <p>9 population.</p> <p>10 What was the database population step?</p> <p>11 A. It's a process of taking a set of images,</p> <p>12 and then putting them in -- into the database and</p> <p>13 the extracting the features and putting the</p> <p>14 features in the database.</p> <p>20 Q. And how large were these database</p> <p>21 structures?</p> <p>22 A. In the order of 15,000 images.</p> <p>Flickner Depo at 25-26</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that                  1 right?                  2 A. That's correct.                  3 Q. Okay. And once it determined matches,                  4 what would the system do next?                  5 A. It would display them, display the image.                  6 Typically, in thumbnail form.                  7 Q. Okay. How many matches would it display?                  8 A. On the order of 20, 30. You -- you could                  9 get more. It's really an ordering of the whole                  10 database.                  11 Q. Okay. And could you vary the amounts of                  12 matches that it would return?                  13 A. Yeah.                  14 Q. Okay. And how would you vary the amount                  15 of matches?                  16 A. I think it was like a configuration                  17 related to the X Windows application that has                  18 scroll bars on it, and you can assess like how many                  19 elements you wanted into it. This is pre-Web.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference	
		Flickner Depo at 38-41	
		<p>1 project at this time?</p> <p>2 A. I don't know that.</p> <p>3 Q. Okay. Would reviewing -- let's see.</p> <p>4 Let's turn to page -- let's turn to page -- this</p> <p>5 one is Bates-stamped, so the page ending in</p> <p>6 Network1_007316.</p> <p>7 Would reviewing this page refresh your</p> <p>8 recollection as to whether --</p> <p>9 A. Yes.</p> <p>10 Q. Okay. Perfect. Feel free.</p> <p>11 MR. DeCLERCK: Just give him a chance to</p> <p>12 finish his question before you respond.</p> <p>13 MR. DANG: Thank you.</p> <p>14 THE DEPONENT: Is there a question</p> <p>15 standing?</p> <p>16 Q. (By Mr. Dang) Sure. Yeah.</p> <p>17 So was there any video search</p> <p>18 functionality included as part of the QBIC system</p> <p>19 at this time?</p> <p>20 A. Evidently, yes.</p> <p>21 Q. Okay. And how did that video search</p> <p>22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using</p> <p>2 those images.</p> <p>3 Q. Okay. Could you take as -- as you did in</p> <p>4 the query by image search system, could you just</p> <p>5 search a video using this system?</p> <p>6 A. You could search for a key frame and that</p> <p>7 could point you to a video.</p> <p>8 Q. As an input into the system, could you</p> <p>9 search -- could you input a whole video and then</p> <p>10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which</p> <p>15 it did so, as you mentioned, was -- would it</p> <p>16 extract key frames from the video, extract features</p> <p>17 from those key frames, and then search those</p> <p>18 features; is that right?</p> <p>19 A. Correct.</p> <p>20 Q. Okay. Other than the use of shots and</p> <p>21 key frames, is there any difference between the</p> <p>22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>
		<p>1 A. You detect shots in -- transitions in</p> <p>2 video and then treat -- treat those as still images</p> <p>3 in the QBIC system.</p> <p>4 Q. So to break that down, you -- what do you</p> <p>5 mean by detecting shots?</p> <p>6 A. You try to find some key frame in a video</p> <p>7 sequence or multiple key frames in a video</p> <p>8 sequence, to give you a summarization of the video.</p> <p>9 Q. And how would you detect those key</p> <p>10 frames?</p> <p>11 A. There were algorithms to do it. I didn't</p> <p>12 personally work on any of those algorithms.</p> <p>13 Q. Are you otherwise aware of any of those</p> <p>14 algorithms?</p> <p>15 A. Well, they used histogram methodologies.</p> <p>16 I remember that.</p> <p>17 Q. Okay. So you would take -- you would use</p> <p>18 a histogram methodology to extract key frames from</p> <p>19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with</p> <p>22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?</p> <p>2 A. There may have been.</p> <p>3 Q. Can you think of any now?</p> <p>4 A. No.</p> <p>5 Q. When you searched for -- or when you</p> <p>6 searched a video using this system, what would</p> <p>7 the -- or what would the system return?</p> <p>8 A. I don't remember if we returned the</p> <p>9 stills or a small -- small video clip.</p> <p>10 Q. Say it returned the stills, could you use</p> <p>11 those stills to point you to a video?</p> <p>12 A. Yeah.</p> <p>13 Q. And how would you do that?</p> <p>14 A. Well, the -- each -- each key frame</p> <p>15 typically represents a frame in the video. So</p> <p>16 there's a -- the key frame is -- is one frame of</p> <p>17 the video so you just seek to that point.</p> <p>18 Q. So if I'm understanding this right, you</p> <p>19 could take a query video, the system would extract</p> <p>20 frames, which would then extract features from it,</p> <p>21 and then the system would return either shot clips</p> <p>22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		Flickner Depo at 40-42



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		<p>3 Q. Okay. Could you take as -- as you did in 4 the query by image search system, could you just 5 search a video using this system? 6 A. You could search for a key frame and that 7 could point you to a video. 8 Q. As an input into the system, could you 9 search -- could you input a whole video and then 10 the system would extract the key frames and then -- 11 A. Yes. 12 Q. -- search that using that? 13 A. If I recall correctly, yes. 14 Q. Okay. And the way -- the method by which 15 it did so, as you mentioned, was -- would it 16 extract key frames from the video, extract features 17 from those key frames, and then search those 18 features; is that right? 19 A. Correct. 20 Q. Okay. Other than the use of shots and 21 key frames, is there any difference between the 22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p> <hr/> <p>1 query by image search system? 2 A. There may have been. 3 Q. Can you think of any now? 4 A. No. 5 Q. When you searched for -- or when you 6 searched a video using this system, what would 7 the -- or what would the system return? 8 A. I don't remember if we returned the 9 stills or a small -- small video clip. 10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>1 A. Right.</p> <p>Flickner Depo at 87.</p> <p>4 Q. What feature extraction methods did the 5 UC Davis implementation of QBIC rely on? 6 A. It was similar to the other texture, 7 shape, color and layout. 8 Q. Was there any indexing scheme used? 9 A. There may have been some text indexing 10 scheme used.</p> <p>Flickner 8/29/23 Depo at 33–37</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>	

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 77–78</p> <p>22 Q. Mr. Flickner, we're back from a break. 23 Next thing I want to talk about is the next step in 24 the process that we talked about earlier in your 25 deposition, which is feature calculation.</p> <p>1 A. Okay. 2 Q. And feature calculation is where you break 3 down the image individual features? 4 A. Features. Not necessarily just visual 5 features. 6 Q. Things like color and shape and texture, 7 though, would be visual features; correct? 8 A. Yes. Yes. 9 Q. And this step of feature calculation can 10 be done on both a query image and images that are 11 used to populate the database? 12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99</p> <p>20 Q. So for each of color, texture, shape, 21 sketch, there are algorithms that are performing 22 some mathematical computation to calculate those 23 features; is that right? 24 A. Yes. 25 Q. Okay. So let's talk about the color</p>

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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two  2 different color computations that are done. One is  3 average color, the other is color histogram; is that  4 right?  5 A. There certainly are those two.  6 Q. Say again.  7 A. There certainly are those two.  8 Q. Okay. And for average color, let's talk  9 about that first, it says [as read], "We compute the  10 average," and it lists four things, "(R, G, B), (Y,  11 i, q), (L, a, b), and MTM coordinates of each object  12 and image."  13 You see that?  14 A. Yep.  15 Q. So does that mean that it does -- every  16 time it -- if it computes average color, it computes  17 all four of those things? Or are those optional,  18 meaning that it can compute one as opposed -- or  19 some combination of those four?  20 A. Some combination of those four.  21 Q. Okay. Are there different algorithms for  22 each of those four or is it the same algorithm?  23 A. RGB, Yiq and LAB are all linear  24 transformations.  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed  2 over time going forward from 1993?  3 A. Most likely they did.  4 Q. Do you recall any details for how they may  5 have changed?  6 A. No.  7 Q. Do you know if functionality was added to  8 compute average color?  9 A. No.  10 Q. Do you -- do you recall any other  11 algorithms or methodologies that were used besides  12 the four that are listed here?  13 A. No.  14 Q. Okay. Second methodology to compute color  15 is referred to as color histogram here; is that  16 correct?  17 A. Yes.  18 Q. And so at a high level can you explain to  19 me what a color histogram is?  20 A. A histogram is a count of each value. And  21 so, for example, if you have 1, 2, 3 as a value and  22 you say 1, 2, 3 again, the histogram would say 2  23 because there are two 1s, two 2s, and two 3s. So  24 it's a count of the number of values across the  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my  2 head.  3 Q. That's something different from a linear  4 transformation?  5 A. It might be a different linear  6 transformation. I don't recall.  7 Q. Okay. So for average color, the  8 algorithms will compute that based on some  9 combination of those four methodologies?  10 A. Yes.  11 Q. Okay. Do you know if those methodologies  12 evolved over time? So this -- so, for example, this  13 argu-- excuse me -- article was written in 1993.  14 Do you know if the way in which QBIC computed  15 average color changed over time or did it stay the  16 same?  17 MR. STRAUSSMAN: Objection; compound.  18 MR. EDWARDS: Let me rephrase.  19 THE WITNESS: I don't recall.  20 MR. EDWARDS: Let me rephrase.  21 BY MR. EDWARDS:  22 Q. So this article was written in 1993, and  23 it lists four methodologies for computing average  24 color features.  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?  2 A. Pixels, color.  3 Q. So is it measuring the probability  4 density --  5 A. It's a --  6 Q. -- of a color being in an image?  7 A. It's a PDF estimator.  8 Q. And what does PDF stand for?  9 A. Probability density function.  10 Q. Okay. Once the color histogram is  11 computed, is it normalized after that?  12 A. Yes, it was normalized.  13 Q. And why did you normalize the color  14 histogram?  15 A. Because different images would have  16 different color balances.  17 (Reporter seeks clarification.)  18 A. Balances, yeah.  19 Q. Is a -- is a reason why you normalize the  20 color histogram in -- for stored images -- well,  21 strike that.  22 Did you -- did you normalize color  23 histograms when you extract -- strike that.  24 When you calculated the color histogram  25 features from a query image and a stored image, is</p>

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>



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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or                  2 more of these features than the other?                  3 A. Yes.                  4 Q. Which one?                  5 A. Shape.                  6 Q. Okay.                  7 (Witness reviews document.)                  8 A. So one thing I can state is originally I                  9 couldn't remember the name of the edge operator --                  10 and the name is Canny, the Canny edge operator --                  11 when we were talking about finding edges.                  12 Q. Okay. So this -- the paragraph on                  13 IBM 2393 refreshed your memory that shape                  14 calculation used Canny edge detection?                  15 A. No, that's sketch.                  16 Q. Oh, I'm sorry.                  17 A. I'm just stating that originally I was                  18 asked a question about standard edge operators. I                  19 couldn't remember the name. The name was Canny.                  20 Q. Canny. And Canny is used in the sketch                  21 calculation?                  22 A. Yeah, it's used in the sketch calculation.                  23 Q. Understood. Okay. Let's go back to                  24 shape.                  25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.                  2 Q. Can you say the name of the word again?                  3 A. I think it's called perround.                  4 Q. Per round?                  5 A. Yeah.                  6 Q. Those -- are those two words, p-e-r,                  7 r-o-u-n-d?                  8 A. P-e-r -- one word.                  9 Q. Okay. Perround, one word.                  10 A. It's basically the perimeter squared over                  11 area.                  12 (Reporter seeks clarification.)                  13 A. Perimeter squared over area.                  14 (Reporter seeks clarification.)                  15 A. Length of the -- over area.                  16 Q. Okay. So let's step back a little bit.                  17 So it says -- the second paragraph says [as read],                  18 "Our shape features are based on a combination of                  19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features                  20 area, circularity, eccentricity, major access                  21 orientation and a set of algebraic moment                  22 invariants," i-n-v-a-r-i-a-n-t-s.                  23 Did I read that correctly?                  24 A. Um-hum.                  25 Q. Okay. For circularity, that is computed</p>	
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.                  2 To calculate the shape feature in a query                  3 image or a stored database image, is the first step                  4 to convert that image into a binary image?                  5 A. I don't think so.                  6 Q. So if you look at the second paragraph --                  7 and the reason why I ask is -- it's the second                  8 sentence in the second paragraph under "Shape                  9 features." It says [as read], "All shapes are                  10 assumed to be non-occluded planar shapes allowing                  11 for each shape to be represented as a binary image."                  12 See that?                  13 A. Yeah.                  14 Q. And then the next sentence says [as read],                  15 "The area is computed as the number of pixels set in                  16 the binary image."                  17 A. Right.                  18 Q. So that's why I ask is it the first step                  19 in calculating shape to convert the image to binary?                  20 A. Yes.                  21 Q. And then once you convert it to binary                  22 image, then what do you do next in order to                  23 calculate the shape?                  24 A. You're computing something called                  25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?                  2 A. Right.                  3 Q. All right. Area is the number of pixels                  4 in the binary image?                  5 A. In the binary blob.                  6 Q. In the binary what?                  7 A. Blob.                  8 Q. Blob. And when you say "blob," what does                  9 that refer to?                  10 A. The outline of the object that you're                  11 doing a shape query on.                  12 Q. And so are each of these, area,                  13 circularity, eccentricity, major axis orientation                  14 and algebraic moment invariants, are those each                  15 different algorithms or is it all the same                  16 algorithm?                  17 A. It's different algorithms.                  18 Q. Okay. And since you worked on the shape                  19 feature the most, do you recall any other details                  20 that are not disclosed in this paragraph?                  21 A. Well, this evolved and we ended up doing                  22 an implementation of something that's not in here.                  23 Q. Okay. And what was that implementation?                  24 A. Something called turning angle per round,                  25 turning angle, which is -- it looks at the tangent</p>	



*Nantworks, LLC v. Bank of America Corporation*

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		<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So 2 you're computing the turning angle. You're 3 computing this angle that represents a shape in a 4 very interesting way. 5 They don't seem to be very good for 6 human -- so if you asked a human whether these two 7 shapes are similar, they would say "yes," but under 8 that feature set. 9 Q. And you call that something per round? 10 What was the name of it? Started with a T. 11 Turrent? 12 A. Turning angle. 13 Q. Oh, turning angle. 14 A. Yeah. 15 Q. Well, it said -- your answer -- you did 16 say turning angle, but you said something called 17 something per round, and it started with a T. I 18 thought you said turrent, but maybe I misunderstood. 19 MR. STRAUSSMAN: Tangent? 20 THE WITNESS: Tangent angle, yeah. 21 BY MR. EDWARDS: 22 Q. Okay. So something called tangent per 23 round, is that what you would call it, this -- 24 A. No. 25 Q. -- this implementation?</p>	<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle. 2 Q. Okay. So the name of the new 3 implementation you're talking about for shape 4 calculation is called turning angle? 5 A. It used turning angle as a major feature. 6 Q. Okay. Was there any other name it went 7 by? 8 A. I don't recall. 9 Q. All right. And that was -- that 10 methodology was implemented to calculate shape on a 11 query image and an image stored in the database post 12 this article? 13 A. Yes. 14 Q. Was that the -- did that -- did that 15 implementation, the turning angle, did that replace 16 the methodology in this article or was it 17 supplementing the metho- -- 18 A. Supplementing. 19 Q. Okay. Other than turning angle, were 20 there any other methodologies used after this 21 article? 22 A. Not that I recall. 23 Q. Okay. Okay. Let's go sketch features, if 24 you take a look at that and then let me know when 25 you're done reading it.</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 139–165</p> <p>5 Q. And for the image that you use as a base          6 for the query, the things we all talked about in          7 terms of feature extraction for average color, color          8 histogram, shape, texture, sketch, all of those          9 things, the same algorithms would be used in order          10 to extract those features from the image query?          11 A. They're different algorithms. You would          12 use an algorithm.          13 Q. I'm sorry. Say that again?          14 A. The algorithms are different between the          15 shape features and the color features and sketch          16 features.          17 Q. Yeah. Understood. What I'm trying --          18 what I'm trying to understand is, the process that          19 we talked about before, when you populate the          20 database and you extract the features from the          21 images that are stored in the database.          22 You know, we went through all those          23 different algorithms that are used for shape, color,          24 both average color and histogram, texture and          25 sketch.</p>

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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>

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And it displays them in the order</p> <p>13 by which they're most similar. So the, you know,</p> <p>14 best match to the next best match to the next best</p> <p>15 match, so on and so forth?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And you said the system determines</p> <p>18 similarity based on some distance measure between</p> <p>19 the extracted features in the image query versus the</p> <p>20 stored image?</p> <p>21 A. The features of the stored image.</p> <p>22 Q. But it's a -- it's some sort of distance</p> <p>23 measure?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's go back to Exhibit 2.</p> </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> <p style="text-align: right; margin: 0;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm</p> <p>2 talking about for a query, so I'm taking an image</p> <p>3 and submitting it to a system as a query.</p> <p>4 A. Query by example.</p> <p>5 Q. Query by example. Okay. 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Like the distance measure, the result</p> <p>14 would be zero if it was an exact match; right?</p> <p>15 A. Typically you'd get that only if you had</p> <p>16 the query image the same as a result image.</p> <p>17 Q. Right. But that's a possibility?</p> <p>18 A. Yeah.</p> <p>19 Q. Okay. So let's take a look at color --</p> <p>20 it's on -- starting at the top of 2394. You know,</p> <p>21 take your time and read that and then I want to ask</p> <p>22 you some questions about it.</p> <p>23 (Witness reviews document.)</p> <p>24 A. Okay.</p> <p>25 Q. Okay. So let's first start with average</p> </td> </tr> </table>	<p style="text-align: right; margin: 0;">Page 142</p> <p>1 QBIC system would uncompress it?</p> <p>2 A. Yep.</p> <p>3 Q. And then it would extract whatever feature</p> <p>4 you want from that uncompressed image?</p> <p>5 A. Correct.</p> <p>6 Q. And then those extracted features from the</p> <p>7 uncompressed JPEG image are used in the matching</p> <p>8 process?</p> <p>9 A. 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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between                  2 the query image and the database image using                  3 weighted Euclidean distance; is that right?                  4 A. Yep.                  5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.                  6 And can you just tell us at a high level                  7 what -- if you can -- what Euclidean distance is?                  8 A. So if you have multiple features or                  9 multiple scaler features, you have to ask the                  10 question I'm trying to build a distance from that                  11 vector to a query vector.                  12 And as you build that -- the distance, you                  13 have -- you may want to weight different elements of                  14 the vector differently. And we found out that using                  15 variance normalization, where weights of the                  16 variance of the feature, gave good aesthetic                  17 results.                  18 (Reporter seeks clarification.)                  19 A. Aesthetic results.                  20 Q. And I apologize, I couldn't hear what you                  21 said. You said, "And we found out that using                  22 variance" . . .                  23 A. So you normalize each feature with its                  24 variance.                  25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)                  2 Q. Well, let me ask my -- let me get my                  3 question out first.                  4 So we talked about the features for                  5 average color before are RGB, Yiq, LAB and MTM.                  6 A. Correct.                  7 Q. And so, for example, for the RGB, you're                  8 saying that you would take the R and you would                  9 divide it by the variants of red and green, for                  10 example --                  11 A. Just variants of red.                  12 Q. Okay. And so you could do the same for                  13 the others, for Yiq or LAB?                  14 A. Exactly.                  15 Q. Okay. You do that for both the image                  16 input query and the stored image; correct?                  17 A. Correct.                  18 Q. And then you're calculating the distance                  19 between them, so determining how similar they are                  20 based on the distance?                  21 A. Yeah, or vector distance.                  22 Q. Understood.                  23 A. Two vectors of differences --                  24 (Reporter seeks clarification.)                  25 A. Two vectors with a distance calculation on</p>	
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.                  2 Q. With its variance.                  3 A. And then compute the average.                  4 Q. Okay.                  5 A. Or, I'm sorry, compute the weighted sum.                  6 So red divided by the variants of red, plus green                  7 divided by the variants of green --                  8 (Reporter seeks clarification.)                  9 A. Red divided by the variants of red, green                  10 divided by the variants of green, L divided by the                  11 variants of L, that's how you combine the various                  12 features.                  13 Q. Understand. And L represents what?                  14 A. Luminance.                  15 Q. Okay. And this is -- you're talking                  16 specifically with respect to average color?                  17 A. Well, the variance normalization is well                  18 known in terms of multidimensional feature merging.                  19 Q. But for average color, you wouldn't use                  20 luminance, right, as a -- as a variant?                  21 A. Luminance would just -- you wouldn't use                  22 just luminance. You could use luminance . . .                  23 Q. Well, so the color features we talked                  24 about before would be RGB, Yiq, LAB --                  25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.                  2 Q. You're going to have to repeat that and be                  3 just a little bit louder, Mr. Flickner. Sorry.                  4 A. That's all right. Let me get my thoughts                  5 together.                  6 So we have multiple dimensional features.                  7 It's not unusual to take each dimension and                  8 normalize it by the variance because that gives                  9 you -- what that does is if you have tight variances                  10 you divide it by, you get bigger numbers. So you                  11 have more information close by.                  12 Q. What was the word you said before "close                  13 by"?                  14 A. I don't remember.                  15 THE REPORTER: Information?                  16 THE WITNESS: Information close by?                  17 BY MR. EDWARDS:                  18 Q. Okay. Okay. So now let's talk about                  19 color histograms.                  20 A. Okay.                  21 Q. Okay? Well, stop. Let's go back to                  22 average color. So is there -- you described the                  23 weighted Euclidean distance that's calculated                  24 between the query image and the database image for                  25 average color.</p>	

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall                  2 that's not disclosed in the paragraph at IBM 2394?                  3 A. Not that I recall.                  4 Q. Okay. Do you recall whether this distance                  5 methodology changed after this article or it stayed                  6 the same?                  7 A. It changed.                  8 Q. Are you certain or do you know?                  9 A. I'm not certain, but I'm pretty certain.                  10 Q. And how did it change?                  11 A. Different features were shaped like an                  12 inch in color. The algorithm evolved. It wasn't                  13 static.                  14 Q. And how did it evolve?                  15 A. I don't recall all the details.                  16 Q. Do you recall whether it supplemented the                  17 weighted Euclidean distance or replaced it?                  18 A. I don't recall.                  19 Q. Is it fair to say there was always some                  20 distance measurement to determine similarity for                  21 average color in the QBIC system?                  22 A. There's some measurement, yeah.                  23 Q. Okay. Let's talk about color histogram.                  24 So in order to determine the similarity                  25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was                  2 determined by weighted Euclidean distance; is that                  3 right?                  4 MR. HANSEN: Same objection.                  5 THE WITNESS: Correct.                  6 BY MR. EDWARDS:                  7 Q. And how did -- how was that weighted                  8 Euclidean distance determined?                  9 A. It was inverse variance.                  10 (Reporter seeks clarification.)                  11 A. Variance.                  12 Q. And it was inverse variance for components                  13 like coarseness, contrast and directionality?                  14 A. Correct.                  15 Q. Okay. And do you recall if that                  16 methodology changed or stayed the same after this                  17 article for the QBIC system?                  18 A. Most likely it evolved.                  19 Q. Do you know for sure?                  20 A. No.                  21 Q. Do you recall any details?                  22 A. No.                  23 Q. All right. Let's talk about shape next.                  24 The similarity between the query image and                  25 the database image also used weighted Euclidean</p>
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines                  2 distance between normalized histograms?                  3 A. Correct.                  4 Q. Do you recall any details of how that                  5 worked?                  6 A. Not off the top of my head.                  7 Q. Do you recall whether that methodology                  8 evolved for matching color histograms after this                  9 article?                  10 A. Not that I recall.                  11 Q. Okay. All right. Let's talk about                  12 texture next. And I don't know if you've read that,                  13 but that's at the bottom of 2394 and it goes to just                  14 barely at the top of 2395.                  15 (Witness reviews document.)                  16 A. Okay.                  17 Q. So for texture, the similarity is                  18 determined by the distance or the weighted Euclidean                  19 distance between the query object and -- the query                  20 object image and the database object image; is that                  21 right?                  22 MR. HANSEN: Objection; vague and ambiguous.                  23 THE WITNESS: Can you repeat.                  24 BY MR. EDWARDS:                  25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?                  2 A. Correct.                  3 Q. And do you recall how that worked?                  4 A. There's computing moments. And we used                  5 the shape measure, which I mentioned earlier,                  6 curvature and turning angle.                  7 (Reporter seeks clarification.)                  8 A. Curvature and turning angle.                  9 Q. And the curvature and turning angle would                  10 be compared between the image query and the database                  11 image; correct?                  12 A. Correct.                  13 Q. And do you recall if that methodology                  14 changed after this article came out in '93?                  15 A. Yes, it did.                  16 Q. How so?                  17 A. Well, in the IEEE computer paper, we                  18 described a different way of doing shape measures.                  19 And they included the moment calculations.                  20 Q. And you use the moment calculations to                  21 determine a distance between the image query and                  22 the -- and the database image?                  23 A. Yes.                  24 Q. Sorry?                  25 A. Yeah. Yes.</p>

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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?          2 A. Given a binary blob, certain high-level          3 moments and then you create -- compute the          4 eigenvectors of certain matrices that are created --          5 (Reporter seeks clarification.)          6 A. Eigenvectors, e-i-g-e -- i-n -- to compute          7 the eigenvectors of certain matrices. And that          8 would give you translation and rotation and          9 variance.          10 Q. And so after the Exhibit 3 1995 IEEE          11 article, did that methodology change to compute the          12 distance for shape?          13 A. I don't recall.          14 Q. So the methodology for shape that you just          15 described using moment calculations, that is          16 different from what is described in the 1993 article          17 for weighted Euclidean distance?          18 A. We still might have used weighted          19 Euclidean distance when the underlying features are          20 different.          21 Q. Understood.          22 And the underlying features are different          23 in the sense that in the 1995 article you're using          24 what features?          25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment          2 invariants.          3 (Witness reviews document.)          4 A. Is there any other papers that we have          5 here?          6 Q. Nope.          7 A. Everything else is screenshots?          8 MR. STRAUSSMAN: I don't think you introduced          9 any other papers.          10 THE WITNESS: I saw it earlier today.          11 BY MR. EDWARDS:          12 Q. Why don't we do it this way. In terms of          13 the feature calculations that were -- for shape on          14 page IBM 900 of Exhibit 3 versus page --          15 A. So if you look at 2393.          16 Q. What page are you directing me to?          17 A. 2393.          18 Q. Okay.          19 A. So it talks about the moment invariants as          20 well.          21 Q. Okay.          22 A. These are those matrices that you compute          23 eigenvectors of.          24 (Reporter seeks clarification.)          25 A. Matrices that you compute eigenvectors of.</p>	
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)          2 Q. I think the page you may be looking for is          3 IBM 900 on the left side.          4 (Witness reviews document.)          5 A. What else do we have here?          6 Q. So if you'll look at -- if you'll -- if          7 you'll compare page IBM 900 from Exhibit 3 to page          8 IBM 2393 from Exhibit 2, those are the descriptions          9 in both articles about the features that are          10 calculated.          11 A. I'm trying to remember what --          12 MR. STRAUSSMAN: Can you direct him a little          13 closer?          14 BY MR. EDWARDS:          15 Q. Can I show you? Do you mind?          16 I believe this is what you're looking for.          17 So if you look right here (indicating).          18 (Witness reviews document.)          19 A. That's the same as this one (indicating).          20 We had another -- there's another discussion about          21 moments.          22 Q. So if you look at -- under "Shape          23 features" at 2393, right there, where you're looking          24 at --          25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment          2 invariants in the 1993 SPIE article?          3 A. Correct.          4 Q. Right. And then if you go to the IEEE          5 article that you primarily co-authored, on page 900,          6 it refers to shape queries using area, circularity,          7 eccentricity, major-axis direction and features          8 derived from the object moments.          9 A. Right.          10 Q. Is that the same thing as algebraic moment          11 invariants?          12 A. Right.          13 Q. So it looks like the methodologies are the          14 same for the features that are extracted between the          15 papers; is that right?          16 A. I thought one paper had algebraic moments          17 and one had turning angle. Maybe they both had          18 turning angle.          19 (Reporter seeks clarification.)          20 A. Turning angle. Algebraic moments.          21 Turning angles.          22 Q. The 1993 paper refers to algebraic moment          23 invariants. The IEEE paper, on IBM 900, refers to          24 features derived from object moments.          25 Are those the same thing?</p>	



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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.                  2 Q. Okay. And so turning angles, which you've                  3 previously testified on, do you think that                  4 calculating shape features based on turning angles                  5 came after these papers?                  6 A. No. They're mentioned in these papers.                  7 Q. Okay. So they're included in these                  8 papers?                  9 A. Yes.                  10 Q. And so any distance measurement using                  11 weighted Euclidean distance would have taken into                  12 account turning angles?                  13 A. As a feature, yeah. Yes.                  14 Q. For both -- for both papers?                  15 A. For both papers.                  16 Q. Okay. Let's talk about sketch, which                  17 is -- if you'll just stick with 2395, which is                  18 Exhibit 2.                  19 MR. STRAUSSMAN: Can you direct him?                  20 THE WITNESS: I found it.                  21 MR. STRAUSSMAN: Okay.                  22 (Witness reviews document.)                  23 BY MR. EDWARDS:                  24 Q. Let me know when you're finished reading                  25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the                  2 best matches based on order of similarity?                  3 A. Um-hum.                  4 Q. Does iterated query refinement mean that I                  5 can further refine that query to search for things                  6 like shape, like a -- you know, some shape in the --                  7 in the query image, like a logo or an icon, and that                  8 will further refine the results to give me things                  9 that have that similar shape inside the results of                  10 the color histogram?                  11 A. Yes.                  12 Q. And then I can -- I can keep doing that, I                  13 can further even refine that result by using a                  14 keyword, for example?                  15 A. Yes. Or you could do it all at once.                  16 Q. Okay. So the results of the query -- so                  17 we talked about before that the results of the                  18 queries display thumbnails of the database images                  19 based on similarity of which they match; correct?                  20 A. Correct.                  21 Q. And then those thumbnails can provide                  22 links to the original image or, if it was an                  23 r-frame, it could be -- you could provide a link to                  24 the video; correct?                  25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.                  2 Q. For sketch, the similarity between the                  3 query image and the database image uses an algorithm                  4 that performs logical binary correlation of the                  5 binary image?                  6 A. Yes.                  7 Q. Are there any other details you recall for                  8 the sketch comparison beyond what's disclosed in                  9 this paragraph on IBM 2395?                  10 A. Not that I recall.                  11 Q. Do you recall the methodology for                  12 determining similarity of the input image and the                  13 database image for sketch changing after this                  14 article?                  15 A. Not that I recall.                  16 Q. So if you go to the next page,                  17 Mr. Flickner, which is 2396, the Section 4.2 talks                  18 about performing queries.                  19 A. Um-hum.                  20 Q. And in the last sentence it refers to                  21 something called iterated query refinement.                  22 A. Yes.                  23 Q. And what does that refer to?                  24 A. It's a way you can refine the query.                  25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.                  13 Q. Okay.                  14 MR. EDWARDS: I'm going to hand you the next                  15 exhibit, Mr. Flickner.                  16 (Deposition Exhibit 10 was marked.)                  17 MR. EDWARDS: Handing you what's been marked as                  18 Exhibit 10.                  19 For the record, it's IBM Bates Nos. 002418                  20 to 2430.                  21 BY MR. EDWARDS:                  22 Q. The title of this article is "Updates to                  23 the QBIC system."                  24 Do you see that?                  25 A. Yes.</p>



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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?</p> <p>2 A. Yes.</p> <p>3 Q. You are listed as a co-author of this</p> <p>4 article; is that correct?</p> <p>5 A. Yes.</p> <p>6 Q. And it is a paper that is published in the</p> <p>7 SPIE; correct?</p> <p>8 A. Correct.</p> <p>9 Q. In 1997; correct?</p> <p>10 A. Yes. It was 1997 or 1998.</p> <p>11 Q. No later than 1998; correct?</p> <p>12 A. Correct.</p> <p>13 Q. So just want to kind of orient you to the</p> <p>14 first page, which is IBM 2419.</p> <p>15 A. It's '98 because '97 is a different paper.</p> <p>16 Q. Well, if you turn the page, look at the</p> <p>17 footer on the right-hand side.</p> <p>18 Are you familiar that SPIE usually</p> <p>19 includes footers with the volume and the date at the</p> <p>20 bottom?</p> <p>21 A. Yeah.</p> <p>22 Q. And if you look at the footer kind of</p> <p>23 towards the right it says -786X-97-\$10 [sic]?</p> <p>24 A. Yeah.</p> <p>25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?</p> <p>2 A. Yep.</p> <p>3 Q. Okay. So let's -- I'm going to have you</p> <p>4 jump around, so I apologize in advance. Let's go to</p> <p>5 the -- kind of the back, IBM 2428.</p> <p>6 A. Okay.</p> <p>7 Q. Is that example of the stamps demo that</p> <p>8 was available on IBM's website?</p> <p>9 A. Yes.</p> <p>10 Q. All right. And if you look at the top in</p> <p>11 the location URL it has the almaden.ibm website</p> <p>12 address; correct?</p> <p>13 A. Correct.</p> <p>14 Q. All right. Let's flip forward to 2429.</p> <p>15 And is 2429 a screenshot of a trademark</p> <p>16 demo that was also available in the Almaden --</p> <p>17 excuse me -- almaden.ibm website?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And that demo looks like the</p> <p>20 trademark query is based on shape; is that right?</p> <p>21 A. It uses shape as one similarity feature.</p> <p>22 Q. Right. So the trademarks are converted to</p> <p>23 a binary image, like we talked before -- talked</p> <p>24 about before, and then they're -- the matching</p> <p>25 process is done based on those binary images?</p>
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the</p> <p>2 conference was in '98.</p> <p>3 Q. Submission was in '97. So the paper was</p> <p>4 published in '97 and then the conference you</p> <p>5 presented it at was in 1998?</p> <p>6 A. That's possible.</p> <p>7 Q. Do you recall presenting this paper at a</p> <p>8 conference in 1998?</p> <p>9 A. No, I don't.</p> <p>10 Q. So the first page refers to the Photonics</p> <p>11 West 1999 -- excuse me. Photonics West 1998</p> <p>12 Electronic Imaging Conference in San Jose.</p> <p>13 Do you recall attending that conference?</p> <p>14 A. It's likely I did, but I don't recall.</p> <p>15 Q. Okay. But you would agree with me this</p> <p>16 paper was made available at least as early as 1998;</p> <p>17 correct?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. So the first page, IBM 2419. Under</p> <p>20 "Introduction," at the time of this paper it says,</p> <p>21 last line on the first paragraph, "Several online</p> <p>22 demos of QBIC are available at</p> <p>23 <a href="http://www.qbic.almaden.ibm.com">http://www.qbic.almaden.ibm.com</a>."</p> <p>24 Do you see that?</p> <p>25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p>22 Q. Okay. So 39 would be the -- so the first</p> <p>23 image at the top left is a 39, the one next to it is</p> <p>24 a 46, so the 39 would be a closer match than the 46;</p> <p>25 correct?</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<i>Id.</i> at 317–322 22 Q. Okay. So for every commercial 23 implementation of QBIC as of the IEEE 1995 article 24 in Exhibit 3, those implementation calculated 25 features of a query image and stored image; is that

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		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>	
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query."</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>	


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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 322</p> <ol style="list-style-type: none"> <li>1 indicates how confident the system is that the</li> <li>2 features of the stored image match the features of</li> <li>3 the input image; correct?</li> <li>4 A. Correct.</li> </ol> <p><i>See also</i> Flickner Depo at 38-41, 201, 209-210, 214-215.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	recognizing the at least one object in the scene as a target object based at least in part on the at least one characteristic of the video stream;	<p>QBIC discloses the limitation.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p>

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		<p>IBM0002390 at 2391-92:</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2392-93</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16\text{M}</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>



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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <i>m</i> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <i>w</i> the width of the image in pixels and <i>h</i> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2393-95</p>

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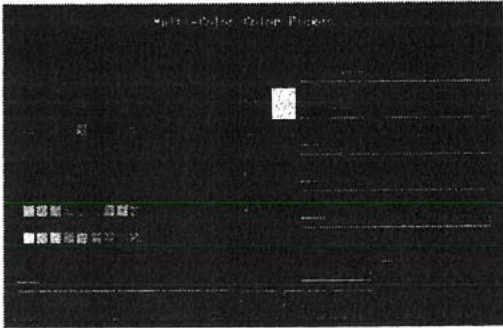
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2395</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “ Find all images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <i>R</i>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>IBM0002390 at 2396:</p>

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		<p><b>4.1. Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. This interface is made up of four parts (listed from top to bottom): the window menu, the tool selection buttons, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images. There are nine drawing tools provided by the interface: Polygon, Rectangle, Ellipse, Paint Brush, Eraser, Line Draw, Object Move, Fill Area, Snake Outline. For example the Polygon tool allows the user to click or drag around bounding edges of the object to be outlined, this can then be refined by the snakes method providing a shrink-wrap effect.</p> <p>Before using any tool on an image the user must first click New to create an object entry (Two shown on bottom of figure 4). The user can then type any text associated with the object to be outlined, or can do this after outlining the object. The user then selected an outlining tool and defines the “mask”. Multiple tools can be used and the last change can be removed with the Undo button or all changes removed with the Clear button.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion- and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative frames, or r-frames,</p>

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		<p>are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects-for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions-which we call objects-in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color</p>

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		<p>queries return items with matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p> <p>Figure 7 shows a histogram query on still images and a color query on video r-frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right.</p> <p>Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture (pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object).</p> <p>An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects</p>



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		<p>and features to implement logical And semantics.</p> <p>....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.</p> <p><b>INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION.</b> Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at pp. 7–8.</p>

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		<p><b>QBIC SYSTEM OVERVIEW</b>                      Figure 1 illustrates a typical QBIC query.*                      The left side shows the query specification, where the user painted a large magenta circular area on a green background using standard drawing tools. Query results are shown on the right: an ordered list of “hits” similar to the query. The order of the results is top to bottom, then left to right, to support horizontal scrolling. In general, all queries follow this model in that the query is specified by using graphical means—drawing, selecting from a color wheel, selecting a sample image, and so on—and results are displayed as an ordered set of images.</p> <p>To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content—colors, textures, shapes, and camera and object motion—and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.</p> <p><b>Data model</b>                      For both population and query, the QBIC data model has</p> <ul style="list-style-type: none"> <li>• still images or scenes (full images) that contain objects (subsets of an image), and</li> <li>• video shots that consist of sets of contiguous frames and contain motion objects.</li> </ul> <p>For still images, the QBIC data model distinguishes between “scenes” (or images) and “objects.” A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative</p> <p>IBM0000893 at 895</p> <p>text at top. Tools in row are polygon outliner, rectangle outliner, ellipse outliner, paintbrush, eraser, line drawing, object translation, flood fill, and snake outliner.</p> <p>frames, or <i>r</i>-frames, are generated for each extracted shot. <i>R</i>-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen.</p> <p>Queries are allowed on objects (“Find images with a red, round object”), scenes (“Find images that have approximately 30-percent red and 15-percent blue colors”), shots (“Find all shots panning from left to right”), or any combination (“Find images that have 30 percent red and contain a blue textured object”).</p> <p>In QBIC, similarity queries are done against the database of pre-extracted features using distance functions between the features. These functions are intended to mimic human perception to approximate a perceptual ordering of the database. Figure 2 shows the match engine, the collection of all distance functions. The match engine interacts with a filtering/indexing module (see “Fast searching and indexing” sidebar, next page) to support fast searching methodologies such as indexing. Users interact with the query interface to generate a query specification, resulting in the features that define the query.</p> <p><b>DATABASE POPULATION</b>                      In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like “baby on beach,” can be associated with an outlined object or with the scene as a whole.</p>

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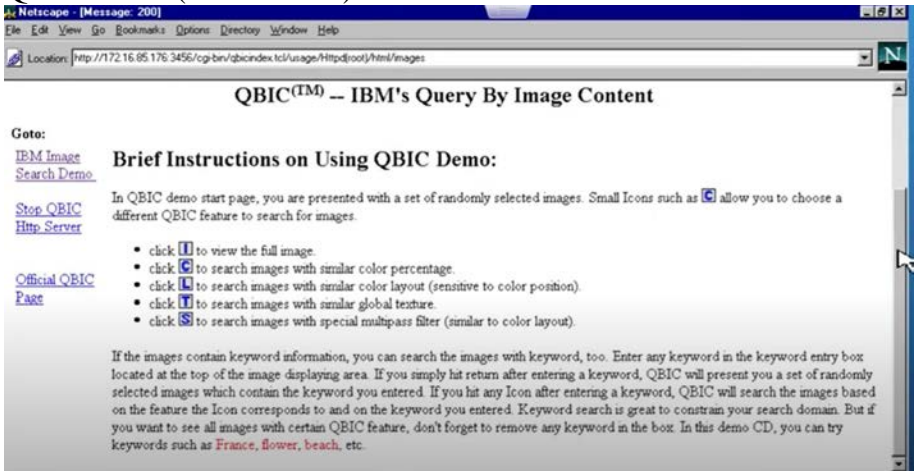
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		<p><b>REPRESENTATIVE FRAME GENERATION.</b>                      Once the shot boundaries have been detected, each shot is represented using an <i>r</i>-frame. <i>R</i>-frames are used for several purposes. First, during database population, <i>r</i>-frames are treated as still images in which objects can be identified by using the previously described methods. Secondly, during query, they are the basic units initially returned in a video query. For example, in a query for shots that are dominantly red, a set of <i>r</i>-frames will be displayed. To see the actual video shot, the user clicks on the displayed <i>r</i>-frame icon.</p> <p>The choice of an <i>r</i>-frame could be as simple as a particular frame in the shot: the</p> <p>IBM0000893 at 898</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged</p>




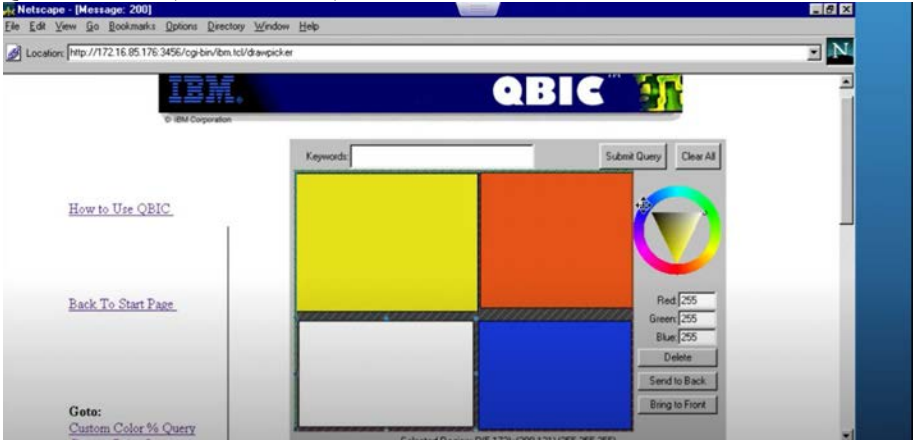
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747)</p>  <p>QBIC Demo (IBM000747)</p>

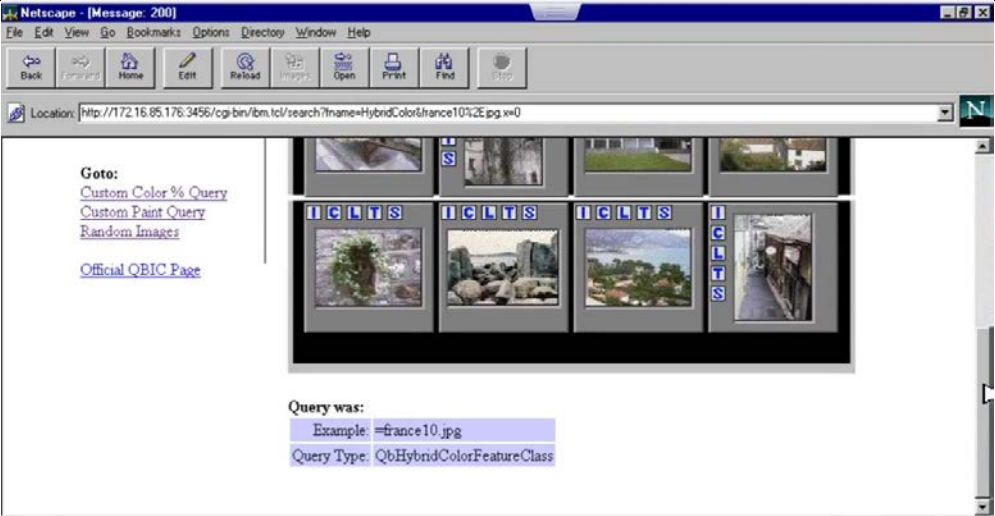
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>The screenshot shows a Netscape browser window displaying the QBIC website. The page features a search bar, a color histogram, and a color picker. The histogram shows a distribution of colors with percentages: 9% (295,295,295) 8% (59,131,59) 4% (106,182,106). The color picker is set to Red: 59, Green: 131, and Blue: 59. Below the histogram, there is a text box explaining how to specify a color histogram query and how to use the color picker.</p> <p>Keywords: <input type="text"/> Submit Query Clear All</p> <p>Red: 59 Green: 131 Blue: 59</p> <p>9% (295,295,295) 8% (59,131,59) 4% (106,182,106)</p> <p>To specify your color histogram query, "paint" a graphical representation of your pattern of colors and approximate percentages that you want.</p> <p>First select a <i>percentage</i> by clicking in the painting area to block off a rectangle of the desired size (percentage of the full area). All new regions are painted white, initially. Then select a color from the color picker to <i>paint</i> your rectangle. You can either click in the color regions or enter your desired</p> <p><a href="#">How to Use QBIC</a></p> <p><a href="#">Back To Start Page</a></p> <p>Goto: <a href="#">Custom Color % Query</a></p>
		<p>QBIC Demo (IBM000747)</p>  <p>The screenshot shows a Netscape browser window displaying the QBIC website. The page features a search bar, a color histogram, and a color picker. The histogram shows a distribution of colors with percentages: 25% (255,255,255) 25% (255,255,255) 25% (255,255,255). The color picker is set to Red: 255, Green: 255, and Blue: 255. Below the histogram, there is a text box explaining how to specify a color histogram query and how to use the color picker.</p> <p>Keywords: <input type="text"/> Submit Query Clear All</p> <p>Red: 255 Green: 255 Blue: 255</p> <p>25% (255,255,255) 25% (255,255,255) 25% (255,255,255)</p> <p>To specify your color histogram query, "paint" a graphical representation of your pattern of colors and approximate percentages that you want.</p> <p>First select a <i>percentage</i> by clicking in the painting area to block off a rectangle of the desired size (percentage of the full area). All new regions are painted white, initially. Then select a color from the color picker to <i>paint</i> your rectangle. You can either click in the color regions or enter your desired</p> <p><a href="#">How to Use QBIC</a></p> <p><a href="#">Back To Start Page</a></p> <p>Goto: <a href="#">Custom Color % Query</a></p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner Depo at 21</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p> <p><b>Flickner Depo at 88</b></p> <p>7 Q. (By Mr. Dang) Suppose you search for a</p> <p>8 set of features or you search using a query image</p> <p>9 in this demonstration, what would the system do?</p> <p>10 MS. HAYDEN: Objection. Foundation.</p> <p>11 THE DEPONENT: The system would</p> <p>12 compute -- in the query image case, the system</p> <p>13 would compute the features on that -- that image</p> <p>14 and then compute the distance associated with each</p> <p>15 one of the images in the database.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference	
		<p><b>Flickner Depo at 22-25</b></p> <p>1 Q. Okay. And what would you do with the                  2 image after you hit and extracted the color                  3 histogram from it?                  4 A. Nothing.                  5 Q. Would those features be stored in any                  6 database or --                  7 A. Yes.                  8 Q. Okay. And let's do -- what about                  9 texture, could you extract texture features from an                  10 image?                  11 A. We did.                  12 Q. And how would you do that?                  13 A. I don't remember exact features we were                  14 using. There were -- we published some papers on                  15 them.                  16 Q. Okay. Was there any reasoning behind                  17 picking the features that you chose?                  18 A. Yes.                  19 Q. And what was that reasoning?                  20 A. We wanted to make it so that the results                  21 were perceptually good.                  22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red                  2 color in it or some sort red color histogram; is                  3 that right?                  4 A. Well, you -- you take specific -- you                  5 search for a red color. You'd compute the                  6 histogram and then basically match the histogram,                  7 which would give you images that had more colors in                  8 the reds. This is not -- it's not a unique thing.                  9 Q. Were you always searching for a                  10 particular feature, or could you just search some                  11 sort of example image?                  12 A. We could search an example image.                  13 Q. And how would that process work?                  14 A. Just extract the features from it.                  15 Q. So let's break that down.                  16 So you would submit an example image to                  17 the -- to the system, right?                  18 A. Uh-huh.                  19 Q. And then how do the -- how -- how does                  20 the system select which features to extract?                  21 A. It would compute them all, typically, or                  22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that                  2 this is a better match, that the ordering was                  3 reasonable and...                  4 Q. So by that, do you mean that people would                  5 view the results returned as the closest or close                  6 matches to your -- to your image?                  7 A. It was -- it would satisfy their query.                  8 Q. Okay. So -- so you would have this set                  9 of features in your database.                  10 How would you search for those features?                  11 A. Typically, we -- initially, we did linear                  12 scan where you just actually evaluate the -- the                  13 distance metric against all the features.                  14 Q. So in linear scan, you would compare some                  15 sort of search term against all the features in the                  16 database?                  17 A. Well, it depends on which features you're                  18 using. You didn't have to use all the features.                  19 You could use just color features or just texture                  20 features or just...                  21 Q. So to make sure I'm understanding this                  22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 36</p> <p>10 Q. So underlying this paper, you mentioned</p> <p>11 you did more work on the shape side of things; is</p> <p>12 that right?</p> <p>13 A. I did.</p> <p>14 Q. And what would that work have entailed?</p> <p>15 A. We wanted to query by shape.</p> <p>16 Q. Okay. And how would that have worked?</p> <p>17 A. We created features related to the shape</p> <p>18 of a -- the object of -- as it populated the</p> <p>19 database, and then we would query against those</p> <p>20 features.</p> <p>Flickner 8/29/23 Depo at 33–37</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>	



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		<p><i>Id.</i> at 52–53</p> <p>12 Q. Underneath there's a sentence that says,                      13 "There are three logical steps in a QBIC                      14 application: Database population, feature                      15 calculation, and image query."                      16 Do you see that?                      17 A. Yeah.                      18 Q. You agree with that?                      19 A. Yeah.                      20 Q. All right. Well, let's talk about the                      21 first step, database population.                      22 What is database population?                      23 A. It's taking a set of images, extracting                      24 the features and putting them in a database.                      25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that                      2 in the database as well?                      3 A. Could be.                      4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      10 also add the image to the database, preparing a                      11 reduced thumbnail and adding any available text                      12 information to the database.                      13 A. Yep.                      14 Q. Is that correct?                      15 A. Yep.</p> <p><i>Id.</i> at 77–78</p>

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		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99</p> <p>20 Q. So for each of color, texture, shape,</p> <p>21 sketch, there are algorithms that are performing</p> <p>22 some mathematical computation to calculate those</p> <p>23 features; is that right?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's talk about the color</p>

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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two                  2 different color computations that are done. One is                  3 average color, the other is color histogram; is that                  4 right?                  5 A. There certainly are those two.                  6 Q. Say again.                  7 A. There certainly are those two.                  8 Q. Okay. And for average color, let's talk                  9 about that first, it says [as read], "We compute the                  10 average," and it lists four things, "(R, G, B), (Y,                  11 i, q), (L, a, b), and MTM coordinates of each object                  12 and image."                  13 You see that?                  14 A. Yep.                  15 Q. So does that mean that it does -- every                  16 time it -- if it computes average color, it computes                  17 all four of those things? Or are those optional,                  18 meaning that it can compute one as opposed -- or                  19 some combination of those four?                  20 A. Some combination of those four.                  21 Q. Okay. Are there different algorithms for                  22 each of those four or is it the same algorithm?                  23 A. RGB, Yiq and LAB are all linear                  24 transformations.                  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed                  2 over time going forward from 1993?                  3 A. Most likely they did.                  4 Q. Do you recall any details for how they may                  5 have changed?                  6 A. No.                  7 Q. Do you know if functionality was added to                  8 compute average color?                  9 A. No.                  10 Q. Do you -- do you recall any other                  11 algorithms or methodologies that were used besides                  12 the four that are listed here?                  13 A. No.                  14 Q. Okay. Second methodology to compute color                  15 is referred to as color histogram here; is that                  16 correct?                  17 A. Yes.                  18 Q. And so at a high level can you explain to                  19 me what a color histogram is?                  20 A. A histogram is a count of each value. And                  21 so, for example, if you have 1, 2, 3 as a value and                  22 you say 1, 2, 3 again, the histogram would say 2                  23 because there are two 1s, two 2s, and two 3s. So                  24 it's a count of the number of values across the                  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my                  2 head.                  3 Q. That's something different from a linear                  4 transformation?                  5 A. It might be a different linear                  6 transformation. I don't recall.                  7 Q. Okay. So for average color, the                  8 algorithms will compute that based on some                  9 combination of those four methodologies?                  10 A. Yes.                  11 Q. Okay. Do you know if those methodologies                  12 evolved over time? So this -- so, for example, this                  13 argu-- excuse me -- article was written in 1993.                  14 Do you know if the way in which QBIC computed                  15 average color changed over time or did it stay the                  16 same?                  17 MR. STRAUSSMAN: Objection; compound.                  18 MR. EDWARDS: Let me rephrase.                  19 THE WITNESS: I don't recall.                  20 MR. EDWARDS: Let me rephrase.                  21 BY MR. EDWARDS:                  22 Q. So this article was written in 1993, and                  23 it lists four methodologies for computing average                  24 color features.                  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?                  2 A. Pixels, color.                  3 Q. So is it measuring the probability                  4 density --                  5 A. It's a --                  6 Q. -- of a color being in an image?                  7 A. It's a PDF estimator.                  8 Q. And what does PDF stand for?                  9 A. Probability density function.                  10 Q. Okay. Once the color histogram is                  11 computed, is it normalized after that?                  12 A. Yes, it was normalized.                  13 Q. And why did you normalize the color                  14 histogram?                  15 A. Because different images would have                  16 different color balances.                  17 (Reporter seeks clarification.)                  18 A. Balances, yeah.                  19 Q. Is a -- is a reason why you normalize the                  20 color histogram in -- for stored images -- well,                  21 strike that.                  22 Did you -- did you normalize color                  23 histograms when you extract -- strike that.                  24 When you calculated the color histogram                  25 features from a query image and a stored image, is</p>

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>

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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or                  2 more of these features than the other?                  3 A. Yes.                  4 Q. Which one?                  5 A. Shape.                  6 Q. Okay.                  7 (Witness reviews document.)                  8 A. So one thing I can state is originally I                  9 couldn't remember the name of the edge operator --                  10 and the name is Canny, the Canny edge operator --                  11 when we were talking about finding edges.                  12 Q. Okay. So this -- the paragraph on                  13 IBM 2393 refreshed your memory that shape                  14 calculation used Canny edge detection?                  15 A. No, that's sketch.                  16 Q. Oh, I'm sorry.                  17 A. I'm just stating that originally I was                  18 asked a question about standard edge operators. I                  19 couldn't remember the name. The name was Canny.                  20 Q. Canny. And Canny is used in the sketch                  21 calculation?                  22 A. Yeah, it's used in the sketch calculation.                  23 Q. Understood. Okay. Let's go back to                  24 shape.                  25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.                  2 Q. Can you say the name of the word again?                  3 A. I think it's called perround.                  4 Q. Per round?                  5 A. Yeah.                  6 Q. Those -- are those two words, p-e-r,                  7 r-o-u-n-d?                  8 A. P-e-r -- one word.                  9 Q. Okay. Perround, one word.                  10 A. It's basically the perimeter squared over                  11 area.                  12 (Reporter seeks clarification.)                  13 A. Perimeter squared over area.                  14 (Reporter seeks clarification.)                  15 A. Length of the -- over area.                  16 Q. Okay. So let's step back a little bit.                  17 So it says -- the second paragraph says [as read],                  18 "Our shape features are based on a combination of                  19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features                  20 area, circularity, eccentricity, major access                  21 orientation and a set of algebraic moment                  22 invariants," i-n-v-a-r-i-a-n-t-s.                  23 Did I read that correctly?                  24 A. Um-hum.                  25 Q. Okay. For circularity, that is computed</p>	
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.                  2 To calculate the shape feature in a query                  3 image or a stored database image, is the first step                  4 to convert that image into a binary image?                  5 A. I don't think so.                  6 Q. So if you look at the second paragraph --                  7 and the reason why I ask is -- it's the second                  8 sentence in the second paragraph under "Shape                  9 features." It says [as read], "All shapes are                  10 assumed to be non-occluded planar shapes allowing                  11 for each shape to be represented as a binary image."                  12 See that?                  13 A. Yeah.                  14 Q. And then the next sentence says [as read],                  15 "The area is computed as the number of pixels set in                  16 the binary image."                  17 A. Right.                  18 Q. So that's why I ask is it the first step                  19 in calculating shape to convert the image to binary?                  20 A. Yes.                  21 Q. And then once you convert it to binary                  22 image, then what do you do next in order to                  23 calculate the shape?                  24 A. You're computing something called                  25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?                  2 A. Right.                  3 Q. All right. Area is the number of pixels                  4 in the binary image?                  5 A. In the binary blob.                  6 Q. In the binary what?                  7 A. Blob.                  8 Q. Blob. And when you say "blob," what does                  9 that refer to?                  10 A. The outline of the object that you're                  11 doing a shape query on.                  12 Q. And so are each of these, area,                  13 circularity, eccentricity, major axis orientation                  14 and algebraic moment invariants, are those each                  15 different algorithms or is it all the same                  16 algorithm?                  17 A. It's different algorithms.                  18 Q. Okay. And since you worked on the shape                  19 feature the most, do you recall any other details                  20 that are not disclosed in this paragraph?                  21 A. Well, this evolved and we ended up doing                  22 an implementation of something that's not in here.                  23 Q. Okay. And what was that implementation?                  24 A. Something called turning angle per round,                  25 turning angle, which is -- it looks at the tangent</p>	

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		<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So 2 you're computing the turning angle. You're 3 computing this angle that represents a shape in a 4 very interesting way. 5 They don't seem to be very good for 6 human -- so if you asked a human whether these two 7 shapes are similar, they would say "yes," but under 8 that feature set. 9 Q. And you call that something per round? 10 What was the name of it? Started with a T. 11 Turrent? 12 A. Turning angle. 13 Q. Oh, turning angle. 14 A. Yeah. 15 Q. Well, it said -- your answer -- you did 16 say turning angle, but you said something called 17 something per round, and it started with a T. I 18 thought you said turrent, but maybe I misunderstood. 19 MR. STRAUSSMAN: Tangent? 20 THE WITNESS: Tangent angle, yeah. 21 BY MR. EDWARDS: 22 Q. Okay. So something called tangent per 23 round, is that what you would call it, this -- 24 A. No. 25 Q. -- this implementation?</p>	<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle. 2 Q. Okay. So the name of the new 3 implementation you're talking about for shape 4 calculation is called turning angle? 5 A. It used turning angle as a major feature. 6 Q. Okay. Was there any other name it went 7 by? 8 A. I don't recall. 9 Q. All right. And that was -- that 10 methodology was implemented to calculate shape on a 11 query image and an image stored in the database post 12 this article? 13 A. Yes. 14 Q. Was that the -- did that -- did that 15 implementation, the turning angle, did that replace 16 the methodology in this article or was it 17 supplementing the metho- -- 18 A. Supplementing. 19 Q. Okay. Other than turning angle, were 20 there any other methodologies used after this 21 article? 22 A. Not that I recall. 23 Q. Okay. Okay. Let's go sketch features, if 24 you take a look at that and then let me know when 25 you're done reading it.</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference				
		<p><i>Id.</i> at 119–128:</p> <table border="1"> <tr> <td> <p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. 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So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p> </td> </tr> <tr> <td> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p> </td> <td> <p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. 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 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then          2 you're looking for blue water, white sand.          3 BY MR. EDWARDS:          4 Q. Do you recall what the methodologies          5 used -- that were used to calculate the orientation          6 of those colors in the image?          7 MR. HANSEN: Objection; lacks foundation.          8 THE WITNESS: There's no orientation per se.          9 It's just position.          10 BY MR. EDWARDS:          11 Q. Well, then position. Do you recall what          12 the methodologies are to calculate the position?          13 MR. HANSEN: Same objection.          14 THE WITNESS: Position is something the user          15 inputs.          16 BY MR. EDWARDS:          17 Q. Something you use what?          18 A. The user had to input.          19 Q. Okay. And then let's move on to the next          20 one, T. It says, "Click T to search images with          21 similar global texture."          22 A. Yeah.          23 Q. Do you recall, in your work on the QBIC          24 project, a feature called global texture that could          25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?          2 A. G-a-b-o-r.          3 Q. So switch over and look at the second page          4 of this Exhibit 6.          5 So -- well, first back -- go back to -- go          6 back to the first page. If you see on the left-hand          7 side it says, "Goto: IBM Image Search Demo," and a          8 little finger there is clicking it.          9 You see it's in red?          10 A. Yeah.          11 Q. Okay. So that's clicking on that link.          12 And then the second page is going to the IBM image          13 search demo.          14 A. Okay.          15 Q. Okay? On the second page it is showing          16 thumbnails with the different icons that we just          17 walked through, I, C, L, T, S, on each of those          18 icons.          19 Do you see that?          20 A. Yep.          21 Q. Do you recognize this as a similar layout          22 to the QBIC demos you hosted in the '90s?          23 A. I don't.          24 Q. You don't?          25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .          2 Q. Say again?          3 A. I missed one of your words. A feature          4 called what?          5 Q. I said do you recall in your work on the          6 QBIC project a feature called global texture that          7 was extracted from the image?          8 A. Yes.          9 Q. Okay. Is that -- is that akin to texture          10 that we looked at earlier?          11 A. Yes.          12 Q. Okay. And the last one is S. It's,          13 "Search images with special multipass filter."          14 Do you recall, in your work on the QBIC          15 project, being able to calculate a feature called          16 multipass filter?          17 A. Probably Gabor functions.          18 Q. Say again?          19 A. Gabor functions.          20 Q. One more time and louder.          21 A. Gabor functions.          22 Q. Gabor functions. Okay. What are Gabor          23 functions?          24 A. Gabor functions are a way of producing          25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM          2 website that was the AIX operating system in          3 Exhibit 3, that did not have a similar thumbnail          4 layout like this?          5 A. A thumbnail, yes. I don't recall it had          6 the buttons, the I, C, L, T, S.          7 Q. You don't recall it had all the buttons or          8 some of the buttons?          9 A. All the buttons.          10 Q. Okay. So you don't recall that it had any          11 buttons?          12 A. I don't -- yeah. I don't recall.          13 Q. It could have, it couldn't have, you just          14 don't remember?          15 A. I just don't remember, yeah.          16 Q. Okay. But the one that you hosted on          17 IBM's website, it did have thumbnails in a similar          18 format here?          19 A. Yeah, it had thumbnails.          20 Q. And these thumbnails represent the images          21 that are stored in the database?          22 A. Yes.          23 Q. Okay. Here, the 470 images would be          24 reflected at least -- one, two, three, four, five,          25 six, seven -- eight of them right here in this</p>



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Element	'004 Claim Recitation	Exemplary Citations in Reference				
		<table border="1"> <tr> <td> <p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p> </td> <td> <p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p> </td> </tr> <tr> <td> <p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p> </td> <td> <p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p> </td> </tr> </table>	<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>	<p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>
<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>					
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<p><i>Id.</i> at 135 – 136</p>						

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p>19 Q. Okay. So one way is to submit an image</p> <p>20 query, where you -- where you submit a -- as an</p> <p>21 input to the query an image, and that could be a</p> <p>22 still image or an r-frame; correct?</p> <p>23 A. Correct.</p>

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		<p><i>Id.</i> at 139–165</p> <p>5 Q. And for the image that you use as a base</p> <p>6 for the query, the things we all talked about in</p> <p>7 terms of feature extraction for average color, color</p> <p>8 histogram, shape, texture, sketch, all of those</p> <p>9 things, the same algorithms would be used in order</p> <p>10 to extract those features from the image query?</p> <p>11 A. They're different algorithms. You would</p> <p>12 use an algorithm.</p> <p>13 Q. I'm sorry. Say that again?</p> <p>14 A. The algorithms are different between the</p> <p>15 shape features and the color features and sketch</p> <p>16 features.</p> <p>17 Q. Yeah. Understood. What I'm trying --</p> <p>18 what I'm trying to understand is, the process that</p> <p>19 we talked about before, when you populate the</p> <p>20 database and you extract the features from the</p> <p>21 images that are stored in the database.</p> <p>22 You know, we went through all those</p> <p>23 different algorithms that are used for shape, color,</p> <p>24 both average color and histogram, texture and</p> <p>25 sketch.</p>

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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>

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Features are extracted. So now we've got</p> <p>20 just the extracted features, whatever those are.</p> <p>21 What happens with those extracted features</p> <p>22 next?</p> <p>23 A. They're put in the database and then</p> <p>24 potentially there are indexes built that help you do</p> <p>25 fast search against those features.</p> </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p style="text-align: right; margin: 0;">Page 144</p> <p>1 that does a comparison for say texture?</p> <p>2 A. You say the matching algorithm?</p> <p>3 Q. Correct.</p> <p>4 A. Yes, they could be different.</p> <p>5 Q. Well, let's talk about them. We can get</p> <p>6 into detail here.</p> <p>7 Well, before we -- before we get there, so</p> <p>8 how does the QBIC system display the results of</p> <p>9 matches to the user?</p> <p>10 A. Typically just thumbnails in a window in</p> <p>11 multiple ordered hits.</p> <p>12 Q. Okay. 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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between  2 the query image and the database image using  3 weighted Euclidean distance; is that right?  4 A. Yep.  5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.  6 And can you just tell us at a high level  7 what -- if you can -- what Euclidean distance is?  8 A. So if you have multiple features or  9 multiple scaler features, you have to ask the  10 question I'm trying to build a distance from that  11 vector to a query vector.  12 And as you build that -- the distance, you  13 have -- you may want to weight different elements of  14 the vector differently. And we found out that using  15 variance normalization, where weights of the  16 variance of the feature, gave good aesthetic  17 results.  18 (Reporter seeks clarification.)  19 A. Aesthetic results.  20 Q. And I apologize, I couldn't hear what you  21 said. You said, "And we found out that using  22 variance" . . .  23 A. So you normalize each feature with its  24 variance.  25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)  2 Q. Well, let me ask my -- let me get my  3 question out first.  4 So we talked about the features for  5 average color before are RGB, Yiq, LAB and MTM.  6 A. Correct.  7 Q. And so, for example, for the RGB, you're  8 saying that you would take the R and you would  9 divide it by the variants of red and green, for  10 example --  11 A. Just variants of red.  12 Q. Okay. And so you could do the same for  13 the others, for Yiq or LAB?  14 A. Exactly.  15 Q. Okay. You do that for both the image  16 input query and the stored image; correct?  17 A. Correct.  18 Q. And then you're calculating the distance  19 between them, so determining how similar they are  20 based on the distance?  21 A. Yeah, or vector distance.  22 Q. Understood.  23 A. Two vectors of differences --  24 (Reporter seeks clarification.)  25 A. Two vectors with a distance calculation on</p>
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.  2 Q. With its variance.  3 A. And then compute the average.  4 Q. Okay.  5 A. Or, I'm sorry, compute the weighted sum.  6 So red divided by the variants of red, plus green  7 divided by the variants of green --  8 (Reporter seeks clarification.)  9 A. Red divided by the variants of red, green  10 divided by the variants of green, L divided by the  11 variants of L, that's how you combine the various  12 features.  13 Q. Understand. And L represents what?  14 A. Luminance.  15 Q. Okay. And this is -- you're talking  16 specifically with respect to average color?  17 A. Well, the variance normalization is well  18 known in terms of multidimensional feature merging.  19 Q. But for average color, you wouldn't use  20 luminance, right, as a -- as a variant?  21 A. Luminance would just -- you wouldn't use  22 just luminance. You could use luminance . . .  23 Q. Well, so the color features we talked  24 about before would be RGB, Yiq, LAB --  25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.  2 Q. You're going to have to repeat that and be  3 just a little bit louder, Mr. Flickner. Sorry.  4 A. That's all right. Let me get my thoughts  5 together.  6 So we have multiple dimensional features.  7 It's not unusual to take each dimension and  8 normalize it by the variance because that gives  9 you -- what that does is if you have tight variances  10 you divide it by, you get bigger numbers. So you  11 have more information close by.  12 Q. What was the word you said before "close  13 by"?  14 A. I don't remember.  15 THE REPORTER: Information?  16 THE WITNESS: Information close by?  17 BY MR. EDWARDS:  18 Q. Okay. Okay. So now let's talk about  19 color histograms.  20 A. Okay.  21 Q. Okay? Well, stop. Let's go back to  22 average color. So is there -- you described the  23 weighted Euclidean distance that's calculated  24 between the query image and the database image for  25 average color.</p>

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall                  2 that's not disclosed in the paragraph at IBM 2394?                  3 A. Not that I recall.                  4 Q. Okay. Do you recall whether this distance                  5 methodology changed after this article or it stayed                  6 the same?                  7 A. It changed.                  8 Q. Are you certain or do you know?                  9 A. I'm not certain, but I'm pretty certain.                  10 Q. And how did it change?                  11 A. Different features were shaped like an                  12 inch in color. The algorithm evolved. It wasn't                  13 static.                  14 Q. And how did it evolve?                  15 A. I don't recall all the details.                  16 Q. Do you recall whether it supplemented the                  17 weighted Euclidean distance or replaced it?                  18 A. I don't recall.                  19 Q. Is it fair to say there was always some                  20 distance measurement to determine similarity for                  21 average color in the QBIC system?                  22 A. There's some measurement, yeah.                  23 Q. Okay. Let's talk about color histogram.                  24 So in order to determine the similarity                  25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was                  2 determined by weighted Euclidean distance; is that                  3 right?                  4 MR. HANSEN: Same objection.                  5 THE WITNESS: Correct.                  6 BY MR. EDWARDS:                  7 Q. And how did -- how was that weighted                  8 Euclidean distance determined?                  9 A. It was inverse variance.                  10 (Reporter seeks clarification.)                  11 A. Variance.                  12 Q. And it was inverse variance for components                  13 like coarseness, contrast and directionality?                  14 A. Correct.                  15 Q. Okay. And do you recall if that                  16 methodology changed or stayed the same after this                  17 article for the QBIC system?                  18 A. Most likely it evolved.                  19 Q. Do you know for sure?                  20 A. No.                  21 Q. Do you recall any details?                  22 A. No.                  23 Q. All right. Let's talk about shape next.                  24 The similarity between the query image and                  25 the database image also used weighted Euclidean</p>
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines                  2 distance between normalized histograms?                  3 A. Correct.                  4 Q. Do you recall any details of how that                  5 worked?                  6 A. Not off the top of my head.                  7 Q. Do you recall whether that methodology                  8 evolved for matching color histograms after this                  9 article?                  10 A. Not that I recall.                  11 Q. Okay. All right. Let's talk about                  12 texture next. And I don't know if you've read that,                  13 but that's at the bottom of 2394 and it goes to just                  14 barely at the top of 2395.                  15 (Witness reviews document.)                  16 A. Okay.                  17 Q. So for texture, the similarity is                  18 determined by the distance or the weighted Euclidean                  19 distance between the query object and -- the query                  20 object image and the database object image; is that                  21 right?                  22 MR. HANSEN: Objection; vague and ambiguous.                  23 THE WITNESS: Can you repeat.                  24 BY MR. EDWARDS:                  25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?                  2 A. Correct.                  3 Q. And do you recall how that worked?                  4 A. There's computing moments. And we used                  5 the shape measure, which I mentioned earlier,                  6 curvature and turning angle.                  7 (Reporter seeks clarification.)                  8 A. Curvature and turning angle.                  9 Q. And the curvature and turning angle would                  10 be compared between the image query and the database                  11 image; correct?                  12 A. Correct.                  13 Q. And do you recall if that methodology                  14 changed after this article came out in '93?                  15 A. Yes, it did.                  16 Q. How so?                  17 A. Well, in the IEEE computer paper, we                  18 described a different way of doing shape measures.                  19 And they included the moment calculations.                  20 Q. And you use the moment calculations to                  21 determine a distance between the image query and                  22 the -- and the database image?                  23 A. Yes.                  24 Q. Sorry?                  25 A. Yeah. Yes.</p>



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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?                  2 A. Given a binary blob, certain high-level                  3 moments and then you create -- compute the                  4 eigenvectors of certain matrices that are created --                  5 (Reporter seeks clarification.)                  6 A. Eigenvectors, e-i-g-e -- i-n -- to compute                  7 the eigenvectors of certain matrices. And that                  8 would give you translation and rotation and                  9 variance.                  10 Q. And so after the Exhibit 3 1995 IEEE                  11 article, did that methodology change to compute the                  12 distance for shape?                  13 A. I don't recall.                  14 Q. So the methodology for shape that you just                  15 described using moment calculations, that is                  16 different from what is described in the 1993 article                  17 for weighted Euclidean distance?                  18 A. We still might have used weighted                  19 Euclidean distance when the underlying features are                  20 different.                  21 Q. Understood.                  22 And the underlying features are different                  23 in the sense that in the 1995 article you're using                  24 what features?                  25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment                  2 invariants.                  3 (Witness reviews document.)                  4 A. Is there any other papers that we have                  5 here?                  6 Q. Nope.                  7 A. Everything else is screenshots?                  8 MR. STRAUSSMAN: I don't think you introduced                  9 any other papers.                  10 THE WITNESS: I saw it earlier today.                  11 BY MR. EDWARDS:                  12 Q. Why don't we do it this way. In terms of                  13 the feature calculations that were -- for shape on                  14 page IBM 900 of Exhibit 3 versus page --                  15 A. So if you look at 2393.                  16 Q. What page are you directing me to?                  17 A. 2393.                  18 Q. Okay.                  19 A. So it talks about the moment invariants as                  20 well.                  21 Q. Okay.                  22 A. These are those matrices that you compute                  23 eigenvectors of.                  24 (Reporter seeks clarification.)                  25 A. Matrices that you compute eigenvectors of.</p>	
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)                  2 Q. I think the page you may be looking for is                  3 IBM 900 on the left side.                  4 (Witness reviews document.)                  5 A. What else do we have here?                  6 Q. So if you'll look at -- if you'll -- if                  7 you'll compare page IBM 900 from Exhibit 3 to page                  8 IBM 2393 from Exhibit 2, those are the descriptions                  9 in both articles about the features that are                  10 calculated.                  11 A. I'm trying to remember what --                  12 MR. STRAUSSMAN: Can you direct him a little                  13 closer?                  14 BY MR. EDWARDS:                  15 Q. Can I show you? Do you mind?                  16 I believe this is what you're looking for.                  17 So if you look right here (indicating).                  18 (Witness reviews document.)                  19 A. That's the same as this one (indicating).                  20 We had another -- there's another discussion about                  21 moments.                  22 Q. So if you look at -- under "Shape                  23 features" at 2393, right there, where you're looking                  24 at --                  25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment                  2 invariants in the 1993 SPIE article?                  3 A. Correct.                  4 Q. Right. And then if you go to the IEEE                  5 article that you primarily co-authored, on page 900,                  6 it refers to shape queries using area, circularity,                  7 eccentricity, major-axis direction and features                  8 derived from the object moments.                  9 A. Right.                  10 Q. Is that the same thing as algebraic moment                  11 invariants?                  12 A. Right.                  13 Q. So it looks like the methodologies are the                  14 same for the features that are extracted between the                  15 papers; is that right?                  16 A. I thought one paper had algebraic moments                  17 and one had turning angle. Maybe they both had                  18 turning angle.                  19 (Reporter seeks clarification.)                  20 A. Turning angle. Algebraic moments.                  21 Turning angles.                  22 Q. The 1993 paper refers to algebraic moment                  23 invariants. The IEEE paper, on IBM 900, refers to                  24 features derived from object moments.                  25 Are those the same thing?</p>	



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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.</p> <p>2 Q. Okay. And so turning angles, which you've</p> <p>3 previously testified on, do you think that</p> <p>4 calculating shape features based on turning angles</p> <p>5 came after these papers?</p> <p>6 A. No. They're mentioned in these papers.</p> <p>7 Q. Okay. So they're included in these</p> <p>8 papers?</p> <p>9 A. Yes.</p> <p>10 Q. And so any distance measurement using</p> <p>11 weighted Euclidean distance would have taken into</p> <p>12 account turning angles?</p> <p>13 A. As a feature, yeah. Yes.</p> <p>14 Q. For both -- for both papers?</p> <p>15 A. For both papers.</p> <p>16 Q. Okay. Let's talk about sketch, which</p> <p>17 is -- if you'll just stick with 2395, which is</p> <p>18 Exhibit 2.</p> <p>19 MR. STRAUSSMAN: Can you direct him?</p> <p>20 THE WITNESS: I found it.</p> <p>21 MR. STRAUSSMAN: Okay.</p> <p>22 (Witness reviews document.)</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Let me know when you're finished reading</p> <p>25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the</p> <p>2 best matches based on order of similarity?</p> <p>3 A. Um-hum.</p> <p>4 Q. Does iterated query refinement mean that I</p> <p>5 can further refine that query to search for things</p> <p>6 like shape, like a -- you know, some shape in the --</p> <p>7 in the query image, like a logo or an icon, and that</p> <p>8 will further refine the results to give me things</p> <p>9 that have that similar shape inside the results of</p> <p>10 the color histogram?</p> <p>11 A. Yes.</p> <p>12 Q. And then I can -- I can keep doing that, I</p> <p>13 can further even refine that result by using a</p> <p>14 keyword, for example?</p> <p>15 A. Yes. Or you could do it all at once.</p> <p>16 Q. Okay. So the results of the query -- so</p> <p>17 we talked about before that the results of the</p> <p>18 queries display thumbnails of the database images</p> <p>19 based on similarity of which they match; correct?</p> <p>20 A. Correct.</p> <p>21 Q. And then those thumbnails can provide</p> <p>22 links to the original image or, if it was an</p> <p>23 r-frame, it could be -- you could provide a link to</p> <p>24 the video; correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.</p> <p>2 Q. For sketch, the similarity between the</p> <p>3 query image and the database image uses an algorithm</p> <p>4 that performs logical binary correlation of the</p> <p>5 binary image?</p> <p>6 A. Yes.</p> <p>7 Q. Are there any other details you recall for</p> <p>8 the sketch comparison beyond what's disclosed in</p> <p>9 this paragraph on IBM 2395?</p> <p>10 A. Not that I recall.</p> <p>11 Q. Do you recall the methodology for</p> <p>12 determining similarity of the input image and the</p> <p>13 database image for sketch changing after this</p> <p>14 article?</p> <p>15 A. Not that I recall.</p> <p>16 Q. So if you go to the next page,</p> <p>17 Mr. Flickner, which is 2396, the Section 4.2 talks</p> <p>18 about performing queries.</p> <p>19 A. Um-hum.</p> <p>20 Q. And in the last sentence it refers to</p> <p>21 something called iterated query refinement.</p> <p>22 A. Yes.</p> <p>23 Q. And what does that refer to?</p> <p>24 A. It's a way you can refine the query.</p> <p>25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links</p> <p>2 to information about the image that was associated</p> <p>3 with the image in the database?</p> <p>4 A. Yes.</p> <p>5 Q. And, again, that can be that -- whatever</p> <p>6 information that the user inputted or was associated</p> <p>7 with the image from the source?</p> <p>8 A. Yes.</p> <p>9 Q. Could the results also display a matching</p> <p>10 score so the user could see how well the particular</p> <p>11 result matched to the -- to the query image?</p> <p>12 A. It could.</p> <p>13 Q. Okay.</p> <p>14 MR. EDWARDS: I'm going to hand you the next</p> <p>15 exhibit, Mr. Flickner.</p> <p>16 (Deposition Exhibit 10 was marked.)</p> <p>17 MR. EDWARDS: Handing you what's been marked as</p> <p>18 Exhibit 10.</p> <p>19 For the record, it's IBM Bates Nos. 002418</p> <p>20 to 2430.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. The title of this article is "Updates to</p> <p>23 the QBIC system."</p> <p>24 Do you see that?</p> <p>25 A. Yes.</p>

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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?</p> <p>2 A. Yes.</p> <p>3 Q. You are listed as a co-author of this</p> <p>4 article; is that correct?</p> <p>5 A. Yes.</p> <p>6 Q. And it is a paper that is published in the</p> <p>7 SPIE; correct?</p> <p>8 A. Correct.</p> <p>9 Q. In 1997; correct?</p> <p>10 A. Yes. It was 1997 or 1998.</p> <p>11 Q. No later than 1998; correct?</p> <p>12 A. Correct.</p> <p>13 Q. So just want to kind of orient you to the</p> <p>14 first page, which is IBM 2419.</p> <p>15 A. It's '98 because '97 is a different paper.</p> <p>16 Q. Well, if you turn the page, look at the</p> <p>17 footer on the right-hand side.</p> <p>18 Are you familiar that SPIE usually</p> <p>19 includes footers with the volume and the date at the</p> <p>20 bottom?</p> <p>21 A. Yeah.</p> <p>22 Q. And if you look at the footer kind of</p> <p>23 towards the right it says -786X-97-\$10 [sic]?</p> <p>24 A. Yeah.</p> <p>25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?</p> <p>2 A. Yep.</p> <p>3 Q. Okay. So let's -- I'm going to have you</p> <p>4 jump around, so I apologize in advance. Let's go to</p> <p>5 the -- kind of the back, IBM 2428.</p> <p>6 A. Okay.</p> <p>7 Q. Is that example of the stamps demo that</p> <p>8 was available on IBM's website?</p> <p>9 A. Yes.</p> <p>10 Q. All right. And if you look at the top in</p> <p>11 the location URL it has the almaden.ibm website</p> <p>12 address; correct?</p> <p>13 A. Correct.</p> <p>14 Q. All right. Let's flip forward to 2429.</p> <p>15 And is 2429 a screenshot of a trademark</p> <p>16 demo that was also available in the Almaden --</p> <p>17 excuse me -- almaden.ibm website?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And that demo looks like the</p> <p>20 trademark query is based on shape; is that right?</p> <p>21 A. It uses shape as one similarity feature.</p> <p>22 Q. Right. So the trademarks are converted to</p> <p>23 a binary image, like we talked before -- talked</p> <p>24 about before, and then they're -- the matching</p> <p>25 process is done based on those binary images?</p>
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the</p> <p>2 conference was in '98.</p> <p>3 Q. Submission was in '97. So the paper was</p> <p>4 published in '97 and then the conference you</p> <p>5 presented it at was in 1998?</p> <p>6 A. That's possible.</p> <p>7 Q. Do you recall presenting this paper at a</p> <p>8 conference in 1998?</p> <p>9 A. No, I don't.</p> <p>10 Q. So the first page refers to the Photonics</p> <p>11 West 1999 -- excuse me. Photonics West 1998</p> <p>12 Electronic Imaging Conference in San Jose.</p> <p>13 Do you recall attending that conference?</p> <p>14 A. It's likely I did, but I don't recall.</p> <p>15 Q. Okay. But you would agree with me this</p> <p>16 paper was made available at least as early as 1998;</p> <p>17 correct?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. So the first page, IBM 2419. Under</p> <p>20 "Introduction," at the time of this paper it says,</p> <p>21 last line on the first paragraph, "Several online</p> <p>22 demos of QBIC are available at</p> <p>23 <a href="http://www.qbic.almaden.ibm.com">http://www.qbic.almaden.ibm.com</a>."</p> <p>24 Do you see that?</p> <p>25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p>22 Q. Okay. So 39 would be the -- so the first</p> <p>23 image at the top left is a 39, the one next to it is</p> <p>24 a 46, so the 39 would be a closer match than the 46;</p> <p>25 correct?</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference		
		<p><i>Id.</i> at 174–182</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; border-right: 1px solid black; padding-right: 10px;"> <p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin-top: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"??                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. 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Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

		<p style="text-align: right;">Page 178</p> <p>1 the image as well?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: It points to the file that's the                  4 QBIC catalog.                  5 BY MR. EDWARDS:                  6 Q. Can you walk us through that one more                  7 time? And just be a little bit louder, sorry.                  8 MR. HANSEN: Same objection.                  9 THE WITNESS: So the QBIC catalog is a set of                  10 files that hold data about visual features in the                  11 image.                  12 (Reporter seeks clarification.)                  13 THE WITNESS: Visual features. The image                  14 extender lets you search against that database,                  15 against that object.                  16 BY MR. EDWARDS:                  17 Q. The image extender lets you search against                  18 that catalog, the name of that catalog?                  19 A. The catalog, yeah.                  20 Q. Okay. And it does so by using a pointer                  21 from the handle in the table?                  22 MR. HANSEN: Objection; lacks foundation.                  23 THE WITNESS: Correct.                  24 BY MR. EDWARDS:                  25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold                  2 data for the following image features: Average                  3 color, Histogram color, Positional color and                  4 Texture."                  5 Is that right?                  6 A. Yep.                  7 Q. Okay. We spoke about average color,                  8 histogram color and texture; correct?                  9 A. Right.                  10 Q. What is positional color?                  11 A. We talked about it briefly. It's color in                  12 particular locations in the image.                  13 Q. Ah. Understood.                  14 That is -- that is similar to L in the                  15 demo that we looked at, which is called color                  16 layout.                  17 A. Okay, yes.                  18 Q. Is that correct?                  19 A. I don't remember if it's called L. Sounds                  20 right.                  21 Q. If you look at --                  22 MR. EDWARDS: If you can show -- give him                  23 Exhibit 6.                  24 THE WITNESS: Oh, this L. Yes.                  25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.                  3 MR. HANSEN: Objection; lacks foundation, calls                  4 for speculation.                  5 MR. EDWARDS: You can put that enormous exhibit                  6 aside.                  7 THE WITNESS: Test 1, 2, 3.                  8 BY MR. EDWARDS:                  9 Q. Go back to Exhibit 3, please. If you                  10 could turn to the page Bates-labeled IBM 894 with                  11 the architecture picture.                  12 A. Okay.                  13 Q. So I just -- I just want to kind of walk                  14 the -- through this architecture, Mr. Flickner. But                  15 as a high level, I just want to understand, is                  16 this -- is this a high-level architecture that would                  17 generally be used for any implementation of QBIC?                  18 A. Yes.                  19 Q. All right. So first step is you submit                  20 still images or r-frames for feature extraction; is                  21 that correct?                  22 A. Correct.                  23 Q. Okay. Features are extracted, such as                  24 color, texture, shape, sketch and text; correct?                  25 A. Location, yep.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 182</p> <p>1 Q. And location. Including the ones that I                  2 listed; correct?                  3 A. Yep.                  4 Q. Okay. After feature extraction is done,                  5 the images and those features for the database                  6 images are stored in the database; correct?                  7 A. Correct.                  8 Q. And then once those are stored, a user can                  9 query using some sort of a user interface; is that                  10 right?                  11 A. Correct.                  12 Q. And the user can query based on color,                  13 texture, shape, multi-object, sketch, location or                  14 text; is that right?                  15 A. Correct.                  16 Q. Okay. Those features are then decomposed                  17 and extracted from the query image and then a                  18 matching engine is used to compare those similarly                  19 extracted features from the stored images; is that                  20 correct?                  21 A. Correct.                  22 Q. And then the best matches are returned in                  23 similarity of order back to the user; is that right?                  24 A. Correct.                  25 Q. Okay. Thank you for that.</p> <p><i>Id.</i> at 190–191                  22 Q. So [as read], "Once the image catalogs are                  23 created, you can use the Image Query component to                  24 find image and business information. Business                  25 information, such as character and numeric data, are</p>

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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 198 – 199</p> <p>15 Q. Okay. And then if we can go to IBM 849.</p> <p>16 There?</p> <p>17 A. Yeah.</p> <p>18 Q. Top of the page says, "Adding image search</p> <p>19 to your Content Manager."</p> <p>20 Do you see that?</p> <p>21 A. Yeah. Yeah.</p> <p>22 Q. And the first paragraph starts -- talks</p> <p>23 about QBIC.</p> <p>24 Do you see that?</p> <p>25 A. Yeah.</p> <hr/> <p style="text-align: right;">Page 199</p> <p>1 Q. It says, "The image search server uses</p> <p>2 IBM's QBIC (query by image content) technology to</p> <p>3 help you search for objects by certain visual</p> <p>4 properties, such as color and texture."</p> <p>5 Did I read that correctly?</p> <p>6 A. Yes.</p> <p>7 Q. It says [as read], "The image search</p> <p>8 server analyzes images and stores the image</p> <p>9 information in a database. Then users can run image</p> <p>10 queries, which use the visual properties of image,</p> <p>11 to match colors, textures, and their positions</p> <p>12 without describing them -- describing them in</p> <p>13 words."</p> <p>14 Did I read that correctly?</p> <p>15 A. Yes.</p> <p>16 Q. And that's consistent with the features</p> <p>17 and functionalities that we have talked about in the</p> <p>18 1993 SPIE and 1995 IEEE article; correct?</p> <p>19 A. Correct.</p> <p><i>Id.</i> at 312 – 313</p>



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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>21 Q. For every implementation of QBIC, if an                      22 input image has an object and the object has colors,                      23 the color histogram feature would match those stored                      24 image that include objects with similar colors;                      25 correct?</p> <hr/> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 317–322</p> <p>22 Q. Okay. So for every commercial                      23 implementation of QBIC as of the IEEE 1995 article                      24 in Exhibit 3, those implementation calculated                      25 features of a query image and stored image; is that</p>



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		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>	
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query."</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>	

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 322</p> <ol style="list-style-type: none"><li>1 indicates how confident the system is that the</li><li>2 features of the stored image match the features of</li><li>3 the input image; correct?</li><li>4 A. Correct.</li></ol> <p>IBM0002263 at 2264:</p>

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	<p style="text-align: center;"><b>Description</b></p> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <p style="text-align: center;"><b>Image Classification</b></p> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <p style="text-align: center;"><b>Image Query</b></p> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p>	<p>and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <p style="text-align: center;"><b>Image Formats</b></p> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCX</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <p style="text-align: center;"><b>Product Positioning</b></p> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p>
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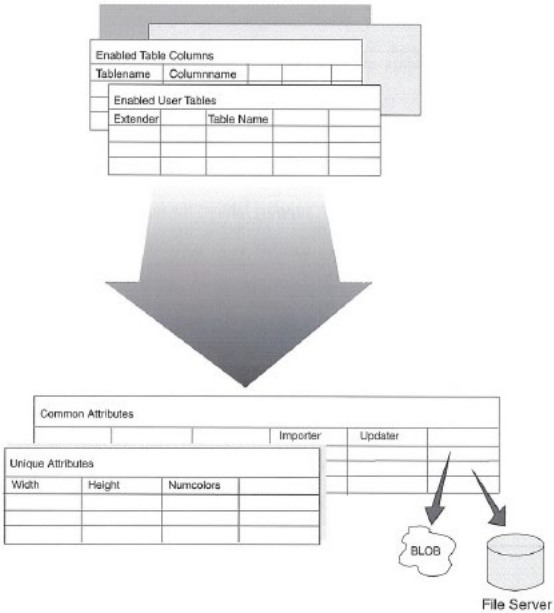
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>IBM000001 at 37-39</p> <hr/> <p><b>Extender data structures</b></p> <p>The Image, Audio, and Video Extenders create and use administrative support tables and handles to store and access image, audio, and video data. The Image Extender also creates and uses QBIC catalogs to access images by content. The Video Extender also uses index files and shot catalogs to access information about scene changes in a video.</p> <p><b>Administrative support tables</b></p> <p><b>Administrative support tables</b>, also called metadata tables, contain the information that the extenders need to process user requests on image, audio, and video objects. The information in administrative support tables is often referred to as “metadata”.</p> <p>As Figure 7 on page 18 illustrates, some of the administrative support tables identify user tables and columns that are enabled for an extender. These tables reference other administrative support tables that are created to hold attribute information about objects in enabled columns. In these tables, the extenders maintain information about attributes that are unique to a particular extender-defined data type, as well as information about attributes that are common across extender data types. For example, the Image Extender maintains information about the width, height, and number of colors in an</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><b>Data structures</b></p> <p>image, as well as information about attributes common to image, audio, and video objects, such as the identification of the person who imported the object into the database or who last updated the object.</p> <p>The administrative support tables can also contain the contents of stored objects in BLOB format. Alternatively, an object can be kept in a file and referenced by the administrative support tables. For example, a video clip can be stored as a BLOB in an administrative support table or kept in a file that is referenced by the table.</p>  <p style="text-align: center;"><i>Figure 7. Administrative support tables</i></p> <p>IBM000001 at 40-41</p>

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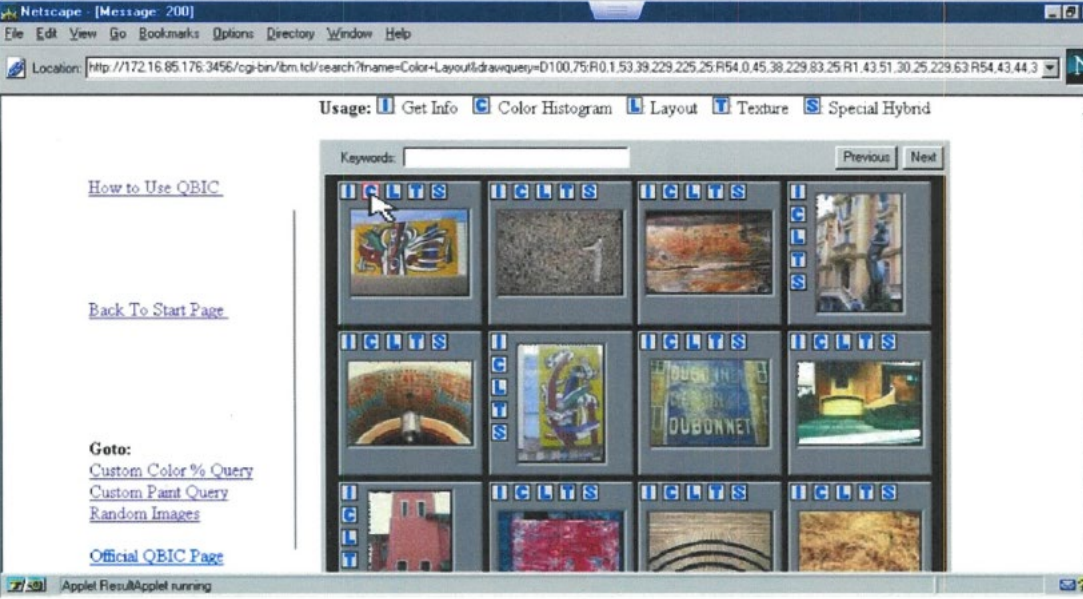
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p>Flickner 8/29/23 Depo Ex. 7 at 1</p>




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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p><i>See also</i> Flickner Depo at 25-26, 38-41, 40-42, 87, 201, 209-210, 214-215.</p> <p>IBM000001 at 39 – 41</p>



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Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

Element	'004 Claim Recitation	Exemplary Citations in Reference																																									
		<p style="text-align: right;"><b>Data structures</b></p> <p><b>Handles</b></p> <p>When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a <b>handle</b> to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object's attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.</p> <p>User Table</p> <table border="1"> <thead> <tr> <th>ID</th> <th>Name</th> <th>Picture</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Handle 1</td> </tr> <tr> <td></td> <td></td> <td>Handle 2</td> </tr> </tbody> </table> <p>Administrative Support Tables</p> <table border="1"> <thead> <tr> <th colspan="4">Common Attributes</th> </tr> <tr> <th>Handle</th> <th>Importer</th> <th>Updater</th> <th></th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Unique Attributes</th> </tr> <tr> <th>Handle</th> <th>Width</th> <th>Height</th> <th>Numcolors</th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>  <p><i>Figure 8. Handles</i></p> <p><b>QBIC catalogs</b></p> <p>A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.</p> <p>You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p style="text-align: right;">Chapter 2. DB2 extender concepts 19              IBM 000039</p>	ID	Name	Picture			Handle 1			Handle 2	Common Attributes				Handle	Importer	Updater		Handle 1				Handle 2				Unique Attributes				Handle	Width	Height	Numcolors	Handle 1				Handle 2			
ID	Name	Picture																																									
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		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® D82® Universal Database: Image, Audio, and Video Extenders</p> <p>IBM 000040</p>

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		<p style="text-align: center;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot catalog file name</li> <li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li> <li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li> <li>• Shot number</li> <li>• Starting frame number</li> <li>• Ending frame number</li> <li>• Representative frame number</li> <li>• Name of a file that contains the contents of the representative frame</li> </ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot handle</li> <li>• Video table name</li> </ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts 21                  IBM 000041</p> <p>IBM0002263 at 226</p>

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		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Description</b> </div> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Classification</b> </div> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Query</b> </div> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p style="text-align: right;">and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Formats</b> </div> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCK</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Product Positioning</b> </div> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <span>285-042</span> <span>-2-</span> </div>

IBM000777 at 794

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		<p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b>                      You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b>                      This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"> <li>• Improved installation procedures</li> <li>• Additional connectors for relational databases                      Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li> <li>• Advanced information mining and search capabilities                      Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li> <li>• Workflow capabilities                      By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li> <li>• Federated level access control                      You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li> <li>• Additional support for Content Manager:                         <ul style="list-style-type: none"> <li>- List, add, retrieve, update, and delete of content class</li> <li>- Asynchronous retrieval of object content</li> </ul> </li> </ul> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate</p>

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		<p>this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>providing an indication upon recognizing the at least one object as the target object; and</p>	<p>QBIC discloses the limitation.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396-98  <b>4.1. Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. This interface is made up of four parts (listed from top to bottom): the window menu, the tool selection buttons, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Fig. 4</p>

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		 <p>Figure 4: Object Identification Tool. Note for example, the right dog's ear, which has been outlined.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390-404) at 2396</p>



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		<p><b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of (<i>R, G, B</i>) sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <i>n</i>th best match (<i>n</i> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p>



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The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9

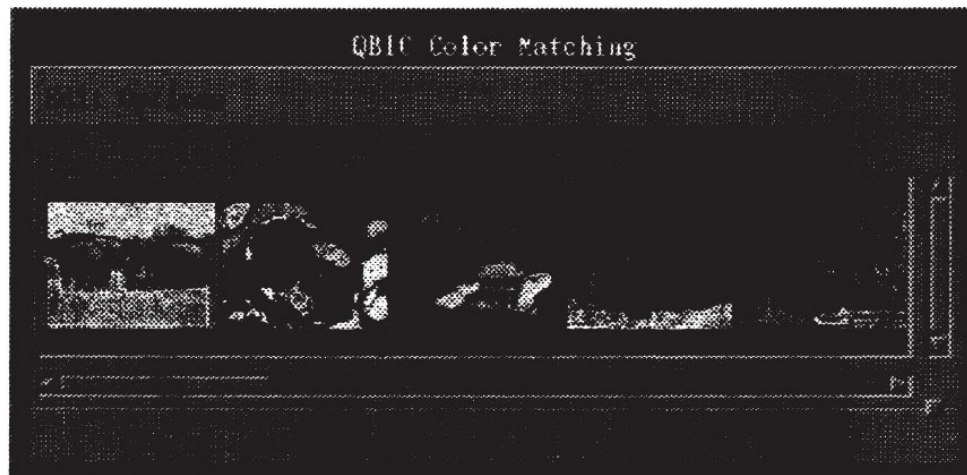

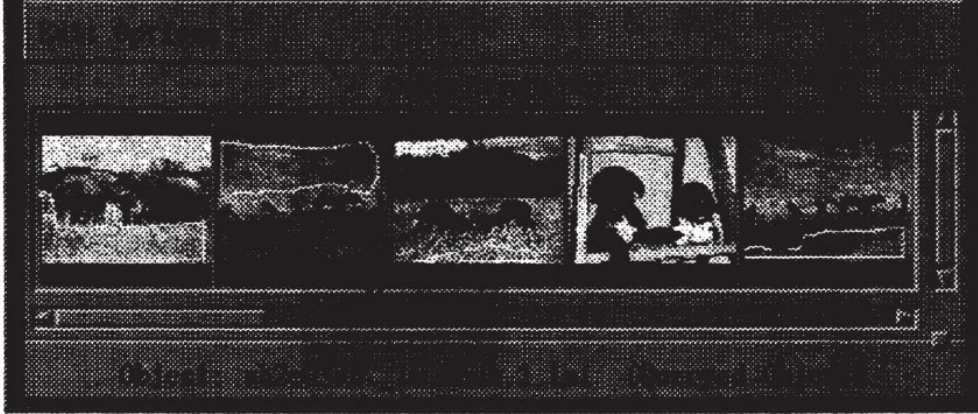


Figure 7: Result of query by example using color only.

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		<p>QBIC Color Matching</p>  <p>Figure 8: Result of query by example using texture only.</p> <p>QBIC Color Matching</p>  <p>Figure 9: Result of query by example using color and texture.</p>

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		<p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.                      For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.                      Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen.                      Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).”  <i>Id.</i> at p. 3.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.                      When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how</p>

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		<p>similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747)</p> 

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		<p><b>QBIC Demo (IBM000747)</b></p>  <p>The screenshot shows a web browser window with the URL <code>http://172.16.85.176:3456/cgi-bin/ibm.tcl/info?france50%2Ejpg</code>. The page features the IBM logo and the text 'QBIC' with a small image of a person. Below this, there is a section titled 'Image france50.jpg' which contains a large image of a building facade with a colorful mural. Navigation links include 'How to Use QBIC' and 'Back To Start Page'. A 'Goto:' field is visible at the bottom left.</p> <p><b>Flickner Depo at 201-202</b></p> <p>5 Q. Now, to search a video by content using          6 CueVideo, how would the features be extracted from          7 the video?          8 MS. HAYDEN: Objection. Foundation.          9 THE DEPONENT: You typically would          10 extract -- you -- you try to find key frames and          11 then you populate the image database with key          12 frames.          13 Q. (By Mr. Dang) And how would you search          14 for those key frames in the image data?          15 A. You could use a QBIC-like engine.          16 Q. And by QBIC-like engine, what do you          17 mean?          18 A. Some image content-based retrieval          19 system.          20 Q. And what would the CueVideo system return          21 in response to a video query?          22 A. Typically, video snippets or videos</p>

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		<p>1 with -- where you already -- you had already seeked</p> <p>2 to the -- the point of the -- of the match.</p> <p>3 Q. Would it return the same video as the</p> <p>4 query video?</p> <p>5 A. It would -- it would return snippets, as</p> <p>6 I recall.</p> <p>7 Q. And snippets of which videos?</p> <p>8 A. Of the video that's -- the -- that the</p> <p>9 database has been created with.</p> <p>10 Q. Were those video snippets indexed in any</p> <p>11 way?</p> <p>12 A. I'm sure they were.</p> <p><b>Flickner Depo at 41-42</b></p> <p>18 Q. So if I'm understanding this right, you</p> <p>19 could take a query video, the system would extract</p> <p>20 frames, which would then extract features from it,</p> <p>21 and then the system would return either shot clips</p> <p>22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>2 Q. Okay. And how many key frames would be</p> <p>3 returned?</p> <p>4 A. It depends how many you requested.</p> <p>5 Q. Could you alter how many you request?</p> <p>6 A. Probably.</p> <p>7 Q. Could you return key frames based on some</p> <p>8 defined threshold of the distance?</p> <p>9 A. Probably.</p>

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		<p>Flickner Depo at 50</p> <p>7 Q. And so if I clicked on this T, and it              8 used the texture features, what would -- what would              9 the system do?</p> <p>10 A. It would return the list of stamps based              11 on similarity and texture.</p> <p>12 Q. And how would it decide which stamps were              13 the most similar to that query image?</p> <p>14 A. It would use those texture features to              15 compute it, and then it -- I think it was using L              16 to distance.</p> <p>Flickner Depo at 162-163</p> <p>15 Q. How did the trade -- how did the              16 technology implemented in the trademark demo decide              17 how many results to return to the user?</p> <p>18 A. So it was -- it was an exact match or a              19 binary search for the text fields using some              20 metric, like string at a distance, or something              21 like that, and that would give you a list and a              22 rank by the image features.</p>



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		<p>7 Q. Okay. What about the -- the stamps demo,              8 going back to that, did the stamps demo return a              9 set number of results for each query?              10 For example, was it always the original              11 image and 11 results?              12 A. Again, the output -- the number of              13 results output was probably a parameterized              14 option -- option, and I don't recall having text              15 ability on the stamp demo.              16 Q. So you think that the user may have been              17 able to indicate to the QBIC system how many              18 results he wanted to see?              19 A. The user could configure the -- the GUI              20 to display a certain number of results.</p> <p>Flickner Depo at 131-132              14 Q. An action that the QBIC system would              15 automatically take based on the results it would              16 return.              17 A. So you're saying as you return results,              18 you do some post-filtering on the image or the --              19 what -- what kind of --              20 Q. Perhaps not -- not post-filtering.              21 But, for example, displaying a hyperlink              22 along with the results for a specific result.              1 A. Yeah, you could do that.</p> <p>Flickner 8/29/23 Depo at 119-128</p>



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		<p style="text-align: right;">Page 118</p> <p>1 Do you see that?                  2 A. Yeah.                  3 Q. And then it describes different icons: I,                  4 C, L, T and S.                  5 Do you see that?                  6 A. Um-hum.                  7 Q. Are those icons similar to the QBIC demo                  8 that you hosted on the IBM's website?                  9 A. I don't recall the specific details. Most                  10 likely, yes.                  11 Q. Okay. So it says, "Click I to view the                  12 full image."                  13 Do you see that?                  14 A. Um-hum.                  15 Q. Was there a similar capability on the demo                  16 that was hosted on IBM's website?                  17 A. I don't recall.                  18 Q. So do you know what happens if you clicked                  19 I?                  20 A. Yeah, you -- pops the window up and you                  21 see the full image.                  22 Q. Okay.                  23 (Reporter seeks clarification.)                  24 A. It pops the window up.                  25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.                  2 Q. Does that correspond to the four features                  3 we looked at earlier, so for -- well, strike that.                  4 For color earlier we looked at two                  5 different flavors. We looked at average color and                  6 we looked at color histogram. So you said --                  7 A. Right.                  8 Q. -- C was color histogram.                  9 Does L correspond to average color or                  10 something different?                  11 A. Well, L has space embedded into it. So                  12 where the color appears in the image matters.                  13 Q. Okay.                  14 A. So C would be the whole image, what was                  15 the color percentage, and L would be I want a                  16 certain percentage in this region and a certain                  17 percentage in this region.                  18 Q. Okay. So what -- if you recall, so to                  19 calculate a color layout feature, do you recall the                  20 details of how that was done?                  21 MR. HANSEN: Objection; foundation.                  22 THE WITNESS: I don't recall.                  23 BY MR. EDWARDS:                  24 Q. Do you recall if that used -- for the                  25 color component, do you recall if that used</p>
		<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such                  2 a . . .                  3 MR. STRAUSSMAN: You got to speak up.                  4 BY MR. EDWARDS:                  5 Q. That's how you implemented what?                  6 A. You implement what the instructions say.                  7 Q. Okay. Is that a similar implementation                  8 for the other demos that you worked on?                  9 A. Most likely, yes.                  10 Q. Okay. So you click on I and then I would                  11 take you to a link that showed the full image?                  12 A. Um-hum.                  13 Q. Okay. And it says, "Click C to search                  14 images with similar color percentage."                  15 Do you see that?                  16 A. Yep.                  17 Q. Is that the color histogram?                  18 A. Most likely.                  19 Q. Okay. And it says, "Click L to search                  20 images with similar color layout."                  21 What does "color layout" mean?                  22 A. So now you're asking for color in                  23 different positions of the image.                  24 Q. Okay.                  25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?                  2 A. Average color or histogram --                  3 (Reporter seeks clarification.)                  4 MR. HANSEN: Objection; foundation.                  5 THE WITNESS: Average color or histogram color.                  6 So histogram as a space a position in the image.                  7 BY MR. EDWARDS:                  8 Q. Right. And color layout, is that                  9 something that you recall being developed by the                  10 QBIC team as a feature that can be extracted?                  11 A. Right.                  12 Q. Okay. And so it is color in a specific                  13 position?                  14 A. Yes.                  15 Q. Do you recall any of the algorithms that                  16 were used to calculate that?                  17 A. I think we were using color histogram.                  18 Q. Color histogram. Okay. And then how                  19 would you calculate the position aspect of it?                  20 MR. HANSEN: Objection; lacks foundation.                  21 THE WITNESS: We had -- the sketch tools would                  22 let you select a region and paint a color. And then                  23 you'd paint a crude map and then you would go search                  24 for color images that have the blue sky and the                  25 white sand. That's a different query than if you</p>

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then          2 you're looking for blue water, white sand.          3 BY MR. EDWARDS:          4 Q. Do you recall what the methodologies          5 used -- that were used to calculate the orientation          6 of those colors in the image?          7 MR. HANSEN: Objection; lacks foundation.          8 THE WITNESS: There's no orientation per se.          9 It's just position.          10 BY MR. EDWARDS:          11 Q. Well, then position. Do you recall what          12 the methodologies are to calculate the position?          13 MR. HANSEN: Same objection.          14 THE WITNESS: Position is something the user          15 inputs.          16 BY MR. EDWARDS:          17 Q. Something you use what?          18 A. The user had to input.          19 Q. Okay. And then let's move on to the next          20 one, T. It says, "Click T to search images with          21 similar global texture."          22 A. Yeah.          23 Q. Do you recall, in your work on the QBIC          24 project, a feature called global texture that could          25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?          2 A. G-a-b-o-r.          3 Q. So switch over and look at the second page          4 of this Exhibit 6.          5 So -- well, first back -- go back to -- go          6 back to the first page. If you see on the left-hand          7 side it says, "Goto: IBM Image Search Demo," and a          8 little finger there is clicking it.          9 You see it's in red?          10 A. Yeah.          11 Q. Okay. So that's clicking on that link.          12 And then the second page is going to the IBM image          13 search demo.          14 A. Okay.          15 Q. Okay? On the second page it is showing          16 thumbnails with the different icons that we just          17 walked through, I, C, L, T, S, on each of those          18 icons.          19 Do you see that?          20 A. Yep.          21 Q. Do you recognize this as a similar layout          22 to the QBIC demos you hosted in the '90s?          23 A. I don't.          24 Q. You don't?          25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .          2 Q. Say again?          3 A. I missed one of your words. A feature          4 called what?          5 Q. I said do you recall in your work on the          6 QBIC project a feature called global texture that          7 was extracted from the image?          8 A. Yes.          9 Q. Okay. Is that -- is that akin to texture          10 that we looked at earlier?          11 A. Yes.          12 Q. Okay. And the last one is S. It's,          13 "Search images with special multipass filter."          14 Do you recall, in your work on the QBIC          15 project, being able to calculate a feature called          16 multipass filter?          17 A. Probably Gabor functions.          18 Q. Say again?          19 A. Gabor functions.          20 Q. One more time and louder.          21 A. Gabor functions.          22 Q. Gabor functions. Okay. What are Gabor          23 functions?          24 A. Gabor functions are a way of producing          25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM          2 website that was the AIX operating system in          3 Exhibit 3, that did not have a similar thumbnail          4 layout like this?          5 A. A thumbnail, yes. I don't recall it had          6 the buttons, the I, C, L, T, S.          7 Q. You don't recall it had all the buttons or          8 some of the buttons?          9 A. All the buttons.          10 Q. Okay. So you don't recall that it had any          11 buttons?          12 A. I don't -- yeah. I don't recall.          13 Q. It could have, it couldn't have, you just          14 don't remember?          15 A. I just don't remember, yeah.          16 Q. Okay. But the one that you hosted on          17 IBM's website, it did have thumbnails in a similar          18 format here?          19 A. Yeah, it had thumbnails.          20 Q. And these thumbnails represent the images          21 that are stored in the database?          22 A. Yes.          23 Q. Okay. Here, the 470 images would be          24 reflected at least -- one, two, three, four, five,          25 six, seven -- eight of them right here in this</p>

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And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p> </td> <td> <p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p> </td> </tr> <tr> <td> <p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p> </td> <td> <p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p> </td> </tr> </table>	<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? 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Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>
<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>					
<p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>					
<p><i>Id.</i> at 144</p>						

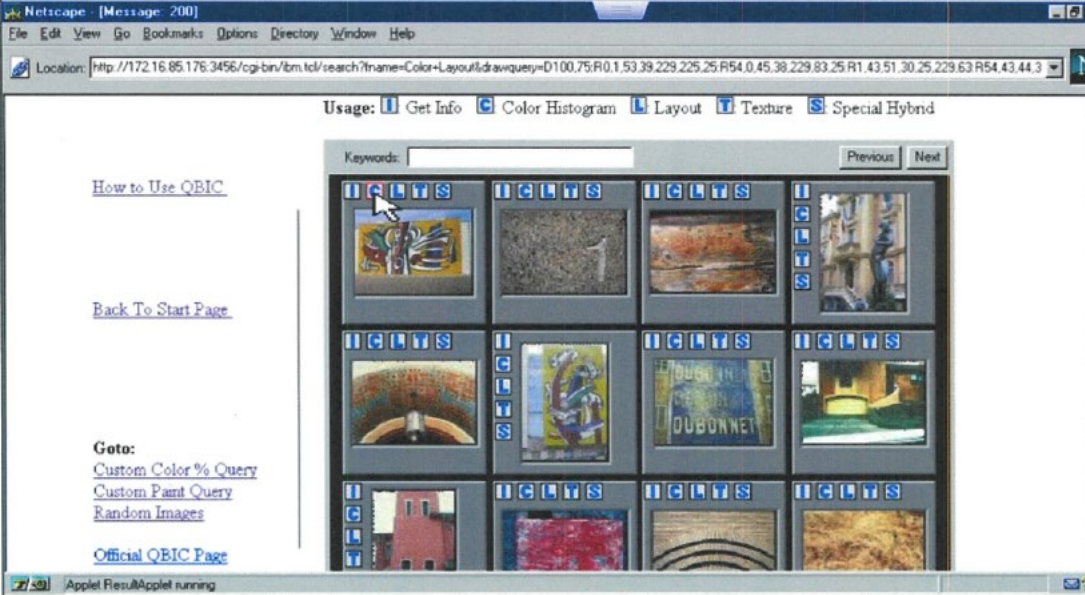
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>5 Q. Well, let's talk about them. We can get                      6 into detail here.                      7 Well, before we -- before we get there, so                      8 how does the QBIC system display the results of                      9 matches to the user?                      10 A. Typically just thumbnails in a window in                      11 multiple ordered hits.                      12 Q. Okay. And it displays them in the order                      13 by which they're most similar. So the, you know,                      14 best match to the next best match to the next best                      15 match, so on and so forth?                      16 A. Correct.</p> <p><i>Id.</i> at 160 – 161                      16 Q. Okay. So the results of the query -- so                      17 we talked about before that the results of the                      18 queries display thumbnails of the database images                      19 based on similarity of which they match; correct?                      20 A. Correct.                      21 Q. And then those thumbnails can provide                      22 links to the original image or, if it was an                      23 r-frame, it could be -- you could provide a link to                      24 the video; correct?                      25 A. Correct.</p>


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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.</p> <p>Flickner 8/29/23 Depo Ex. 7 at 1</p>  <p><i>Id.</i> at 2</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo at Ex. 8</p>



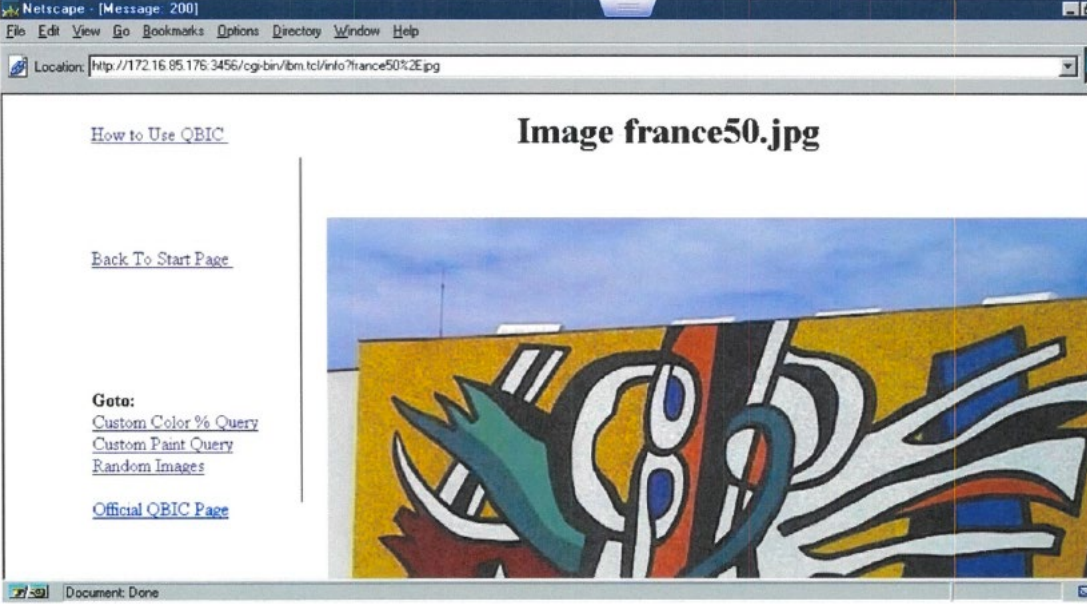
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>

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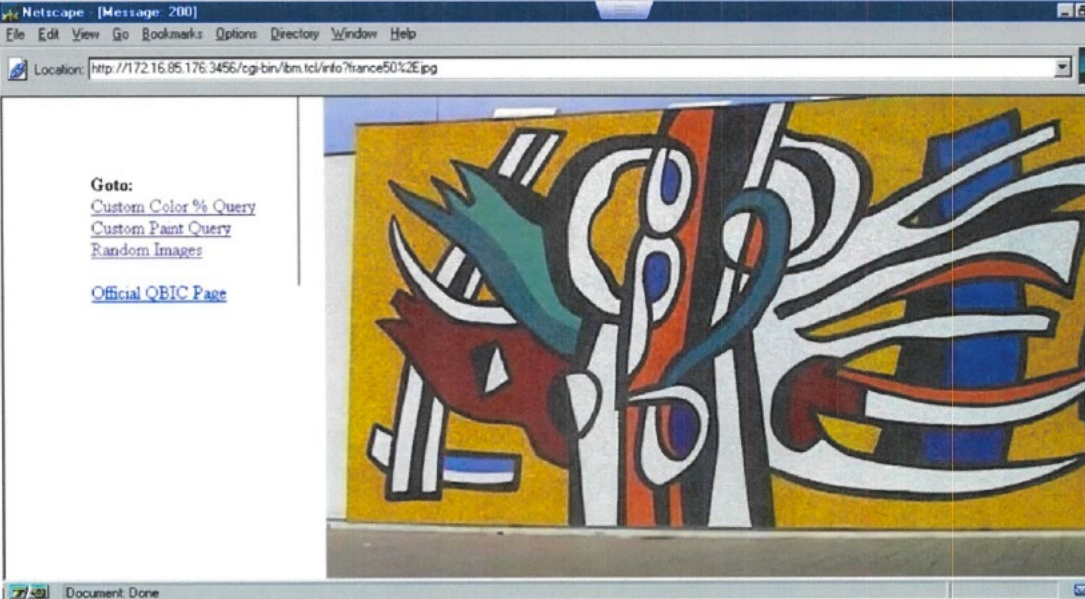
Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>The screenshot shows a Netscape browser window with the title "[Message: 200]". The address bar displays the URL "http://172.16.85.176:3456/cgi-bin/ibm.tcl/info?france50%2Ejpg". The main content area features a large, colorful abstract painting titled "Image france50.jpg". To the left of the painting, there is a list of links: "How to Use QBIC", "Back To Start Page", "Goto: Custom Color % Query", "Custom Paint Query", "Random Images", and "Official QBIC Page". The status bar at the bottom of the browser window indicates "Document Done".</p> <p><i>Id.</i> at 3</p>



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Invalidity Chart for U.S. Patent 9,324,004 based on the Query by Image and Video Content (“QBIC”) System

Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>The screenshot shows a Netscape browser window with the title "[Message: 200]". The address bar contains the URL "http://172.16.85.176:3456/cgi-bin/bm.tcl/info?france50%2Ejpg". The main content area features a large, vibrant abstract graphic with bold lines and colors (yellow, red, blue, white, green). To the left of the graphic, there is a list of links under the heading "Goto:":</p> <ul style="list-style-type: none"><li><a href="#">Custom Color % Query</a></li><li><a href="#">Custom Paint Query</a></li><li><a href="#">Random Images</a></li><li><a href="#">Official QBIC Page</a></li></ul> <p>The status bar at the bottom of the browser window displays "Document Done".</p>

Flickner 8/29/23 Depo at Ex. 9

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8/2/2019 Search Results

<http://www.qbic.almaden.ibm.com/cgi-bin/stamps-demo> Go JUL JAN FEB  
 25 captures 17 1998 1999 2000 About this capture  
 15 Feb 1998 - 15 Aug 2003

**QBIC**™

© IBM Corporation

Usage:  Get Info  Histogram  Layout  Find Similar Texture  
 Special Hybrid Color

How to Use QBIC

Stamps database  
courtesy of Walnut  
Creek CDROM.

Goto:  
Custom Color % Query  
Custom Paint Query  
Query by Properties  
Random Images

Official QBIC Page

I C L T S I C L T S I C L T S I C L T S  
 I C L T S I C L T S I C L T S I C L T S  
 I C L T S I C L T S I C L T S I C L T S  
 I C L T S

(Use a Java-capable Web browser to enable additional functionality.)

Query was:  
Random

**EXHIBIT 4**  
FLICKNER  
August 8, 2019  
Rebecca Romano, CSR 12546

Def EXHIBIT 9  
WITNESS: Flickner  
DATE: 8-29-23

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		<p><i>See also</i> Flickner Depo at 22-25, 25-26, 38-41, 209-210</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	presenting to a user, via an address, content information associated with the target object.	<p>QBIC discloses the limitation.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>4.2. <b>Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of <math>(R, G, B)</math> sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <math>n</math>th best match (<math>n</math> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p>5. <b>Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>IBM0002390 at 2391-92</p> <p>2.1. <b>Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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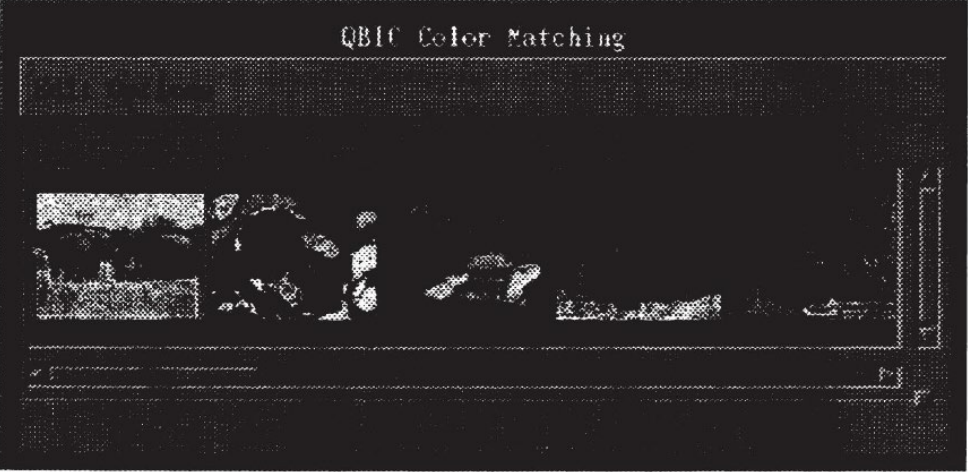
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9</p>



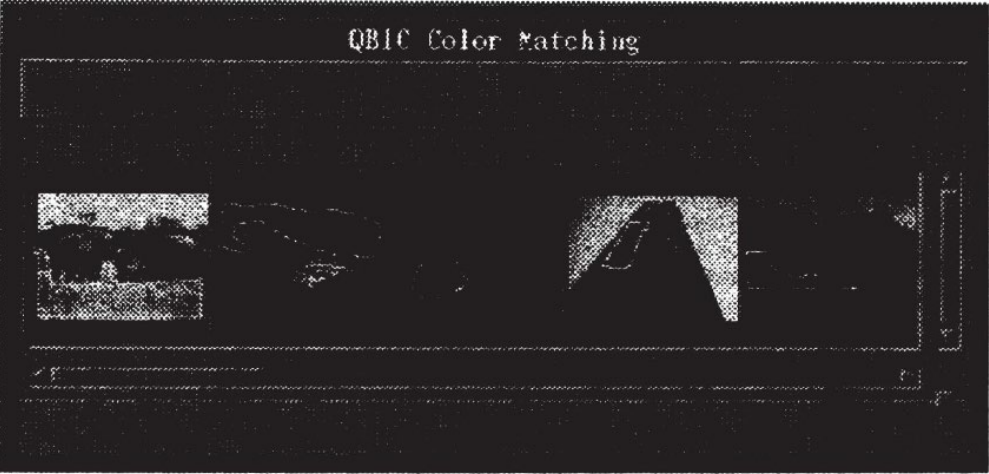
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 7: Result of query by example using color only.</p>

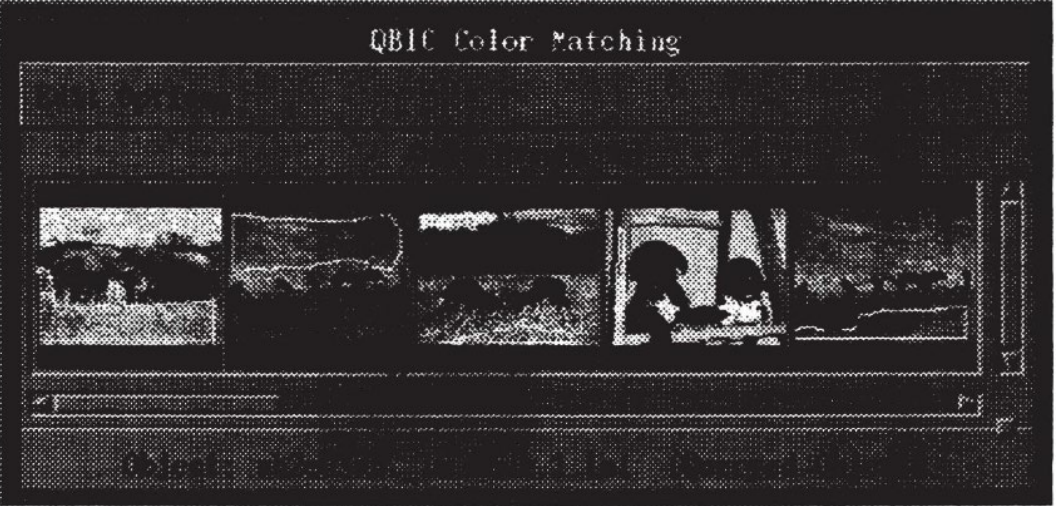
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 8: Result of query by example using texture only.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 9: Result of query by example using color and texture.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content—colors, textures, shapes, and camera and object motion—and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>



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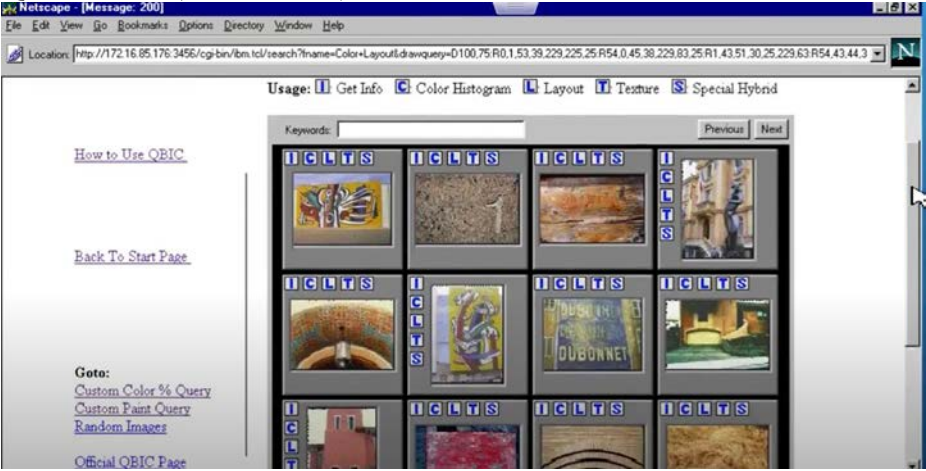
Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>The diagram illustrates the QBIC system architecture, divided into database population (top) and query (bottom) phases.</p> <p><b>Database Population (Top):</b></p> <ul style="list-style-type: none"> <li><b>Input:</b> Still images and Video.</li> <li><b>Video Processing:</b> Video is processed through "Feature extraction" to produce "Motion objects" and "Shots".</li> <li><b>Object Identification:</b> A "User" provides input to "Object identification", which outputs "Objects".</li> <li><b>Scene Processing:</b> "Still images" and "Objects" are processed through "Feature extraction" to produce "Scene" (containing Sketch, Positional color/texture) and "Object" (containing User defined, Texture, Color, Location, Shape).</li> <li><b>Database:</b> All extracted features (Scene, Object, Video motion, Camera motion) are stored in a "Database".</li> <li><b>Filtering/Indexing:</b> A "Filtering/indexing" step is connected to the Database.</li> </ul> <p><b>Query (Bottom):</b></p> <ul style="list-style-type: none"> <li><b>Query Interface:</b> A "User" provides input to a "Query interface" with search criteria: Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, User defined, Existing image.</li> <li><b>Match Engine:</b> The query is processed by a "Match engine" using the same search criteria as the query interface.</li> <li><b>Output:</b> The match engine returns "Best matches returned in similarity order" to the "User".</li> </ul>

Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.


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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p><b>QBIC Demo (IBM000747)</b></p> 

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>QBIC Demo (IBM000747)</p>  <p>Flickner Depo at 131-132</p> <p>14 Q. An action that the QBIC system would          15 automatically take based on the results it would          16 return.</p> <p>17 A. So you're saying as you return results,          18 you do some post-filtering on the image or the --          19 what -- what kind of --</p> <p>20 Q. Perhaps not -- not post-filtering.</p> <p>21 But, for example, displaying a hyperlink          22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p> <p>Flickner 8/29/23 Depo at 53-56</p>

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		16 Q. And when it refers to "text information,"	
		17 what is it referring to?	
		18 A. Anything that could be extracted in the	
		19 context of how the image was annotated.	
		20 Q. And when you say "annotated," annotated by	
		21 the user who was populating the database?	
		22 A. Could be.	
		23 Q. What else could it be?	
		24 A. It could be the supplier of the data.	
		25 Q. Okay. So you may have some annotations	

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Element	'004 Claim Recitation	Exemplary Citations in Reference	
		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 68–72</p> <p>22 Q. Okay. And in what form would those                  23 results be displayed to me? For images would they                  24 be displayed as a thumbnail?                  25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those                  2 be displayed to you?                  3 A. It could be as a thumbnail or as a short                  4 video clip or as a single representative frame.                  5 Q. Okay. So they could be -- so for a video,                  6 there's a video that matched the image query of an                  7 r-frame, the results I could get back could include                  8 three things. It could be a still image, it could                  9 be a thumbnail, or it could be an r-frame                  10 representation?                  11 A. R-frame, I think, is representative frame.                  12 So it was a key frame in that video sequence,                  13 summary frame.                  14 Q. Once I ran a query on an r-frame; right?                  15 Well, let's stop there.                  16 If I run a query on still images,                  17 typically the results I would get back are                  18 thumbnails that are most similar to the                  19 characteristics which I queried from the query                  20 image; right?                  21 A. You could get thumbnails back. You could                  22 also get the full-sized image back.                  23 Q. Okay.                  24 A. Thumbnail is a tool for helping you return                  25 lots of results and quickly scan it.</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference	
		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I                  2 have to click on the thumbnail in order to bring up                  3 the full-sized image?                  4 A. You could.                  5 Q. Otherwise I could automatically receive                  6 the full-sized image as part of the result?                  7 A. You could.                  8 Q. Okay. So walk through that process if I'm                  9 using an r-frame of a video. If I do a -- if I run                  10 a query on an r-frame of a video as a -- an image                  11 query, how could I get the results back?                  12 MR. HANSEN: Objection; vague and ambiguous.                  13 BY MR. EDWARDS:                  14 Q. In what form would I get the results back?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: You could get back the still                  17 r-frame, representative frame, you could get back                  18 the thumbnail, or you could get back the entire                  19 video clip that that r-frame represents, a few                  20 frames.                  21 BY MR. EDWARDS:                  22 Q. If I received a thumbnail or the r-frame,                  23 would there be some sort of link I could click on to                  24 get the underlying full video?                  25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic                  2 units initially returned in a video query."                  3 Meaning the r-frames?                  4 A. Correct.                  5 Q. "For example, in a query for shots that                  6 are dominantly red, a set of r-frames will be                  7 displayed. To see the actual video shot, the user                  8 clicks on the displayed r-frame icon."                  9 A. Yep.                  10 Q. And that was one of the ways you were                  11 describing that the results of a r-frame query would                  12 be returned to the user?                  13 A. Right.                  14 Q. Do you know if that was the preferred way                  15 that was used in demos in commercial applications?                  16 MR. HANSEN: Objection; vague and ambiguous,                  17 lacks foundation.                  18 MR. STRAUSSMAN: You can answer.                  19 THE WITNESS: I don't know.                  20 BY MR. EDWARDS:                  21 Q. But, Mr. Flickner, this -- generally this                  22 article represents the status of the QBIC technology                  23 as of the date of this publication, which is                  24 September 1995; is that right?                  25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.                  2 THE WITNESS: As I recall -- I'm not sure                  3 definitely, but, yes, this is -- you could do that.                  4 BY MR. EDWARDS:                  5 Q. So let's go to page IBM 898.                  6 So if you'll take -- just read that                  7 paragraph that starts with the header                  8 "Representative Frame Generation."                  9 MR. STRAUSSMAN: And if you need to read                  10 anything else to put it in context, feel free to do                  11 so.                  12 THE WITNESS: Okay.                  13 (Witness reviews document.)                  14 THE WITNESS: So what was your question, again?                  15 BY MR. EDWARDS:                  16 Q. If you go to the sentence that says,                  17 "First" -- it's the second sentence in that                  18 paragraph. It says, "First, during database                  19 population, r-frames are treated as still images."                  20 See that?                  21 A. Yeah.                  22 Q. And that's what you told me earlier,                  23 correct?                  24 A. Yeah.                  25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --                  2 Q. Okay.                  3 A. -- there's an editorial process.                  4 Q. Say that last part?                  5 A. There's an editorial process. You submit                  6 it, they edit and make changes and eventually it                  7 appears.                  8 Q. Right. So what you're saying is there's                  9 some lag between the time that you wrote the article                  10 and the time it was published?                  11 A. Yeah.                  12 Q. So this article -- but this article                  13 represents the state of the QBIC technology at least                  14 as of September 1995?                  15 A. Yeah. Yes.                  16 Q. And then let's go to IBM 900.                  17 And take your time to orient yourself on                  18 that page, but what I really want to ask you about                  19 is the last paragraph on the left-hand column going                  20 up to the top of the right-hand column.                  21 A. Yep.                  22 Q. So it says this paper describes [as read],                  23 "a prototype system that uses image and video                  24 content as the basis for retrievals."                  25 Is that right?</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 118–119</p> <p>18 Q. So do you know what happens if you clicked                      19 I?                      20 A. Yeah, you -- pops the window up and you                      21 see the full image.                      22 Q. Okay.                      23 (Reporter seeks clarification.)                      24 A. It pops the window up.                      25 Q. And how do you know that?</p> <hr/> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such                      2 a . . .                      3 MR. STRAUSSMAN: You got to speak up.                      4 BY MR. EDWARDS:                      5 Q. That's how you implemented what?                      6 A. You implement what the instructions say.                      7 Q. Okay. Is that a similar implementation                      8 for the other demos that you worked on?                      9 A. Most likely, yes.                      10 Q. Okay. So you click on I and then I would                      11 take you to a link that showed the full image?</p> <p><i>Id.</i> at 129 – 131</p>



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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>
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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 160–161</p> <p>16 Q. Okay. So the results of the query -- so                      17 we talked about before that the results of the                      18 queries display thumbnails of the database images                      19 based on similarity of which they match; correct?                      20 A. Correct.                      21 Q. And then those thumbnails can provide                      22 links to the original image or, if it was an                      23 r-frame, it could be -- you could provide a link to                      24 the video; correct?                      25 A. Correct.</p> <hr/> <p>1 Q. And does the thumbnail also provide links                      2 to information about the image that was associated                      3 with the image in the database?                      4 A. Yes.                      5 Q. And, again, that can be that -- whatever                      6 information that the user inputted or was associated                      7 with the image from the source?                      8 A. Yes.                      9 Q. Could the results also display a matching                      10 score so the user could see how well the particular                      11 result matched to the -- to the query image?                      12 A. It could.</p> <p><i>Id.</i> at 321</p>

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Element	'004 Claim Recitation	Exemplary Citations in Reference
		<p>5 Q. Mr. Flickner, every commercial                      6 implementation of QBIC as of the Exhibit 3, IEEE                      7 1995 article, returned results of the matching                      8 process to the user in the form of a stored image                      9 and information associated with that image; is that                      10 fair?                      11 MR. HANSEN: Objection; lacks foundation.                      12 THE WITNESS: Yes.                      13 BY MR. EDWARDS:                      14 Q. Okay. And a thumbnail is an image;                      15 correct?                      16 A. Thumbnail is an image.</p> <p>Flickner Depo at 25-26, 41-42, 50, 162-163, 201-202, 209-210</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**2. Claim 6**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
6	<p>The method of claim 1, wherein the at least one object is identified as the target object based at least in part on at least one user input.</p>	<p>QBIC discloses the limitation.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391-92  <i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396                      All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <i>n</i>th best match (<i>n</i> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>

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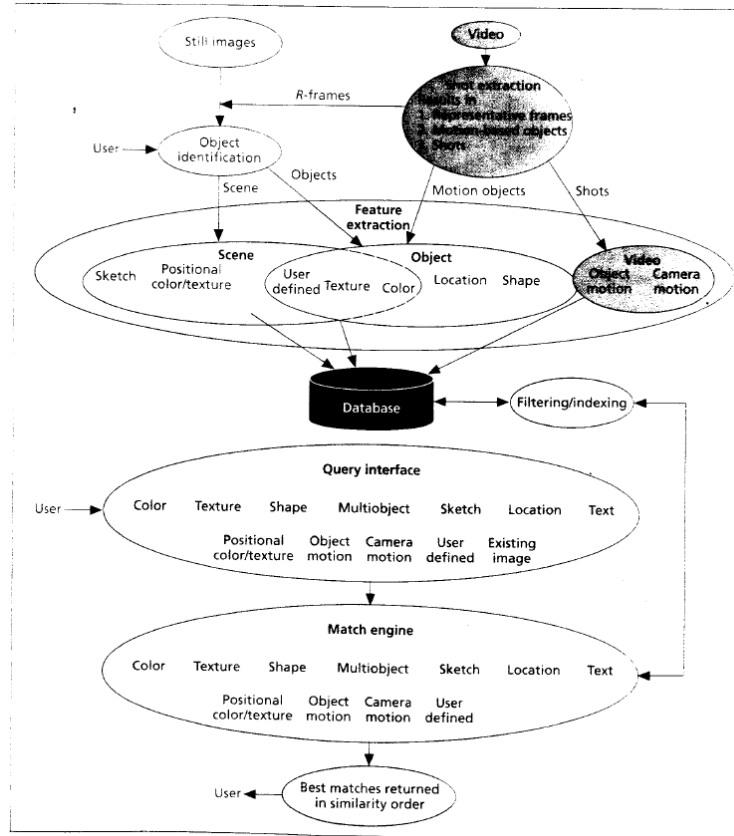


Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.

“USER INTERFACE. The user interface must be designed to let users easily select content-based properties, allow these properties to be combined with each other and with text or parametric data, and let users reformulate queries and generally navigate the database.” *Id.* at p. 9.

Image, Audio, and Video Extenders Administration and Programming (IBM 000001-617):

“Your applications can even search for images by content. Imagine an application

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		<p>that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog. When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>
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QBIC Demo (IBM000747)



QBIC Demo (IBM000747)





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QBIC Demo (IBM000747)



Flickner Depo at 49-50

13 Q. Okay. And what about the L button, it  
14 says "Layout," right?

15 A. Yeah.

16 Q. What does that mean?

17 A. You did a crude sketch.

18 Q. Sorry. What was that?

19 A. You would do a crude sketch.

20 Q. A crude sketch.

21 What is a -- what do you mean by a crude  
22 sketch?

1 A. You would -- it would pop -- pop up a  
2 drawing box, and you could draw lines and -- and  
3 input different colors, if I recall correctly.

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		<p>Flickner Depo at 138</p> <p>1 Q. And on this page, I had selected the 2 first image, and I clicked on -- using the 3 emulator, I clicked on the C under the first image 4 in the top left. 5 A. Uh-huh. 6 Q. And you can see below that -- that that's 7 the example -- the example is wgrayford.JPG, and 8 the query type was a color histogram. 9 A. Uh-huh. 10 Q. And it brought up -- and this seems to 11 have brought up a set of results. 12 A. Right. 13 Q. In this demo version, did -- did it 14 always bring up -- well, the original image and 15 11 results? 16 A. If -- if the image was in the database, 17 it -- it certainly would bring it up. How many 18 results might have been a parameter.</p> <p>Flickner 8/29/23 Depo at 100</p> <p>3 Q. And what is -- what does "sketch" refer 4 to? 5 A. It's a way of taking a user-supplied rough 6 sketch and finding images that have features 7 associated with those rough sketches.</p> <p><i>Id.</i> at 119–124</p>
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		<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>
		<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p>

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then                  2 you're looking for blue water, white sand.                  3 BY MR. EDWARDS:                  4 Q. Do you recall what the methodologies                  5 used -- that were used to calculate the orientation                  6 of those colors in the image?                  7 MR. HANSEN: Objection; lacks foundation.                  8 THE WITNESS: There's no orientation per se.                  9 It's just position.                  10 BY MR. EDWARDS:                  11 Q. Well, then position. Do you recall what                  12 the methodologies are to calculate the position?                  13 MR. HANSEN: Same objection.                  14 THE WITNESS: Position is something the user                  15 inputs.                  16 BY MR. EDWARDS:                  17 Q. Something you use what?                  18 A. The user had to input.                  19 Q. Okay. And then let's move on to the next                  20 one, T. It says, "Click T to search images with                  21 similar global texture."                  22 A. Yeah.                  23 Q. Do you recall, in your work on the QBIC                  24 project, a feature called global texture that could                  25 be extracted from the image?</p> <p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .                  2 Q. Say again?                  3 A. I missed one of your words. A feature                  4 called what?                  5 Q. I said do you recall in your work on the                  6 QBIC project a feature called global texture that                  7 was extracted from the image?                  8 A. Yes.                  9 Q. Okay. Is that -- is that akin to texture                  10 that we looked at earlier?                  11 A. Yes.                  12 Q. Okay. And the last one is S. It's,                  13 "Search images with special multipass filter."                  14 Do you recall, in your work on the QBIC                  15 project, being able to calculate a feature called                  16 multipass filter?                  17 A. Probably Gabor functions.                  18 Q. Say again?                  19 A. Gabor functions.                  20 Q. One more time and louder.                  21 A. Gabor functions.                  22 Q. Gabor functions. Okay. What are Gabor                  23 functions?                  24 A. Gabor functions are a way of producing                  25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?                  2 A. G-a-b-o-r.                  3 Q. So switch over and look at the second page                  4 of this Exhibit 6.                  5 So -- well, first back -- go back to -- go                  6 back to the first page. If you see on the left-hand                  7 side it says, "Goto: IBM Image Search Demo," and a                  8 little finger there is clicking it.                  9 You see it's in red?                  10 A. Yeah.                  11 Q. Okay. So that's clicking on that link.                  12 And then the second page is going to the IBM image                  13 search demo.                  14 A. Okay.                  15 Q. Okay? On the second page it is showing                  16 thumbnails with the different icons that we just                  17 walked through, I, C, L, T, S, on each of those                  18 icons.                  19 Do you see that?                  20 A. Yep.                  21 Q. Do you recognize this as a similar layout                  22 to the QBIC demos you hosted in the '90s?                  23 A. I don't.                  24 Q. You don't?                  25 A. No.</p> <p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM                  2 website that was the AIX operating system in                  3 Exhibit 3, that did not have a similar thumbnail                  4 layout like this?                  5 A. A thumbnail, yes. I don't recall it had                  6 the buttons, the I, C, L, T, S.                  7 Q. You don't recall it had all the buttons or                  8 some of the buttons?                  9 A. All the buttons.                  10 Q. Okay. So you don't recall that it had any                  11 buttons?                  12 A. I don't -- yeah. I don't recall.                  13 Q. It could have, it couldn't have, you just                  14 don't remember?                  15 A. I just don't remember, yeah.                  16 Q. Okay. But the one that you hosted on                  17 IBM's website, it did have thumbnails in a similar                  18 format here?                  19 A. Yeah, it had thumbnails.                  20 Q. And these thumbnails represent the images                  21 that are stored in the database?                  22 A. Yes.                  23 Q. Okay. Here, the 470 images would be                  24 reflected at least -- one, two, three, four, five,                  25 six, seven -- eight of them right here in this</p>
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*Id.* at 159–160

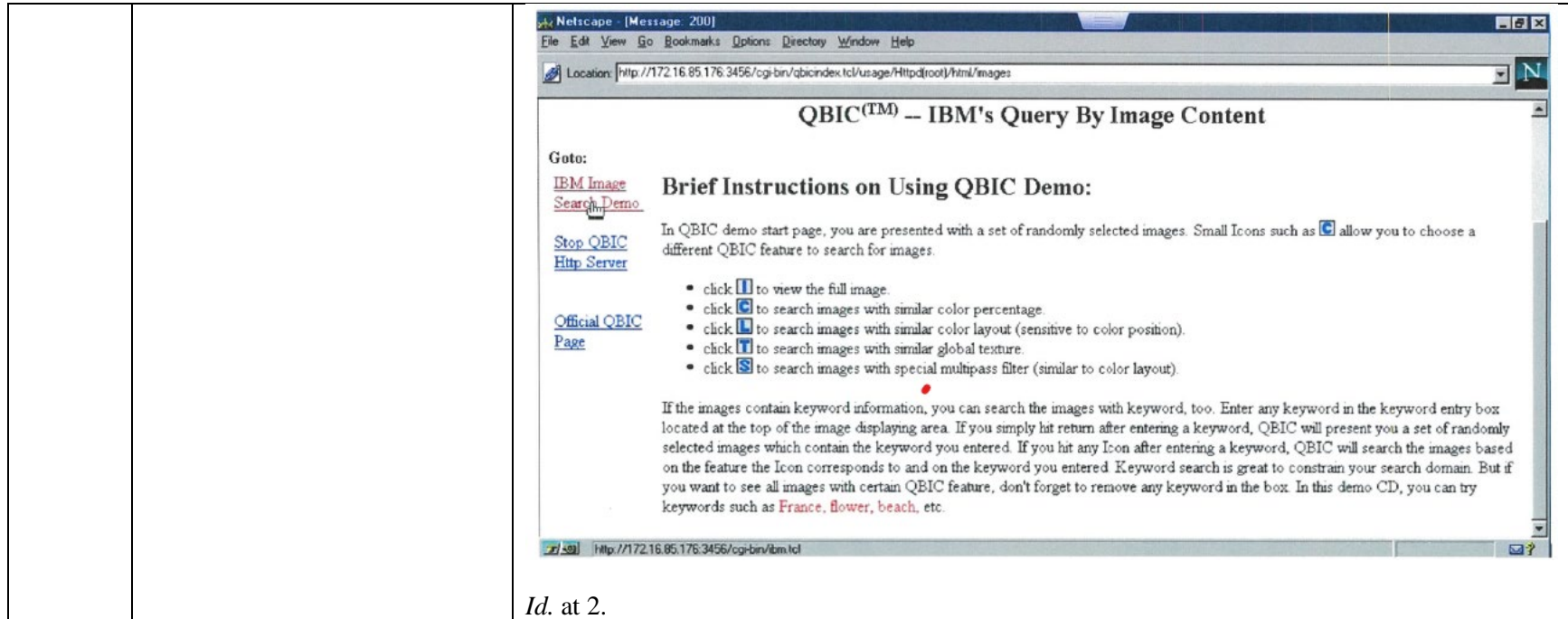
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		<p>20 Q. And in the last sentence it refers to 21 something called iterated query refinement. 22 A. Yes. 23 Q. And what does that refer to? 24 A. It's a way you can refine the query. 25 Q. So if I submit an image query for color</p> <hr/> <p>1 histogram, as an example, and I get a return, the 2 best matches based on order of similarity? 3 A. Um-hum. 4 Q. Does iterated query refinement mean that I 5 can further refine that query to search for things 6 like shape, like a -- you know, some shape in the -- 7 in the query image, like a logo or an icon, and that 8 will further refine the results to give me things 9 that have that similar shape inside the results of 10 the color histogram? 11 A. Yes. 12 Q. And then I can -- I can keep doing that, I 13 can further even refine that result by using a 14 keyword, for example? 15 A. Yes. Or you could do it all at once.</p> <p>Flickner 8/29/23 Depo at Ex. 6 at 1</p>
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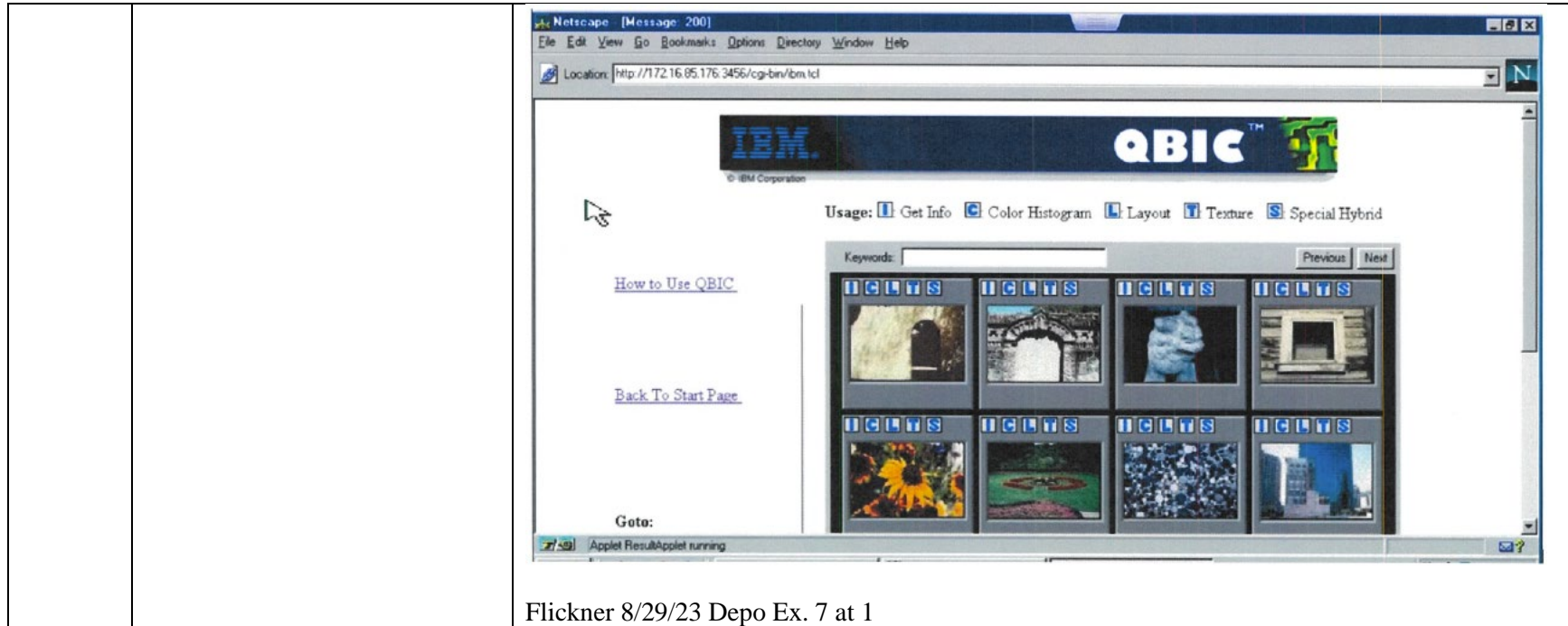
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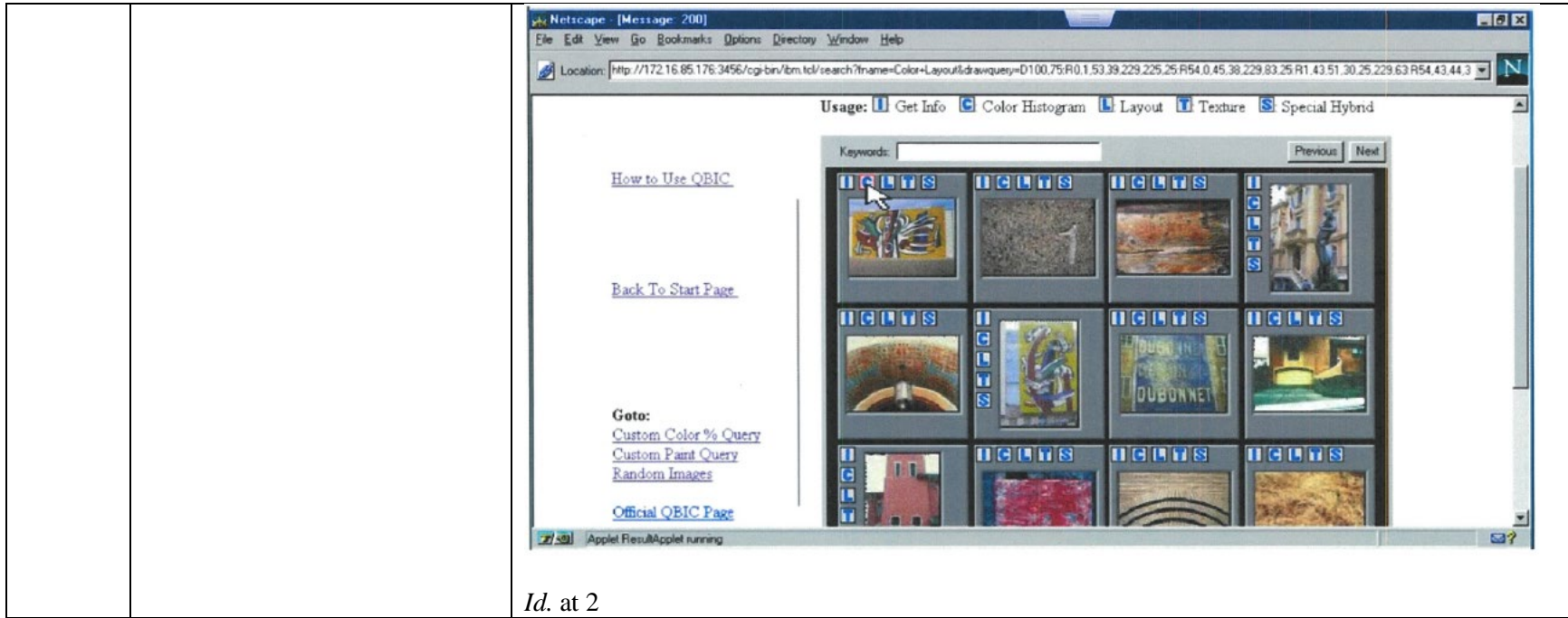
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Flickner 8/29/23 Depo Ex. 7 at 1

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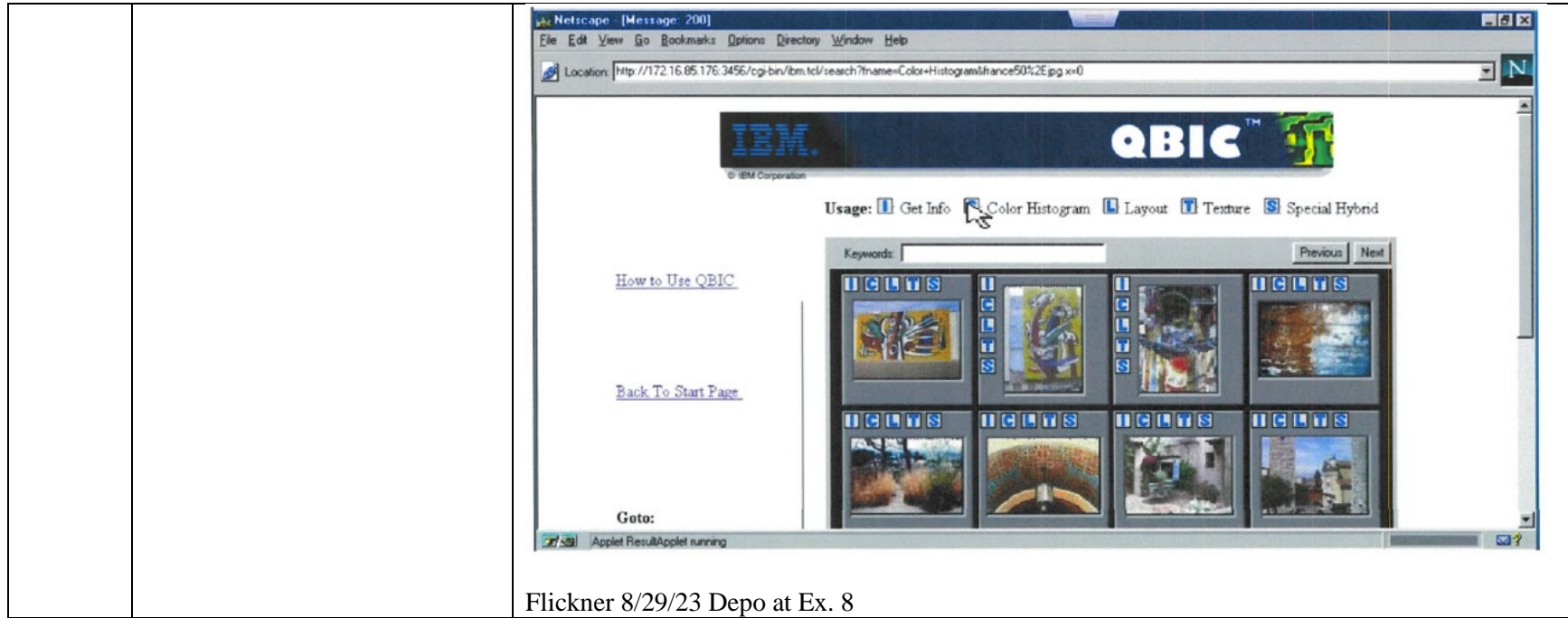
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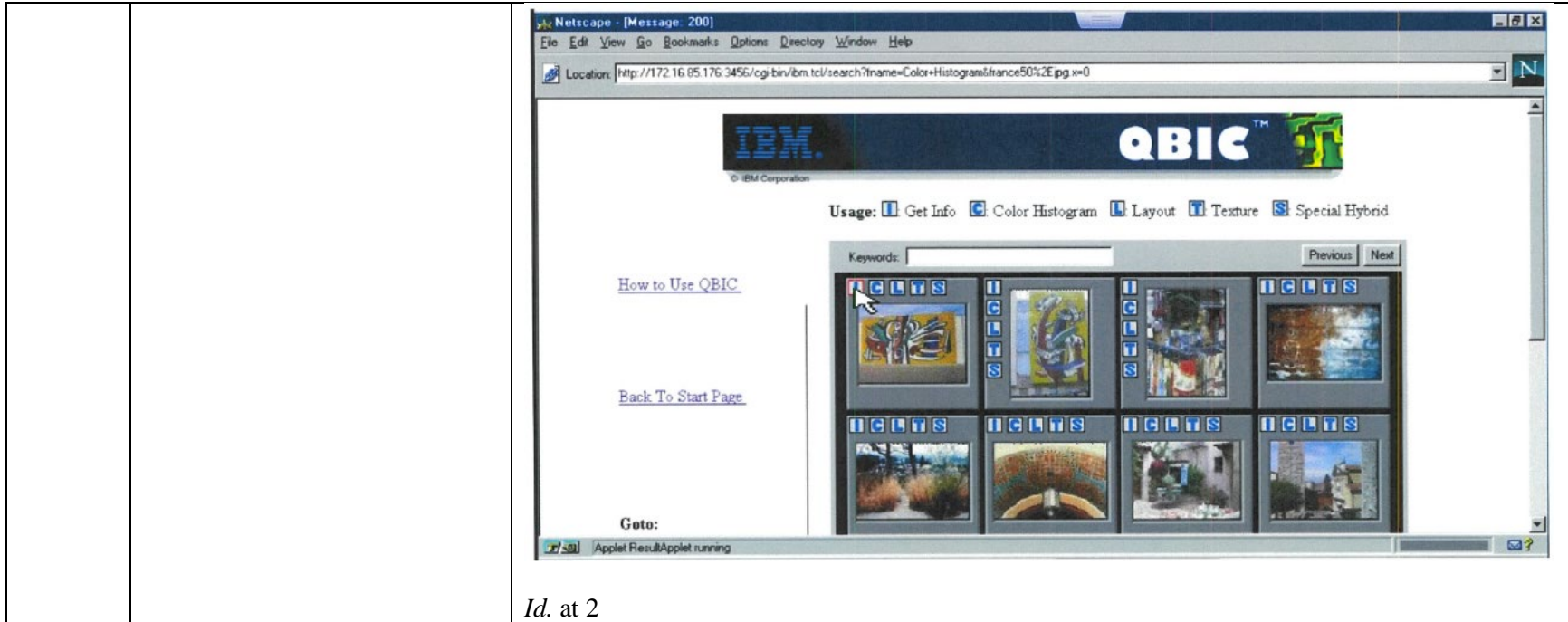
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Flickner 8/29/23 Depo at Ex. 8

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*Id.* at 2

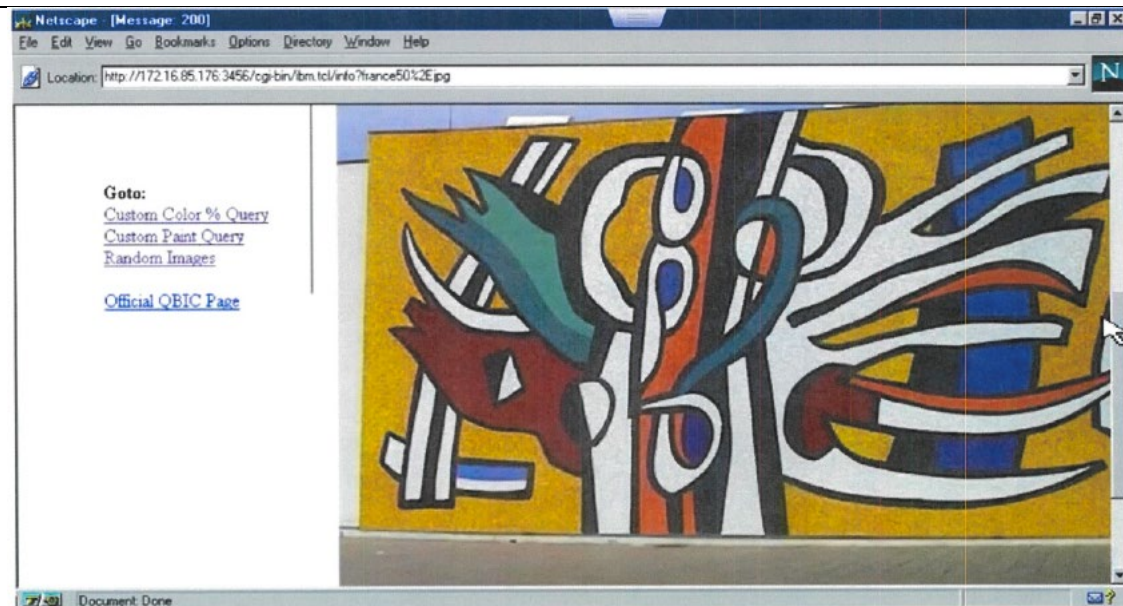
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*See also* Flickner Depo at 62-63, 131-132

To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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**3. Claim 18**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
18	<p>The method of claim 1, further comprising communicating at least one of banking account information, user data and terminal specific data to a banking company.</p>	<p>QBIC discloses this limitation.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>IBM0002390 at 2391-92</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>



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containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.

In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.

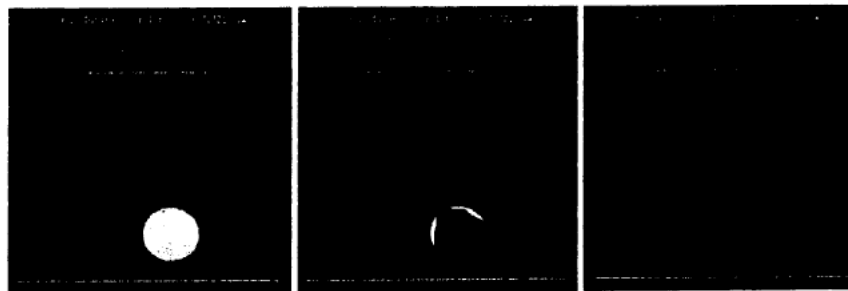


Figure 1: Original image, approximate user outline, and automatically refined outline of sun.

Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):

“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” *Id.* at p. 3.

“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other

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		<p>tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>Flickner Depo at 131-132.</p> <p>Flickner 8/29/23 Depo at 197–198</p> <p>17 Q. First sentence says, "Many paper-intensive 18 enterprises, such as insurance companies and 19 financial institutions, administer large volumes of 20 business-related content. The need for an 21 enterprise solution for managing and accessing 22 business information spans many industries." 23 Did I read that correctly? 24 A. Yes. 25 Q. Okay. For -- is it -- is it your</p>
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		<p>1 experience and understanding that QBIC is something 2 that would be beneficial for businesses that have 3 large volumes of business-related content? 4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC 8 functionality was good for insurance companies and 9 financial institutions. 10 Do you recall that? 11 A. Yes. 12 Q. Do you agree with that? 13 A. Yes. 14 Q. Okay. QBIC would be good for any company 15 that has large amounts of business-related 16 information, including multimedia content; correct? 17 A. Correct.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, a person of ordinary skill in the art would have been motivated to improve, modify, or combine QBIC with prior art reference teachings to arrive at this limitation at least because QBIC was designed for applications that included large amounts of business-related information, including multi-media content, including for financial</p>
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		institutions. <i>See, e.g.</i> , IBM 000789; Flickner Depo Tr. at 191:16-192:8, 293:14-294:8.
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Invalidity Chart for U.S. Patent 8,478,036 based on  
U.S. Patent No. 6,947,571 to Rhoads (“Rhoads”)

### **Exhibit C-3**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Rhoads was filed on May 15, 2000, claiming the priority date of May 19, 1999. Rhoads published at least as of September 20, 2005, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Rhoads anticipates asserted claim 1 of the ’036 Patent. To the extent Rhoads is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Rhoads is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

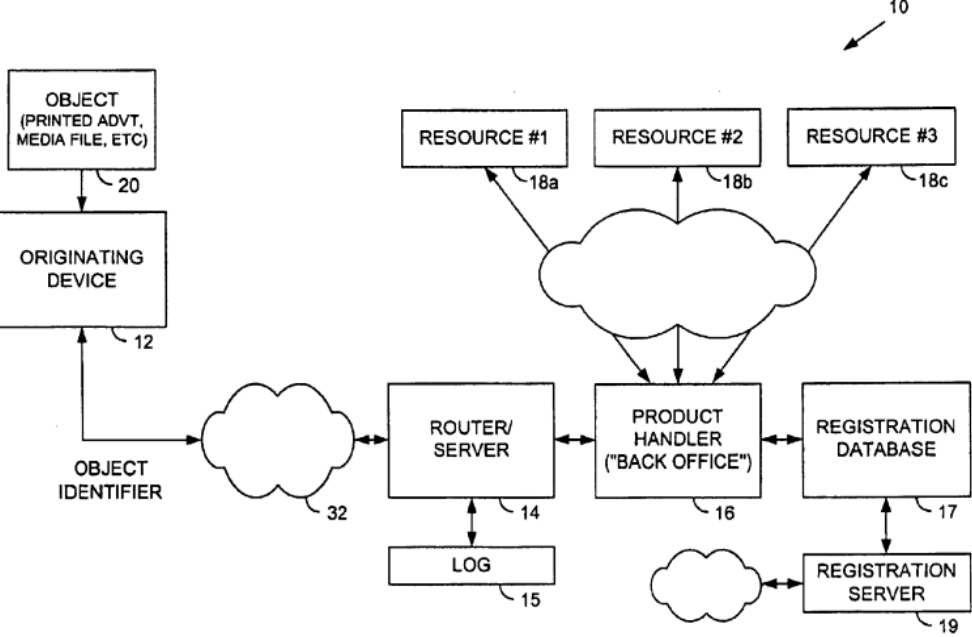
The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.

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 U.S. Patent No. 6,947,571 to Rhoads (“Rhoads”)

**1. Claim 1**

Element	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	<p>Rhoads discloses a content provisioning system.</p> <p>Rhoads at Abstract</p> <ul style="list-style-type: none"> <li>• “A cell phone is equipped with a 2D optical sensor, enabling a variety of applications. For example, such a phone may also be provided with a digital watermark decoder, permitting decoding of steganographic data on imaged objects. Movement of a phone may be inferred by sensing movement of an imaged pattern across the optical sensor’s field of view, allowing use of the phone as a gestural input device through which a user can signal instructions to a computer-based process. A variety of other arrangements by which electronic devices can interact with the physical world are also detailed, e.g., involving sensing and responding to digital watermarks, bar codes, RFIDs, etc.”</li> </ul> <p>Rhoads at 5:54-56.</p> <ul style="list-style-type: none"> <li>• “Basically, the technology detailed in this disclosure may be regarded as enhanced systems by which users can interact with computer-based devices.”</li> </ul> <p>Rhoads at 9:35-41</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.”</li> </ul> <p>Rhoads at Fig. 2 (and accompanying description)</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 49:15-18</p> <ul style="list-style-type: none"> <li>“Referring to FIG. 2, a system 10 according to the exemplary embodiment includes an originating device 12, a router/server 14, a product handler 16, a registration database 17, and one or more remote resources 18.”</li> </ul> <p>Rhoads at 50:21-26</p> <ul style="list-style-type: none"> <li>“As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).”</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1A]	<p>a target database storing known targets of different types and recognition parameters associated with the known targets;</p>	<p>Rhoads discloses a target database storing known targets of different types and recognition parameters associated with the known targets.</p> <p>Rhoads at 9:35–10:21</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from</p>

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		<p>within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>The next step in the decoding process, determining orientation of the Bedoop data, can likewise be discerned by reference to visual clues. For example, some objects include subliminal graticule data, or other calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either placed for that sole purpose (e.g. reference lines or fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also be employed to deduce the orientation of the object by reference to its</p>

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		<p>edges.”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"> <li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.”</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 23:33–54</p> <ul style="list-style-type: none"> <li>• “When a recipient of a business card holds it in front of a Bedoop sensor, the operating system on the local system launches a local Bedoop application. That local Bedoop application, in turn, establishes an external internet connection to a remote business card server. The address of that server may already be known to the local Bedoop application (e.g., having been stored from previous use), or the local Bedoop system can traverse the above-described public network of DNS servers to reach the business card server.</li> </ul> <p>A database on the business card name server maintains a large collection of business card data, one database record per UID. When that server receives Bedoop data from a local Bedoop system, it parses out the UID and accesses the corresponding database record. This record typically includes more information than is commonly printed on conventional business cards. Sample fields from the record may include, for example, name, title, office phone, office fax, home phone, home fax, cellular phone, email address, company name, corporate web page address, personal web page address, secretary's name, spouse's name, and birthday. This record is transmitted back to the originating Bedoop system.”</p> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content. It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li> </ul> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards.</p>



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		<p>This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 50:27-60</p> <ul style="list-style-type: none"> <li>• “In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</li> </ul> <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p>

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		<p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p>

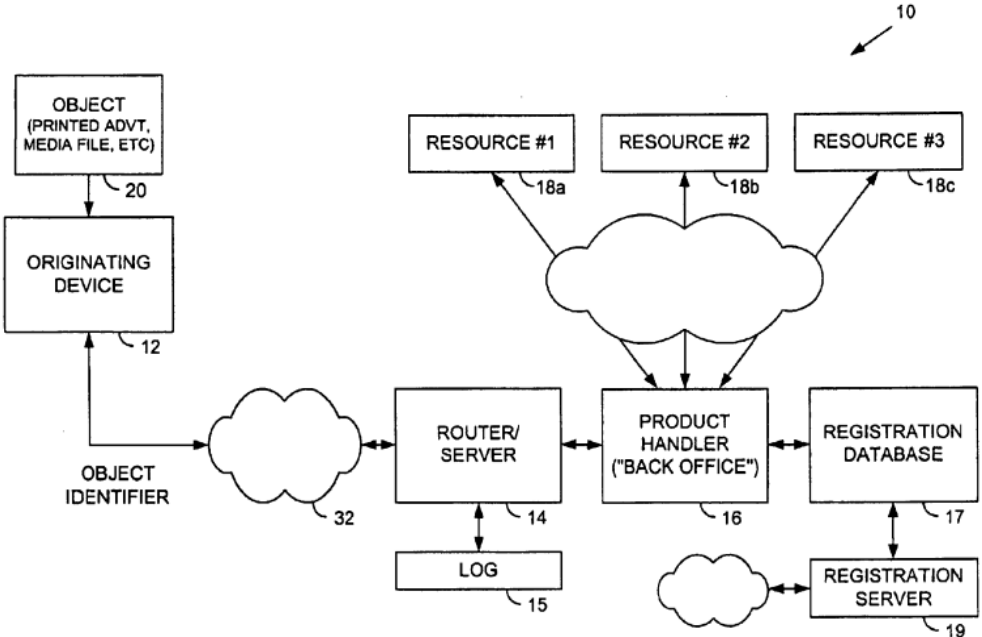
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 52:38-51</p> <ul style="list-style-type: none"> <li>• “In order for the system to identify the response (e.g., a URL) that corresponds to an object identifier (e.g., a watermark), this data must first be associated within the database 17 in association with the watermark to which it corresponds. The watermark registration process captures some basic identification information used later to validate the incoming message, and identifies the associated information/action In the illustrated example the identification information includes:                      Customer Account,                      Object and associated attributes (name, description, expiration, etc.),                      Action, and                      Registered Serial Number (for registration updates)                      The Customer Account identifies the watermark registrant. In most cases, this is also the party to be billed for services. For validation and security reasons, the Customer Account is required to be a known, existing account. Account information, including the account's password, is maintained by an Account Management system.                      The Object and associated attributes identifies the object to be watermarked. The object attributes typically include the name and description of the object and a list of accounts authorized to access the object's registration. These authorized “supporting” accounts are typically the ad agencies, pre-press houses, etc. involved in the watermark embedding process in the print advertising example contemplated herein.                      The Action defines the response the customer desires when the watermark is detected. It varies byproduct, but in the illustrative embodiment involves the return of some additional information regarding the watermarked object. In the illustrative system, the action is return of a URL or HTML to be used to display a web page associated with the watermarked object. For other products, the desired response may be display of the object's owner &amp; rights</li> </ul>

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		<p>information, software/data downloads, delivery of streamed audio or video, presentation of an advertisement, initiation of object-based actions, etc. The Registered Serial Number forms the last component of the registration. It is this assigned vendor and product-unique identifier that allows the system to acquire the specific information/action for the object in question.”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	an identification platform coupled with the target database, and that	<p>Rhoads discloses an identification platform coupled with the target database.</p> <p>Rhoads at Fig. 2 (and accompanying description)</p>

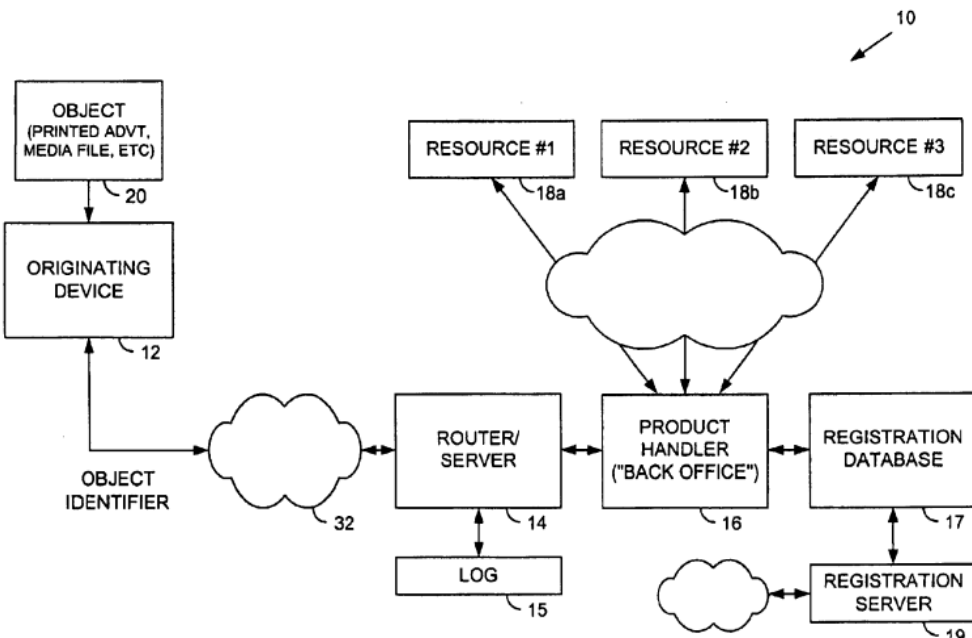
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		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"> <li>“As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider). In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</li> </ul>

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		<p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar</p>

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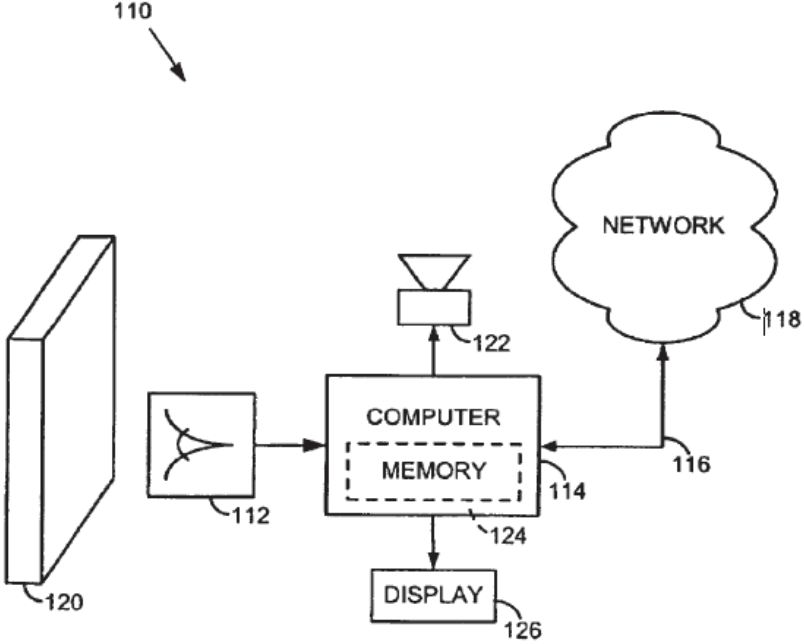
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		known problems, according to known methods which would yield predictable results.
[1B.i]	communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;	<p>Rhoads discloses communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p>Rhoads at Fig. 2 (and accompanying description)</p>  <p><b>FIG. 2</b></p> <p>Rhoads at 3:41–51</p> <ul style="list-style-type: none"> <li>• “According to another aspect, the invention includes a promotional method comprising: (a) presenting an object within the field of view of an optical sensor device, the object being selected from the list consisting of a retail product, packaging for a retail product, or printed advertising; (b) acquiring</li> </ul>

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		<p>optical data corresponding to the object; (c) decoding plural-bit digital data from the optical data; (d) submitting at least some of said decoded data to a remote computer; and (e) determining at the remote computer whether a prize should be awarded in response to submission of said decoded data.”</p> <p>Rhoads at 7:24-42</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</li> </ul> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28.”</p> <p>Rhoads at Fig. 11 (and accompanying description)</p>



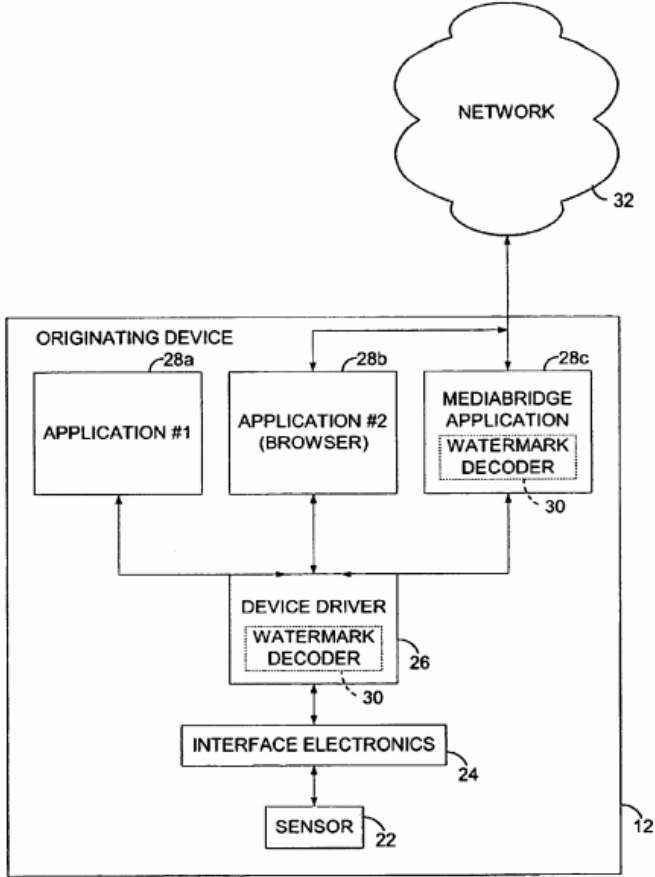
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		 <p style="text-align: center;"><b>FIG. 11</b></p> <p>Rhoads at 7:13-29</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 11, a basic embodiment 110 of the present technology includes an optical sensor 112, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed</li> </ul>

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		<p>by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</p> <p>Rhoads 8:66 – 9:12</p> <ul style="list-style-type: none"> <li>• “In still other embodiments, the camera (or other sensor) can be equipped with one or more auxiliary fixed-focus lenses that can be selectively used, depending on the particular application. Some such embodiments have a first fixed focused lens that always overlies the sensor, with which one or more auxiliary lenses can be optically cascaded (e.g., by hinge or slide arrangements). Such arrangements are desirable, e.g., when a camera is not a dedicated Bedoop sensor but also performs other imaging tasks. When the camera is to be used for Bedoop, the auxiliary lens is positioned (e.g., flipped into) place, changing the focal length of the first lens (which may be unsuitably long for Bedoop purposes, such as infinity) to an appropriate Bedoop imaging range (such as one foot).”</li> </ul> <p>Rhoads at Fig. 3 (and accompanying description)</p>

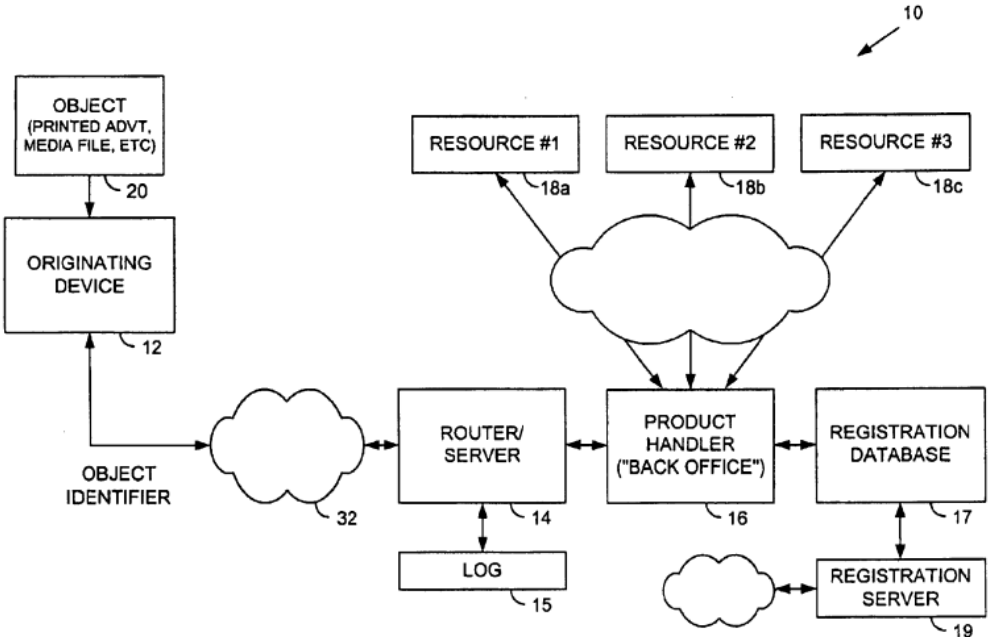
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		 <p><b>FIG. 3</b></p> <p>Rhoads at 17:46–54</p> <ul style="list-style-type: none"> <li>• “The building can be provided with an image sensor (such as a video camera or the like), an associated Bedoop. detection system, and the proximity</li> </ul>

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		<p>detector. When a user wearing the badge approaches, the proximity detector signals the camera to capture image data. The Bedoop detection system identifies the badge photograph (e.g., by clues as are described in the prior applications, or without such aids), captures optical data, and decodes same to extract the steganographically-embedded data hidden therein.”</p> <p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"> <li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li> </ul> <p>Rhoads at 49:24-27</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar</p>

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		known problems, according to known methods which would yield predictable results.
[1B.ii]	receives the digital representation from the mobile device; and	<p>Rhoads discloses receives the digital representation from the mobile device.</p> <p>Rhoads at 5:21-23</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload.”.</li> </ul> <p>Rhoads at Fig. 2 (and accompanying description)</p>  <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 12:23 – 33</p>

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		<ul style="list-style-type: none"> <li>• “Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</li> </ul> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)” To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p> <p>Rhoads at 49:19-47</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</li> </ul> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28. Device driver software 26 serves as a software interface, communicating at a relatively high level with the application programs 28 (e.g., through API instructions whose content and format are standardized to facilitate application programming), and at a relatively low level with the interface electronics 24.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement’s image</li> </ul>

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		<p>in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30.</p> <p>Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</p> <p>Rhoads at 50:21–51:3</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).</li> </ul> <p>In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital</p>



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		<p>rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)</p> <p>The illustrated product handler 16 comprises essentially the same hardware elements as the router 14, e.g., CPU, memory, etc. Although FIG. 2 shows just one product handler, several product handlers can be included in the system—either co-located or geographically distributed. Different handlers can be dedicated to different functions (e.g., serving URLs, serving music, etc.) or to different watermark sources (e.g., one responds to watermarks found in audio, another responds to watermarks found in print advertising, etc.).”</p> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>FIG. 12</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	<p>recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets; and</p>	<p>Rhoads discloses recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.</p> <p>Rhoads at 9:35–10:21</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object’s boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such</p>

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		<p>movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>The next step in the decoding process, determining orientation of the Bedoop data, can likewise be discerned by reference to visual clues. For example, some objects include subliminal graticule data, or other calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either placed for that sole purpose (e.g. reference lines or fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also</p>

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		<p>be employed to deduce the orientation of the object by reference to its edges.”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"> <li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.”</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 23:33–54</p> <ul style="list-style-type: none"> <li>• “When a recipient of a business card holds it in front of a Bedoop sensor, the operating system on the local system launches a local Bedoop application. That local Bedoop application, in turn, establishes an external internet connection to a remote business card server. The address of that server may already be known to the local Bedoop application (e.g., having been stored from previous use), or the local Bedoop system can traverse the above-described public network of DNS servers to reach the business card server.</li> </ul> <p>A database on the business card name server maintains a large collection of business card data, one database record per UID. When that server receives Bedoop data from a local Bedoop system, it parses out the UID and accesses the corresponding database record. This record typically includes more information than is commonly printed on conventional business cards. Sample fields from the record may include, for example, name, title, office phone, office fax, home phone, home fax, cellular phone, email address, company name, corporate web page address, personal web page address, secretary's name, spouse's name, and birthday. This record is transmitted back to the originating Bedoop system.”</p> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content. It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li> </ul> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles,</p>

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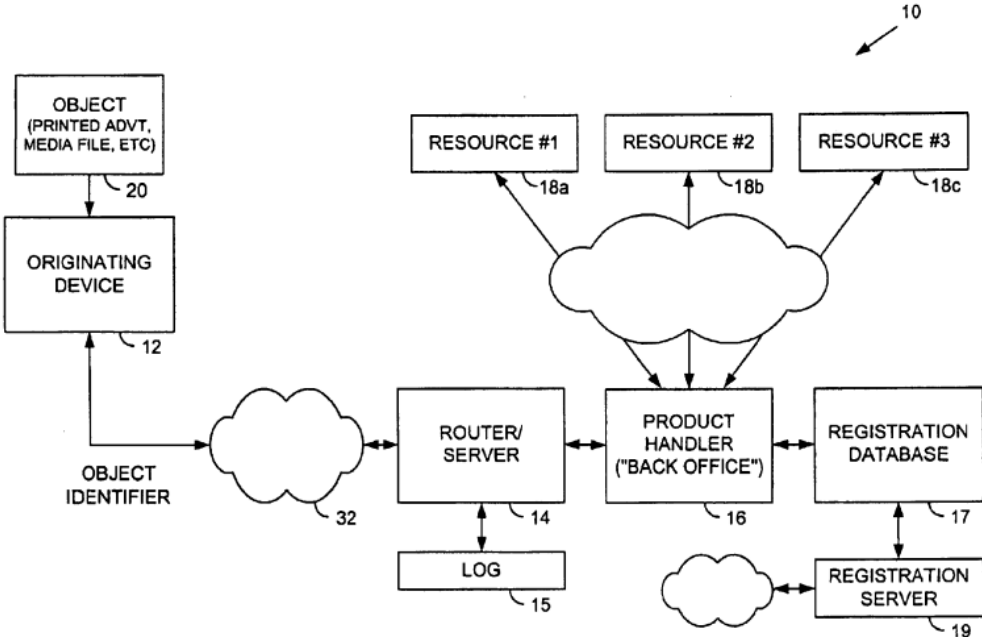
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		<p>direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 84:11 – 17</p> <ul style="list-style-type: none"> <li>• “B55. A method comprising:  presenting an object to an optical sensor, the optical sensor producing image data, the object being steganographically encoded with plural bits of digital data;  decoding said digital data from the image data; and  in response to said digital data, displaying an image of a like object.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	a content service coupled with the identification platform, and that:	<p>Rhoads discloses a content service coupled with the identification platform.</p> <p>Rhoads at Fig. 2 (and accompanying description)</p>



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		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 12:23 – 33</p> <ul style="list-style-type: none"> <li>“Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</li> </ul>

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		<p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>“Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)” To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</li> </ul> <p>Rhoads at 49:19-47</p> <ul style="list-style-type: none"> <li>“Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc.</li> </ul>

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		<p>Non-electronic objects can also include sounds produced by loudspeakers.</p> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28. Device driver software 26 serves as a software interface, communicating at a relatively high level with the application programs 28 (e.g., through API instructions whose content and format are standardized to facilitate application programming), and at a relatively low level with the interface electronics 24.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30.</li> </ul> <p>Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</p>

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		<p>Rhoads at 50:21–51:3</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).</li> </ul> <p>In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user’s personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a</p>

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		<p>remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)</p> <p>The illustrated product handler 16 comprises essentially the same hardware elements as the router 14, e.g., CPU, memory, etc. Although FIG. 2 shows just one product handler, several product handlers can be included in the system—either co-located or geographically distributed. Different handlers can be dedicated to different functions (e.g., serving URLs, serving music, etc.) or to different watermark sources (e.g., one responds to watermarks found in audio, another responds to watermarks found in print advertising, etc.).”</p> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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		<p>FIG. 12</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the</p>

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		<p>limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.i]	<p>obtains content information related to the known target; and</p>	<p>Rhoads discloses obtains content information related to the known target.</p> <p>Rhoads at 22:28–33</p> <ul style="list-style-type: none"> <li>• “Magazine (and newspaper) pages can be steganographically encoded with Bedoop data to provide another “paper as portal” experience. As with the earlier-described office document case, the encoded data yields an address to a computer location (e.g., a web page) having the same, or related, content.”</li> </ul> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li> </ul> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 50:35-60</p> <ul style="list-style-type: none"> <li>• “In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12). In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</li> </ul> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch</p>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 52:3-29</p> <ul style="list-style-type: none"> <li>• “[user] Sees the data/action associated with the object (e.g., views web page)”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.ii]	<p>sends the content information to at least one of the identification platform and the mobile device.</p>	<p>Rhoads discloses sends the content information to at least one of the identification platform and the mobile device.</p> <p>Rhoads at 22:28–33</p> <ul style="list-style-type: none"> <li>• “Magazine (and newspaper) pages can be steganographically encoded with Bedoop data to provide another “paper as portal” experience. As with the earlier-described office document case, the encoded data yields an address to a computer location (e.g., a web page) having the same, or related, content.”</li> </ul> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li> </ul> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 50:35-60</p> <ul style="list-style-type: none"> <li>• “In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12). In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</li> </ul> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 52:3-29</p> <ul style="list-style-type: none"> <li>• “[user] Sees the data/action associated with the object (e.g., views web page)”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit C-4**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, Mault was filed on September 7, 2001, claiming the priority date of September 7, 2000. Mault published at least as of April 25, 2002, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Mault anticipates asserted claim 1 of the ’036 Patent. To the extent Mault is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Mault is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Claim	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	<p>Mault discloses a content provisioning system.</p> <p>Mault at Abstract</p> <ul style="list-style-type: none"> <li>• “A method for assisting a person create a record of food items consumed by the person comprises the capturing of food images corresponding to food items consumed, for example by creating an image using an optical image sensor; recording the food images in the memory of an electronic device; viewing the food images on the display of the electronic device, so as to identify food items consumed; selecting food item identifiers corresponding to the food images, and recording food item identifiers in a memory, So as to create a record of food items consumed.”</li> </ul> <p>Mault at [0038]</p> <ul style="list-style-type: none"> <li>• “A person can be provided with a portable electronic device, having an image creation capability. For example, the portable electronic device may be a personal digital assistant (PDA) having an optical image sensor. The optical image sensor can be an accessory to the PDA, or can be within the housing of the PDA.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to</p>

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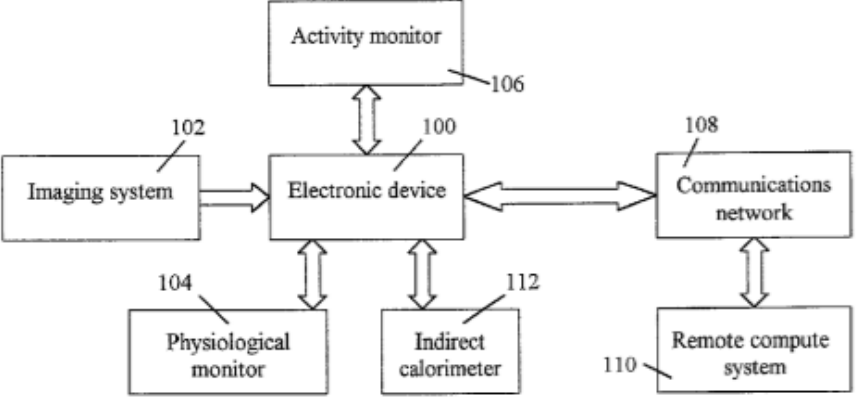
Claim	'036 Claim Recitation	Exemplary Citations in Reference
		known methods which would yield predictable results.
[1A]	a target database storing known targets of different types and recognition parameters associated with the known targets;	<p>Mault discloses a target database storing known targets of different types and recognition parameters associated with the known targets.</p> <p>Mault at [0016]</p> <ul style="list-style-type: none"> <li>• “The food image can be recorded in a memory of the electronic device, or any other memory accessible to the electronic device, such as a memory module, remote database, and the like. The food item name can be selected from one or more lists of food item names presented on the display of the electronic device, for example from one or more menus presented on the display.”</li> </ul> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li> </ul> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network Such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on</li> </ul>



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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>the remote computer System, a computer expert System, an image analysis system, a human operative in communication with the remote computer system, or Some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</p> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet.”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• “FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging System 102, a physiological Sensor 104, an activity Sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110.”</li> </ul> <p>Mault at Fig. 5</p>

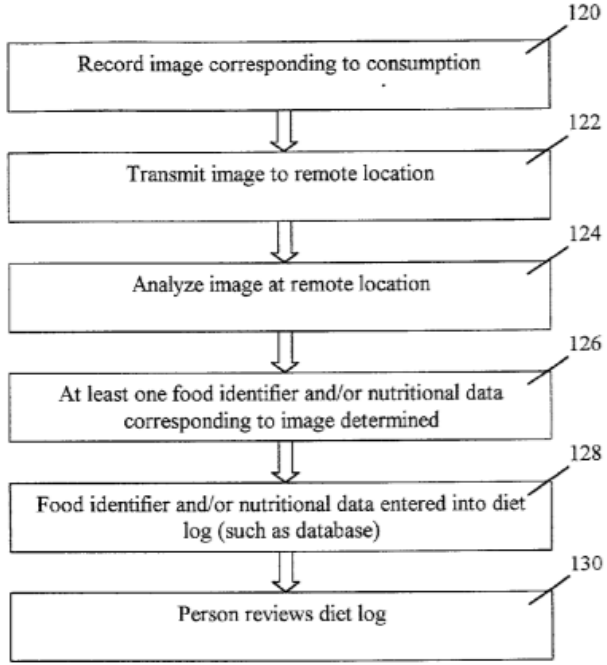
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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 5</p> <p>Mault at [0027]</p> <ul style="list-style-type: none"> <li>“ FIG. 5 illustrates a system allowing diet log creation;”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging system 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110. The electronic device can be a PDA or other device carried by the person. The imaging device can be included with the electronic device in a unitary device. The physiological sensor may detect eating, for example a blood glucose sensor can detect the rise in blood glucose after a meal, allowing the electronic device to alert the person to make a diet log entry. The activity sensor provides a signal correlated with a physical activity level of the person.</li> </ul> <p>Mault at [0049]</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “FIG. 6 is a flow chart of a method for diet logging. Box <b>120</b> corresponds to recording an image of food. Box <b>122</b> corresponds to transmission of the image to a remote location, Such as a remote computer System. . . . Box <b>124</b> corresponds to analysis of the image of the remote location.”</li> </ul> <p>Mault at Fig. 6</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 6</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		known methods which would yield predictable results.
[1B]	an identification platform coupled with the target database, and that	<p>Mault discloses an identification platform coupled with the target database.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li> </ul> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network Such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on the remote computer System, a computer expert System, an image analysis system, a human operative in communication with the remote computer system, or Some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</li> </ul> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet. Other options include receiving transmissions such as wireless data transmissions from food vendors or food vending devices, viewing the recorded diet log, editing the diet log, or analyzing previously recorded images.”</p> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• “FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging System 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110.”</li> </ul> <p>Mault at Fig. 5</p> <p>Figure 5</p>

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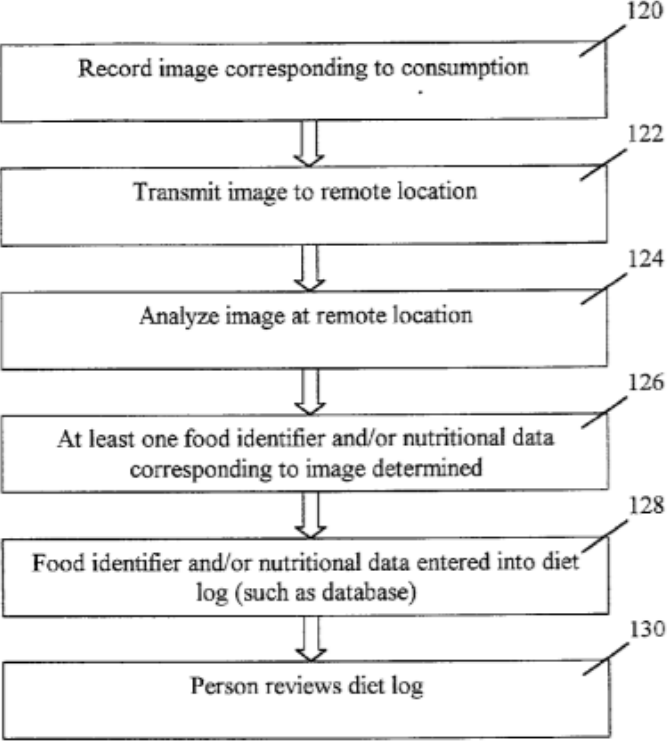
Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Mault at [0027]</p> <ul style="list-style-type: none"> <li>• “ FIG. 5 illustrates a system allowing diet log creation;”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging system 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110. The electronic device can be a PDA or other device carried by the person. The imaging device can be included with the electronic device in a unitary device. The physiological sensor may detect eating, for example a blood glucose sensor can detect the rise in blood glucose after a meal, allowing the electronic device to alert the person to make a diet log entry. The activity sensor provides a signal correlated with a physical activity level of the person.</li> </ul> <p>Mault at [0049]</p> <ul style="list-style-type: none"> <li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “Box <b>122</b> corresponds to transmission of the image to a remote location, such as a remote computer system. Other data can be transmitted with the image, for example a sales receipt, data provided by the food vendor, location the image was taken (which may be correlated with a restaurant identity), a menu image, and the weight of the food (which may be provided by a mat). Box <b>124</b> corresponds to analysis of the image of the remote location. Image</li> </ul>

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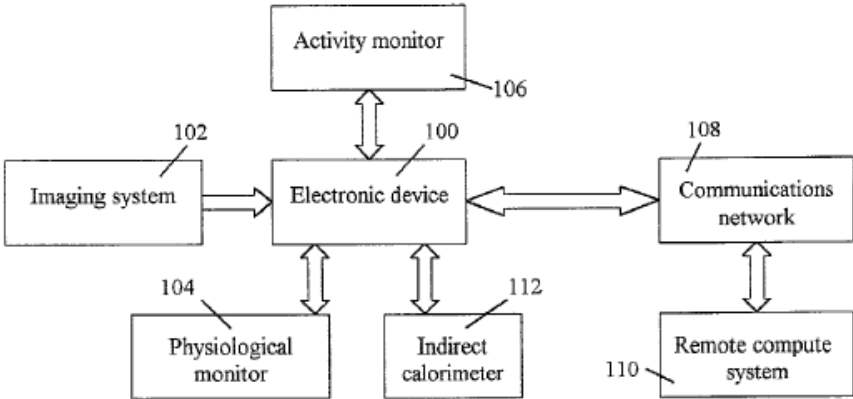
Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert System, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images.”</p> <p>Mault at Fig. 6</p>



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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 6</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B.i]	communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;	<p>Mault discloses communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p>Mault at Fig. 5</p>  <p style="text-align: center;">Figure 5</p> <p>Mault at [0008]</p> <ul style="list-style-type: none"> <li>• “The image can be stored, for example, on the memory of an imaging device such as a camera, a memory of a device in communication with the imaging device, a memory module (such as a memory stick), a memory of a portable computing device, or on a memory associated with a remote computer system, such as one accessible over a communications network. In this context, the term image refers to an electronic file, or equivalent, containing information corresponding to an image. An example would be a conventional</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>JPEG file.”</p> <p>Mault at [0009]</p> <ul style="list-style-type: none"> <li>• “After recording the image, at a convenient later time the person can retrieve a stored image and view the image on a display. The display can be part of the imaging device, or other device such as a personal digital assistant, personal computer, Internet appliance, WebTV, e-book, tablet computer, pager, cell phone, interactive TV, spectacle mounted display, visor, and the like. An electronic device having a display used to view an image may be in communication with a separate device used to create the image, for example using wireless or cable-based links.”</li> </ul> <p>Mault at [0011]</p> <ul style="list-style-type: none"> <li>• “The imaging device, used to create an image of foods consumed, can be a digital camera, device having the functionality of a camera, such as a personal digital assistant (PDA), cell phone, electronic book, pager, calculator, or other consumer electronics device. The imaging device can also be an ornamental component, clothing item, or other functional or decorative item having image creation capabilities, Such as spectacles, buttons, a pen, cutlery item, key ring, keys, belt, cigarette-like object, ring, body ornament, or jewelry.”</li> </ul> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</p> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network Such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on the remote computer System, a computer expert System, an image analysis system, a human operative in communication with the remote computer system, or Some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</li> <li>•</li> </ul> <p>Mault at [0027]</p> <ul style="list-style-type: none"> <li>• “ FIG. 5 illustrates a system allowing diet log creation;”</li> </ul> <p>Mault at [0038–39]</p> <ul style="list-style-type: none"> <li>• “A person can be provided with a portable electronic device, having an image creation capability. For example, the portable electronic device may be a personal digital assistant (PDA) having an optical image sensor. The optical image sensor can be an accessory to the PDA, or can be within the housing of the PDA. The portable electronic device may also be a digital camera, wireless telephone, pager, organizer, calculator (numeric calculator, diet calculator, graphing calculator), spectacle mounted device, wrist mounted device, or other electronic device having image production capabilities.</li> </ul> <p>FIG. 1A shows a schematic of an electronic device which may be used in embodiments of the present invention, having a processor <b>10</b>, an image capturing system <b>12</b>, a data entry mechanism <b>14</b>, a memory <b>16</b>, a clock <b>18</b>,</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>and display 18.”</p> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode Scanner, or the optical image Sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet.”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging system 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110. The electronic device can be a PDA or other device carried by the person. The imaging device can be included with the electronic device in a unitary device. The physiological sensor may detect eating, for example a blood glucose sensor can detect the rise in blood glucose after a meal, allowing the electronic device to alert the person to make a diet log entry. The activity sensor provides a signal correlated with a physical activity level of the person.</li> </ul> <p>Mault at [0049]</p> <ul style="list-style-type: none"> <li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</li> </ul>

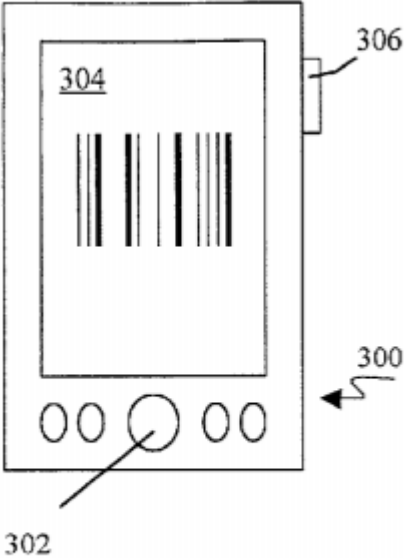
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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “Box 124 corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert System, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images.”</li> </ul> <p>Mault at [0054]</p> <ul style="list-style-type: none"> <li>• “FIG. 9 shows a schematic of a system in which an imaging system <b>220</b>, such as a camera, transmits images over a communications network <b>222</b> to a remote computer system <b>224</b>.”</li> </ul> <p>Mault at [0073]</p> <ul style="list-style-type: none"> <li>• “Fig. 11 shows a PDA 280 with display 284, buttons 282, and imaging device 286 directed at a can of pickles 288. The display 284 can be used to indicate the image to be captured. A button such as 282 may be pressed to record the image. The display 184 can be used to view captured images of foods stored in the memory of the PDA, for assisting the person in creating a diet log.”</li> </ul> <p>Mault at [0080]</p> <ul style="list-style-type: none"> <li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode (e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer</li> </ul>

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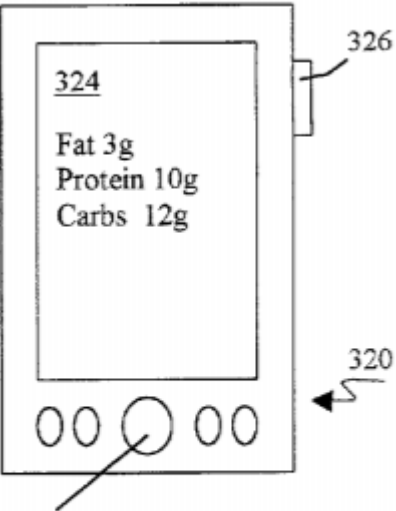
Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>System (remote in this context meaning a computer system not carried by the person, for example a commercial server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the database.”</p> <p>Mault at [0081]</p> <ul style="list-style-type: none"> <li>• “FIG. 12 shows an image of a barcode presented on the display 304 of PDA 300 (the PDA having data entry buttons 302, and an image sensor 306). Image analysis software can be used to analyze the image of the barcode, So as to determine UPC, product name, nutritional data, and the like. Alternatively, a barcode Scanner can be used to read the barcode, or an accessory device which in communication with the PDA may be used as a barcode scanner.”</li> </ul> <p>Mault at Fig. 12</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 12</p> <p>Mault at [0082]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display 324 of a PDA320, having data entry buttons 322 and optical image Sensor 326. Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”</li> </ul> <p>Mault at Fig. 13</p>



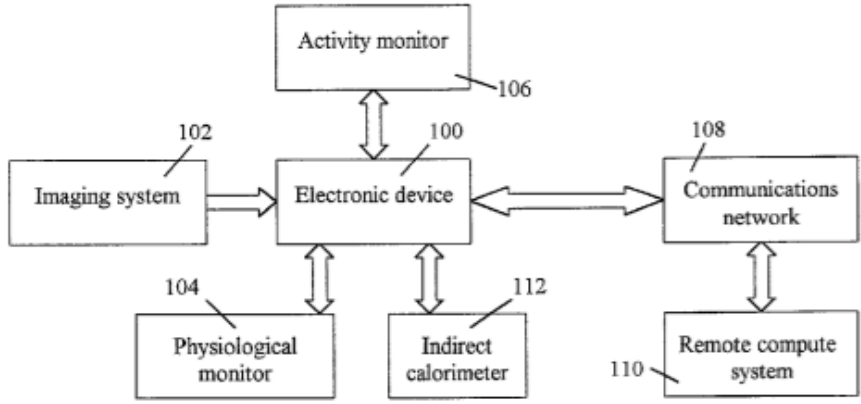
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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>322</p> <p>Figure 13</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

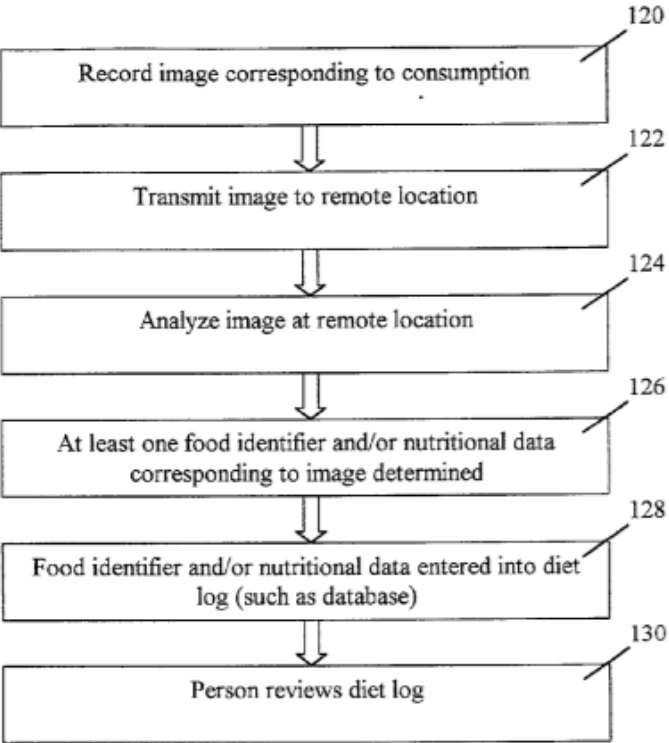
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Claim	'036 Claim Recitation	Exemplary Citations in Reference
[1B.ii]	receives the digital representation from the mobile device; and	<p>Mault discloses receives the digital representation from the mobile device.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li> </ul> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network Such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on the remote computer System, a computer expert System, an image analysis system, a human operative in communication with the remote computer system, or Some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• “FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging System 102, a physiological Sensor 104, an activity Sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110.”</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Mault at Fig. 5</p>  <p style="text-align: center;">Figure 5</p> <p>Mault at [0049]</p> <ul style="list-style-type: none"> <li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “FIG. 6 is a flow chart of a method for diet logging. Box 120 corresponds to recording an image of food. Box 122 corresponds to transmission of the image to a remote location, Such as a remote computer System. . . . Box 124 corresponds to analysis of the image of the remote location.”</li> </ul> <p>Mault at Fig. 6</p>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 6</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have</p>

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		<p>been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	<p>recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets; and</p>	<p>Mault discloses recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label,</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</p> <p>Mault at [0018].</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network such as the internet, receiving food identification data from the remote computer system (which may be generated by a software running on the remote computer system, a computer expert system, an image analysis system, a human operative in communication with the remote computer system, or some combination of techniques); and recording the food identification data so as to create a record of foods consumed.”</li> </ul> <p>Mault at [0041]</p> <ul style="list-style-type: none"> <li>• “FIG. 1A, other components of the electronic device are omitted for clarity. On receiving a signal from the external control or from the processor, the controller <b>24</b> initiates the capture of an image by sensor <b>28</b>, and may store the image in memory <b>30</b> along with a time stamp provided by clock <b>32</b>.”</li> </ul> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet. Other options include receiving transmissions such as wireless data transmissions from food vendors or food vending devices,</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>viewing the recorded diet log, editing the diet log, or analyzing previously recorded images.”</p> <p>Mault at [0047]</p> <ul style="list-style-type: none"> <li>• “The time and location that the image was recorded can also be recorded in memory and displayed, so as to assist diet logging.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “Box <b>124</b> corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert system, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images. Box <b>126</b> corresponds to determining food identity and/or nutritional content of the food within the image.”</li> </ul> <p>Mault at [0075–77]</p> <ul style="list-style-type: none"> <li>• “Image processing techniques can be used to identify food items from images. For packaged foods, optical character recognition may be used to record and identify nutritional information and/or identify the item consumed. Computer analysis of images may be carried out on the PDA or using another computer system in communication with the PDA. For example, an image of food packaging may be used to identify the food contained. An image of the nutritional content information panel provided by the manufacturer on the package may also be recorded. Optical character recognition may be used to obtain information from the image for storage in a diet log. An image of a box of corn flakes may be recognized by a computer as such, and used to generate a corn flake serving record in a diet log.</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>For non-packaged foods, e.g. restaurant meals, image analysis may also be used in identifying the food items. Imaging at a number of wavelengths, followed by false color image generation, can be used to help identify image components. Spectroscopic imaging can be used in computer-assisted food recognition.</p> <p>Image processing, image recognition, and pattern recognition algorithms are useful in analyzing stored images so as to create a diet log. Algorithms may be applied to color images, or images recorded at a number of different wavelengths (e.g. in the IR, optical, and UV) which may assist identification. Stored images can be identified by comparison with previously stored images that the person has identified, using a software learning mechanism such as a neural network.”</p> <p>Mault at [0080]</p> <ul style="list-style-type: none"> <li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code Scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode (e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer System (remote in this context meaning a computer System not carried by the person, for example a commercial Server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the database.”</li> </ul> <p>Mault at [0081]</p> <ul style="list-style-type: none"> <li>• “FIG. 12 shows an image of a barcode presented on the display <b>304</b> of PDA <b>300</b> (the PDA having data entry buttons <b>302</b>, and an image sensor <b>306</b>).</li> </ul>



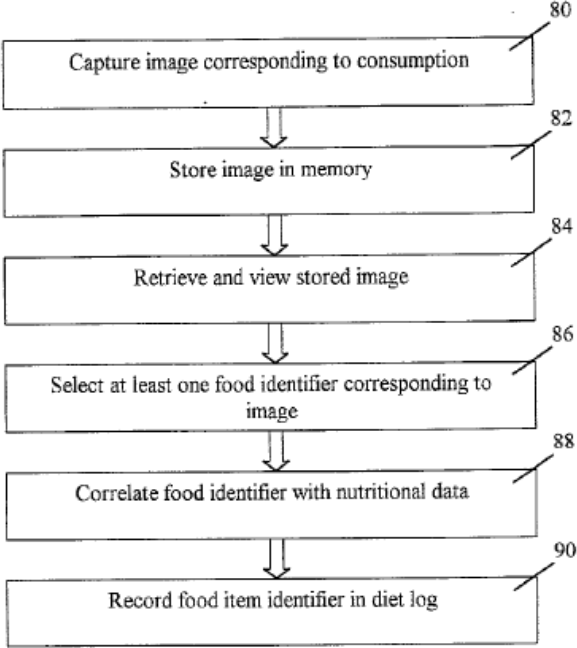
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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Image analysis software can be used to analyze the image of the barcode, so as to determine UPC, product name, nutritional data, and the like.”</p> <p>Mault at [0082]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display 324 of a PDA 320, having data entry buttons 322 and optical image Sensor 326. Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”</li> </ul> <p>Mault at [0090]</p> <ul style="list-style-type: none"> <li>• “Colors, shapes, printed codes, and fluorescent markers of tablets can be used to assist identification, either by a person or an [sic] software image analysis program.”</li> </ul> <p>Mault at [0091]</p> <ul style="list-style-type: none"> <li>• “Images can be recorded at intervals by a device carried by the person, and the images used to create a lifestyle log for the person. This can include analysis of images of meals consumed, so as to create a diet log. Images can be recorded automatically, for example at time intervals, so as to spare the person the effort of remembering to record images of foods consumed. Image creation can be triggered by events, such as physiological parameters which change during eating, position (such as using a global positioning system), voice commands, wireless transmission from a remote device, such as a food vending machine, and the like.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with</p>

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 Invalidity Chart for U.S. Patent 8,478,036 based on  
 U.S. Patent Publication No. 2002/0047867 to Mault et al. (“Mault”)

Claim	'036 Claim Recitation	Exemplary Citations in Reference
		other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1C]	a content service coupled with the identification platform, and that:	Mault discloses a content service coupled with the identification platform,  Mault at Fig. 4

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		 <p style="text-align: center;">Figure 4</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “The identity of food items consumed can be correlated with nutritional data, for example using a nutritional database, and the nutritional data can stored in an electronic memory so as to create a nutritional record, for example as part of a diet log.”</li> </ul> <p>Mault at [0047]</p> <ul style="list-style-type: none"> <li>• “Box <b>88</b> corresponds to selecting a food item identifier, such as a food name, corresponding to the displayed image. The selection can be made from a menu displayed to the person. Box <b>88</b> corresponds to correlating a food item identifier with nutritional data. Box <b>90</b> corresponds to recording the food item</li> </ul>

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		<p>identifier and corresponding nutritional data in memory, so as to create a diet log.”</p> <p>Mault at [0059]</p> <ul style="list-style-type: none"> <li>• “For example, a person can sit down to a meal and record an image of the meal using the electronic device. The image is transmitted to a remote location where it is analyzed and converted into a caloric value. The caloric value can be transmitted back to the person, allowing the person to decide whether to eat the meal, choose another meal, or eat some portion of the meal consistent with reaching a calorie balance goal.”</li> </ul> <p>Mault at [0082–83]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image sensor <b>326</b>. Optical character recognition software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.</li> </ul> <p>Food item identities and nutritional information can also be received from food vendors, e.g. grocery stores, on-line retailers, restaurants, vending machines, diet food retailers, etc. The PDA may prompt the person to identify the source of the food being imaged, and this information can be used to help in identification.”</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have</p>

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		<p>been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.i]	<p>obtains content information related to the known target; and</p>	<p>Mault discloses obtains content information related to the known target.</p> <p><i>See</i> [1C] above</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.ii]	<p>sends the content information to at least one of the identification platform and the mobile device.</p>	<p>Mault discloses sends the content information to at least one of the identification platform and the mobile device.</p> <p>Mault at [0052]</p> <ul style="list-style-type: none"> <li>• “A diet log channel, generated by remote server (or other remote computer systems, or other content provider) <b>176</b>, and received by the set top box over communications network <b>178</b>, can be selected for display on the interactive</li> </ul>

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		<p>television <b>160</b>. A display of food item identifiers, such as food names in a menu format, can be displayed on the display <b>162</b> of the interactive TV <b>160</b>. An image stored in the local memory <b>172</b> can be added to the diet log channel signal, using techniques known in the art, so that the person views the diet log channel with an embedded image of the food consumed. The person then selects items corresponding to the food consumed from the displayed menu. Selection data is generated with user input <b>146</b> (for example a keyboard) and transmitted to the set top box and to the remote server. The display is changed appropriately on receipt of the selection data by the content provider and the selection is added to the diet log of the person, which is stored in a database associated with or otherwise accessible by the remote server <b>176</b>.”</p> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “FIG. 6 is a flow chart of a method for diet logging. Box <b>120</b> corresponds to recording an image of food. Box <b>122</b> corresponds to transmission of the image to a remote location, such as a remote computer system. Other data can be transmitted with the image, for example a sales receipt, data provided by the food vendor, location the image was taken (which may be correlated with a restaurant identity), a menu image, and the weight of the food (which may be provided by a mat). Box <b>124</b> corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert system, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images. Box <b>126</b> corresponds to determining food identity and/or nutritional content of the food within the image. Box <b>128</b> corresponds to storing the food identity and nutritional content into a database, so as to create a diet log. Box <b>130</b> corresponds to the person reviewing the diet log for accuracy at a convenient later time.”</li> </ul>

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Claim	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Mault at [0059]</p> <ul style="list-style-type: none"> <li>• “For example, a person can sit down to a meal and record an image of the meal using the electronic device. The image is transmitted to a remote location where it is analyzed and converted into a caloric value. The caloric value can be transmitted back to the person, allowing the person to decide whether to eat the meal, choose another meal, or eat some portion of the meal consistent with reaching a calorie balance goal.”</li> </ul> <p>Mault at [0074]</p> <ul style="list-style-type: none"> <li>• “FIG. 11 shows a PDA <b>280</b> with display <b>284</b>, buttons <b>282</b>, and imaging device <b>286</b> directed at a can of pickles <b>288</b>. The display <b>284</b> can be used to indicate the image to be captured. A button such as <b>282</b> may be pressed to record the image. The display <b>184</b> can be used to view captured images of foods stored in the memory of the PDA, for assisting the person in creating a diet log.”</li> </ul> <p>Mault at [0075]</p> <ul style="list-style-type: none"> <li>• “Optical character recognition may be used to obtain information from the image for storage in a diet log. An image of a box of corn flakes may be recognized by a computer as such, and used to generate a corn flake serving record in a diet log. Computer analysis may be used as a first attempt in producing a diet log, and if unsuccessful, the image can be passed to a human for analysis.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s</p>

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		Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.



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### **Exhibit C-5**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Sizer was filed on March 28, 1997. Sizer published at least as of March 14, 2000, and is available as prior art at least under 35 U.S.C. § 102 (a), (b) and (e).

As shown in the chart below, Sizer anticipates asserted claim 1 of the ’036 Patent. To the extent Sizer is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Sizer is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	Sizer discloses a system.  Sizer at 12:62-13:13 <ul style="list-style-type: none"> <li>• In accordance with the present invention, a capture device now can initiate a transaction by capturing transaction data from marks contained on an object, such as a magazine advertisement, where the marks have embedded therein a code corresponding to transaction data for initiating a transaction. The capture device includes a scanner, operable by a user, for reading marks contained on the object and a controller for interpreting the marks and retrieving transaction data embedded in the marks. Through associated apparatus as described above, a telephone call can be originated by information contained in the transaction data in at least a portion of the transaction data transferred to a desired destination for initiating a transaction. As a result, it is now possible now for magazines, newspapers, printed media and many other objects to contain marks relating to an advertisement or solicitation which can be easily scanned and a transaction completed to the vendor of the advertisement or solicitation. This saves much time and allows easier access to services and products.</li> </ul>
[1A]	a target database storing known targets of different types and recognition parameters associated with the known targets;	Sizer discloses a target database storing known targets of barcodes.  Sizer at FIG. 1

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 1</b></p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor</li> </ul>

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		<p>134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</p> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"> <li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li> </ul> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"> <li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to effectuate a transaction.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in</p>

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		the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B]	an identification platform coupled with the target database, and that	Sizer discloses an identification platform coupled with the target database. Sizer at FIG. 2 <p>FIG. 2</p> <p>Sizer at 5:3-20</p> <ul style="list-style-type: none"> <li>“Briefly, it was found using a spectrum analyzer on a typical video signal,</li> </ul>

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		<p>that there are comparatively large frequency components at the line rate and at the frame rate and its harmonics, but that between these frequencies, there are other frequency bands in which little information is carried. One such frequency band is between 15 and 30 kHz. By adding a low level carrier signal or tone at a frequency in this band, say 25 kHz, the video image is not degraded, but a properly tuned decoder can receive and decode the encoded information. In this way, digital information can be subliminally inserted in a video signal by adding to the video signal an amplitude shift keyed (ASK) or frequency shift keyed (FSK) carrier signal, and the digital information can later be recovered using ASK or FSK decoding. Encoded data can also be inserted in a television signal and recovered by a receiver that responds to the picture displayed on the television, in the manner described in U.S. Pat. No. 4,807,031 cited above.”</p> <p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.</li> </ul> <p>On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at 7:1-6</p> <ul style="list-style-type: none"> <li>• “The output of filter/receiver 215, representing the data captured by capture device 110, is applied to a microprocessor 220, which is arranged to perform various data processing and control functions in coordination with programs stored in an associated memory 221 as well as inputs received from a user of capture device 110.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.i]	communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;	<p>Sizer discloses an identification platform coupled with the target database that communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p>Sizer at FIG. 2</p>

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		<p><b>FIG. 2</b></p> <p>Sizer at 3:34-38</p> <ul style="list-style-type: none"> <li>The scanner 50 unit includes a scanning head 51 positioned on the bottom of the wireless capture device 110. In the particular embodiment illustrated with the scanner head 51 positioned on the bottom of the wireless capture device 110, the device is manually oriented in use so that the scanner head 51 moves over the marks to be read. The scanner unit 50 is wired directly to a microprocessor 220 (FIG. 2) of the device 110 and works in a manner that will be explained below.</li> </ul>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.</li> </ul> <p>On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p> <p>Sizer at 12:34-35</p> <ul style="list-style-type: none"> <li>• It is further to be noted that the present invention can be used in the context of automobiles and mobile telephones.</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the</p>

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		reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B.ii]	receives the digital representation from the mobile device; and	<p>Sizer discloses an identification platform coupled with the target database that receives the digital representation from the mobile device.</p> <p>Sizer at FIG. 2</p> <p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a</li> </ul>

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		<p>television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.</p> <p>On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	recognizes the target as a known target from the target database based on comparing parameters	Sizer discloses recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.

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	<p>derived from the digital representation to recognition parameters associated with the known targets; and</p>	<p>Sizer at FIG. 2</p> <p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image. On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is</li> </ul>

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		<p>captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	a content service coupled with the identification platform, and that:	<p>Sizer discloses a content service coupled with the identification platform.</p> <p>Sizer at FIG. 1</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 1</b></p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor</li> </ul>

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		<p>134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</p> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"> <li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li> </ul> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"> <li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to effectuate a transaction.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in</p>

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		the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1C.i]	obtains content information related to the known target; and	Sizer discloses [a content service coupled with the identification platform] that obtains content information related to the known target.  Sizer at FIG. 1



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 1</b></p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</p> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"> <li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li> </ul> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"> <li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to effectuate a transaction.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in</p>

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		the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1C.ii]	sends the content information to at least one of the identification platform and the mobile device.	Sizer discloses [a content service coupled with the identification platform] that sends the content information to at least one of the identification platform and the mobile device.  Sizer at FIG. 1

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 1</b></p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>“If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</p> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"> <li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li> </ul> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"> <li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to effectuate a transaction.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit C-6**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Harris was filed on July 18, 2000. Harris published at least as of December 23, 2003, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Harris anticipates asserted claim 1 of the ’036 Patent. To the extent Harris is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Harris is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	Harris discloses a system.  Harris at 4:41-48 “In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”
[1A]	a target database storing known targets of different types and recognition parameters associated with the known targets;	Harris discloses a target database storing known targets of barcodes.  Harris at FIG. 4



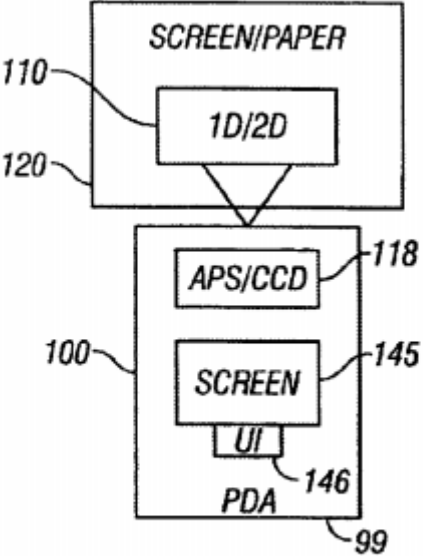
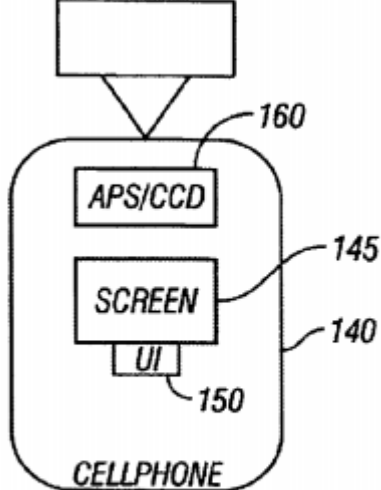
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate</p>

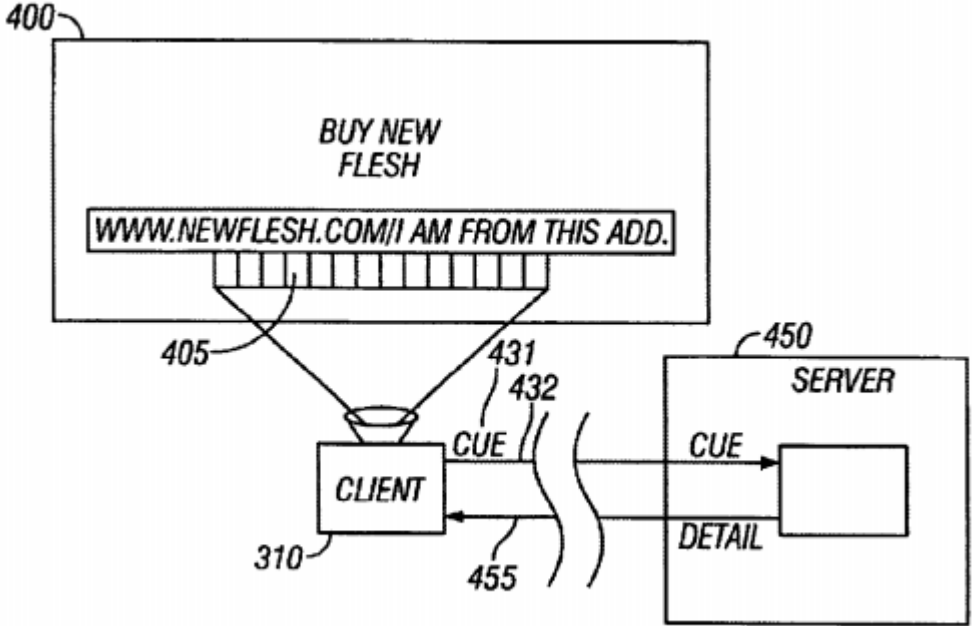
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B]	an identification platform coupled with the target database, and that	Harris discloses an identification platform coupled with the target database.  Harris at FIG. 1A and FIG. 1B

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 U.S. Patent No. 6,666,377 to Harris (“Harris”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> </div> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using <b>a personal digital assistant 100</b> as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being <b>a cellular telephone</b> which also may include a screen 145 and user interface 150. The cellular telephone can be</li> </ul>

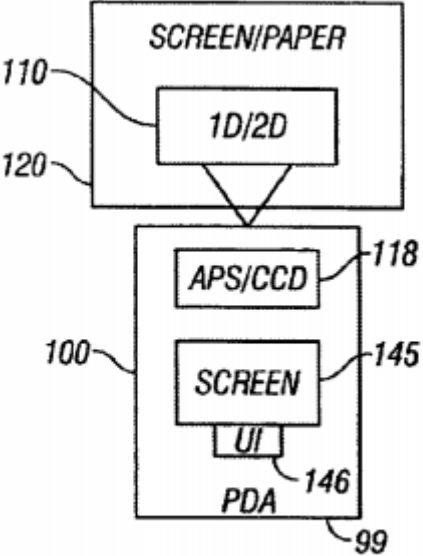
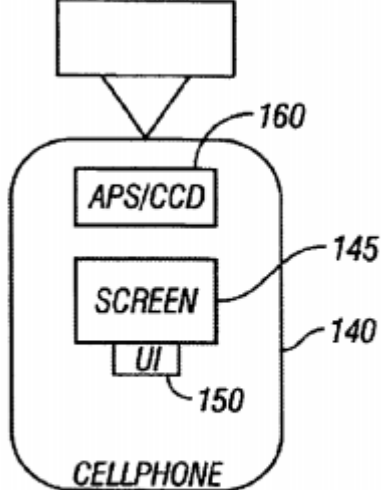
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>  <p>The diagram, labeled FIG. 4, illustrates a system for processing an advertisement. At the top, a rectangular box labeled 400 represents the advertisement. Inside this box, the text "BUY NEW FLESH" is displayed above a horizontal bar code labeled 405. Below the bar code, a smaller box contains the URL "WWW.NEWFLESH.COM//I AM FROM THIS ADD.". A lens-like component labeled 431 is positioned to scan the bar code, with a light path labeled 432 leading to a "CLIENT" box labeled 310. The client sends a "CUE" signal to a "SERVER" box labeled 450. The server responds with a "DETAIL" signal back to the client. A wavy line labeled 455 represents a network connection between the client and the server.</p> <p><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

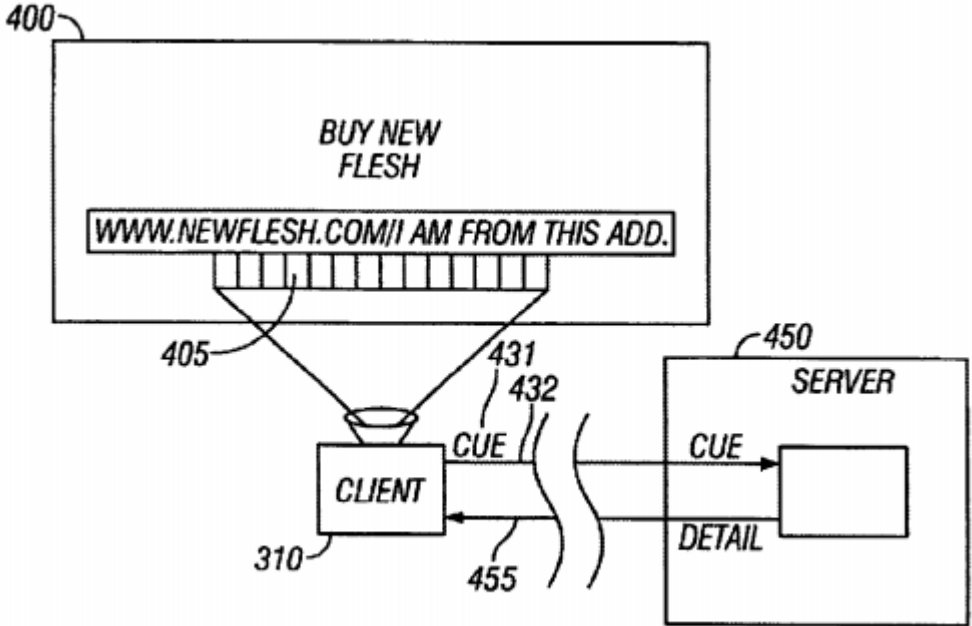
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 U.S. Patent No. 6,666,377 to Harris (“Harris”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.i]	communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;	<p>Harris discloses an identification platform coupled with the target database that communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p>Harris at FIG. 1A and FIG. 1B</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> </div> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using <b>a personal digital assistant 100</b> as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being <b>a cellular telephone</b> which also may include a screen 145 and user interface 150. The cellular telephone can be</li> </ul>

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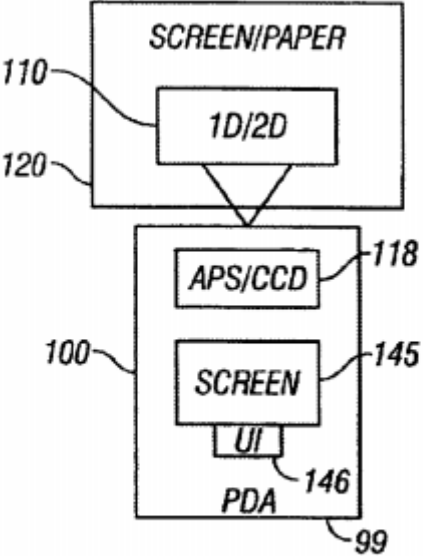
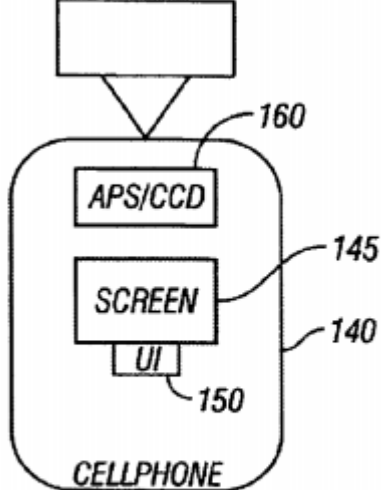
Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>  <p>The diagram, labeled FIG. 4, illustrates a system for processing an advertisement. At the top, a rectangular box labeled 400 represents the advertisement. Inside this box, the text "BUY NEW FLESH" is displayed above a horizontal bar code labeled 405. Below the bar code, a URL is provided: "WWW.NEWFLESH.COM//I AM FROM THIS ADD.". A lens-like component, labeled 431, is positioned to scan the bar code. This component is connected to a box labeled 310, which is identified as the "CLIENT". A line labeled 432 connects the lens to the client. From the client, a line labeled "CUE" (455) is sent to a box labeled 450, identified as the "SERVER". The server then sends a line labeled "DETAIL" back to the client. A wavy line separates the client and server boxes, indicating a network connection.</p> <p><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

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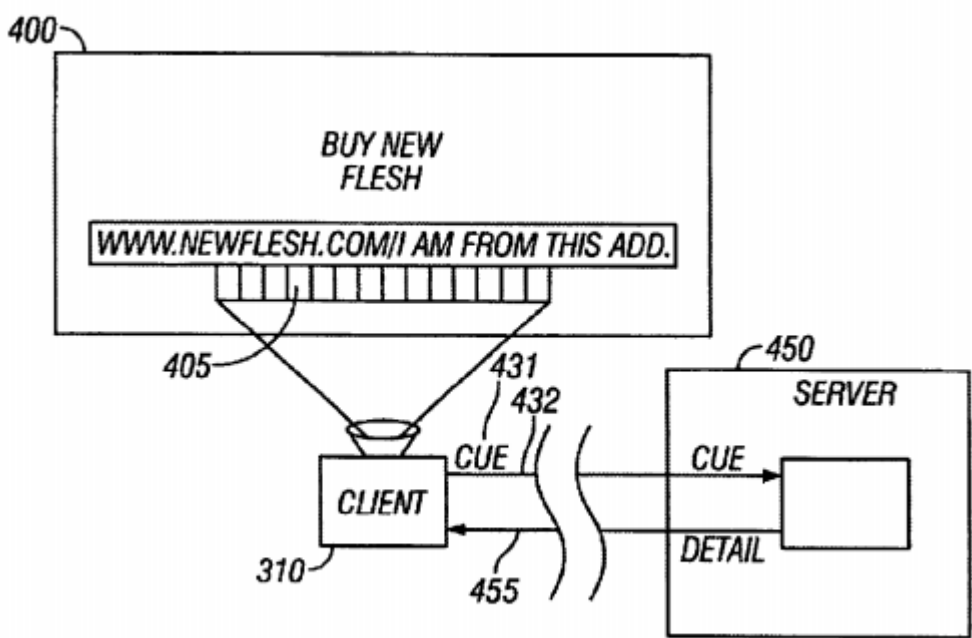
Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.ii]	receives the digital representation from the mobile device; and	<p>Harris discloses an identification platform coupled with the target database that receives the digital representation from the mobile device.</p> <p>Harris at FIG. 1A and FIG. 1B</p>



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 U.S. Patent No. 6,666,377 to Harris (“Harris”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> </div> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using <b>a personal digital assistant 100</b> as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being <b>a cellular telephone</b> which also may include a screen 145 and user interface 150. The cellular telephone can be</li> </ul>

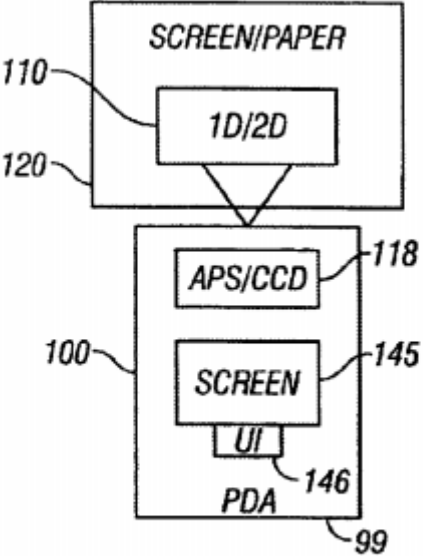
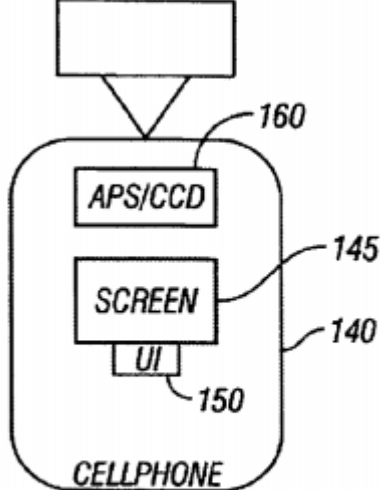
*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872  
 Invalidity Chart for U.S. Patent 8,478,036 based on  
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>  <p>The diagram, labeled FIG. 4, illustrates a system for processing an advertisement. At the top, a rectangular box labeled 400 represents the advertisement. Inside this box, the text "BUY NEW FLESH" is displayed above a horizontal bar code labeled 405. Below the bar code, a URL is provided: "WWW.NEWFLESH.COM//I AM FROM THIS ADD.". A lens-like component, labeled 431, is positioned to scan the bar code. This component is connected to a box labeled 310, which is identified as the "CLIENT". A line labeled 432 connects the lens to the client. From the client, a line labeled "CUE" (455) extends to a box labeled 450, identified as the "SERVER". Inside the server box, there is a smaller rectangular component. A line labeled "DETAIL" returns from the server to the client. A wavy line separates the client and server boxes, indicating a network connection.</p> <p><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

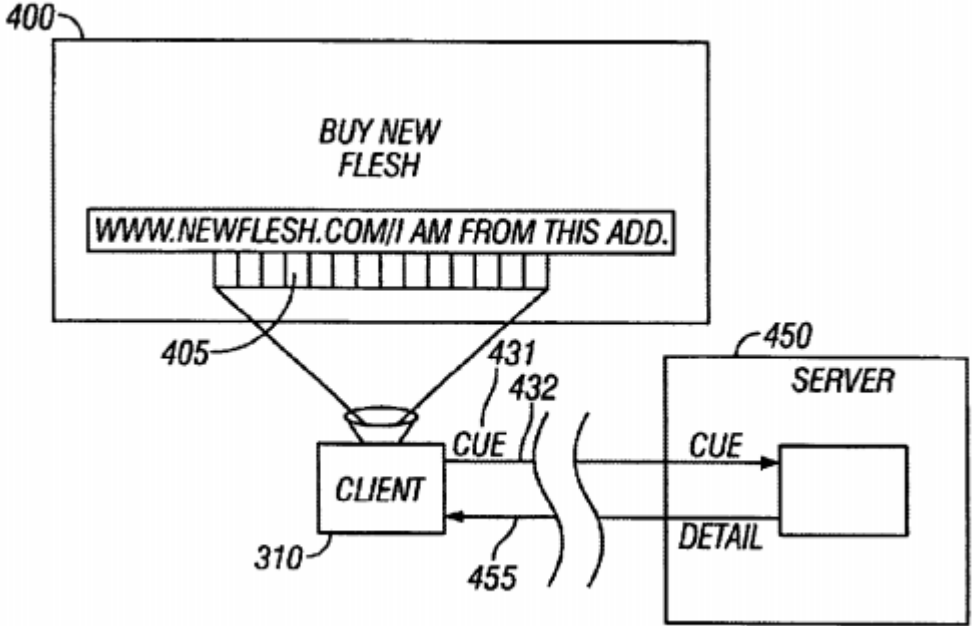
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		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets; and	<p>Harris discloses recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.</p> <p>Harris at FIG. 1A and FIG. 1B</p>

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		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> </div> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using <b>a personal digital assistant 100</b> as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being <b>a cellular telephone</b> which also may include a screen 145 and user interface 150. The cellular telephone can be</li> </ul>

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		<p>associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>  <p>The diagram, labeled FIG. 4, illustrates a system for processing an advertisement. At the top, a rectangular box labeled 400 represents the advertisement. Inside this box, the text "BUY NEW FLESH" is displayed above a horizontal bar code labeled 405. Below the bar code, a URL is provided: "WWW.NEWFLESH.COM//I AM FROM THIS ADD.". A lens-like component, labeled 431, is positioned to scan the bar code. This component is connected to a box labeled 310, which is identified as the "CLIENT". A line labeled 432 connects the lens to the client. From the client, a line labeled "CUE" (with reference numeral 455) extends to a box labeled 450, identified as the "SERVER". Inside the server box, there is a smaller rectangular box. A line labeled "CUE" points from the server to this inner box, and another line labeled "DETAIL" points from the inner box back to the server. A wavy line separates the client and server boxes, indicating a network connection.</p> <p><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

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		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	a content service coupled with the identification platform, and that:	<p>Harris discloses a content service coupled with the identification platform.</p> <p>Harris at FIG. 4</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate</p>

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		this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1C.i]	obtains content information related to the known target; and	Harris discloses [a content service coupled with the identification platform] that obtains content information related to the known target.  Harris at FIG. 4



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		<p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate</p>

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		<p>this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.ii]	<p>sends the content information to at least one of the identification platform and the mobile device.</p>	<p>Harris discloses [a content service coupled with the identification platform] that sends the content information to at least one of the identification platform and the mobile device.</p> <p>Harris at FIG. 4</p>

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		<p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate</p>

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		this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit C-11**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Ehrhart was filed on July 13, 2001, claiming the priority date of July 13, 2001. Ehrhart published at least as of April 20, 2004, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Ehrhart anticipates asserted claim 1 of the ’036 Patent. To the extent Ehrhart is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Ehrhart is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	<p>Ehrhart discloses a content provisioning system.</p> <p>“The present invention relates to an optical reader that includes a color imaging assembly that generates color imaging data. An image analysis circuit determines if the acquired image should be characterized as a color photograph or as including a graphical symbol. A processing circuit processes the imaging data based on the image analysis circuit's determination of whether the image is a graphical symbol or a color photograph. The present invention allows a user to acquire and process both color images and graphical symbols, such as bar codes, text, OCR symbols or signatures. The optical reader of the present invention is also configured to associate an acquired image with at least one other acquired image.” Ehrhart at Abstract.</p>
[1A]	a target database storing known targets of different types and recognition parameters associated with the known targets;	<p>Ehrhart discloses a target database storing known targets of barcodes.</p> <p><i>Id.</i> at [1Pre].</p> <p>“In one embodiment, this mode includes a Signature verification program wherein the user may select between a Static verification or a dynamic verification. In the Static mode, the user captures the image of a Signature. The captured image is compared with a reference image Stored in a remote database. In the dynamic mode, optical reader 10 uses the Stylus and Signature block to capture the Signature. In this mode, Signature block 62 measures unique dynamic parameters, Such as applied pressure, direction and timing of movements, or a combination of these parameters. One of ordinary skill in the art will recognize that this list is not meant to be all-</p>

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		<p>inclusive, but rather, is a representative example. The captured dynamic parameters are compared with a reference data Stored in a remote database.” Ehrhart at 8:64-9:10.</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	an identification platform coupled with the target database, and that	<p>Ehrhart discloses an identification platform coupled with the target database.</p> <p><i>Id.</i> at [1Pre-A].</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14, alphanumeric key pad 16, and display 60. In one embodiment, function keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG. 1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100. Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>“In one embodiment, this mode includes a Signature verification program wherein the user may select between a Static verification or a dynamic verification. In the Static mode, the user captures the image of a Signature. The captured image is compared with a reference image Stored in a remote database. In the dynamic mode, optical reader 10 uses the Stylus and Signature block to capture the Signature. In this mode, Signature block 62 measures unique dynamic parameters, Such as applied pressure, direction and timing of movements, or a combination of these parameters. One of ordinary skill in the art will recognize that this list is not meant to be all-</p>



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		<p>inclusive, but rather, is a representative example. The captured dynamic parameters are compared with a reference data Stored in a remote database.” Ehrhart at 8:64-9:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.i]	<p>communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;</p>	<p>Ehrhart discloses an identification platform coupled with the target database that communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p><i>Id.</i> at [1Pre-B].</p> <p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14, alphanumeric key pad 16, and display 60. In one embodiment, function keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG. 1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100. Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.ii]	receives the digital representation from the mobile device; and	<p>Ehrhart discloses an identification platform coupled with the target database that receives the digital representation from the mobile device.</p> <p><i>Id.</i> at [1Pre-B].</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>“In the embodiment depicted in FIG. 2, ASIC 44 is implemented using a programmable logic array (PLA) device. In a similar embodiment, ASIC 44 is implemented using a field programmable gate array (FPGA) device. ASIC 44 is tasked with controlling the image acquisition process, and the storage of image data. As part of the image acquisition process, ASIC 44 performs various timing and control functions including control of light source 24, control of color imager 34, and control of external interface 56. It will be apparent to those of ordinary skill in the pertinent art that modifications and variations can be made to processor 40 of the present invention depending on the cost, availability, and performance of off-the-shelf microprocessors, and the type of color imager used. In one embodiment, microprocessor 42 and ASIC 44 are replaced by a single microprocessor 40. In one embodiment, microprocessor 40 is implemented using a single RISC processor. In yet another embodiment, microprocessor 40 is implemented using a RISC and DSP hybrid processor.” Ehrhart at 7:32-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not</p>

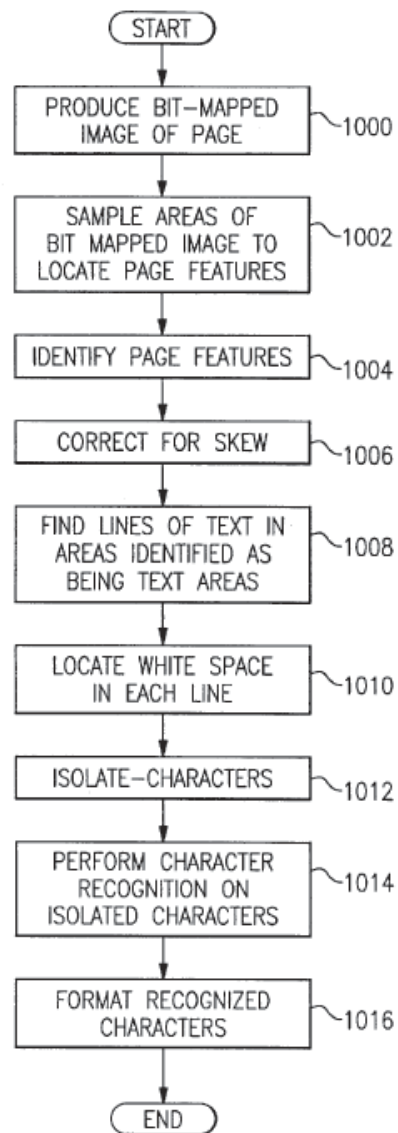
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	<p>recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets; and</p>	<p>Ehrhart discloses recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.</p> <p><i>Id.</i> at [1Pre-B].</p> <p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p> <p>“In one embodiment, this mode includes a Signature verification program wherein the user may select between a Static verification or a dynamic verification. In the Static mode, the user captures the image of a Signature. The captured image is compared with a reference image Stored in a remote database. In the dynamic mode,</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>optical reader 10 uses the Stylus and Signature block to capture the Signature. In this mode, Signature block 62 measures unique dynamic parameters, Such as applied pressure, direction and timing of movements, or a combination of these parameters. One of ordinary skill in the art will recognize that this list is not meant to be all-inclusive, but rather, is a representative example. The captured dynamic parameters are compared with a reference data Stored in a remote database.” Ehrhart at 8:64-9:10.</p> <p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.” Ehrhart at 10:5-20.</p> <p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p>

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**FIG. 10**

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	a content service coupled with the identification platform, and that:	<p>Ehrhart discloses a content service coupled with the identification platform.</p> <p><i>Id.</i> at [1Pre-B].</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.i]	<p>obtains content information related to the known target; and</p>	<p>Ehrhart discloses [a content service coupled with the identification platform] that obtains content information related to the known target.</p> <p><i>Id.</i> at [1Pre-C].</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.ii]	<p>sends the content information to at least one of the identification platform and the mobile device.</p>	<p>Ehrhart discloses [a content service coupled with the identification platform] that sends the content information to at least one of the identification platform and the mobile device.</p> <p><i>Id.</i> at [1Pre-C].</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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### Exhibit C-23

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. A statement of reasons and good cause for each supplement in this chart is identified in the cover pleading.

QBIC was known or used by others in the United States and publicly used or on sale in the United States by November 5, 2000. *See generally* W. Niblack et al., *The QBIC Project: Querying Images By Content Using Color, Texture, and Shape*, SPIE Vol. 1908 (1993), pp. 173–187 (IBM0002390–404); M. Flickner et al., *Query by Image and Video Content: The QBIC System (“QBIC”) (IBM0000893.)*, IEEE Sept. 1995, pp. 23–32 (IBM0000893–902); W. Niblack et al, *Updates to the QBIC System*, SPIE Vol. 3312 (1997), pp. 150–161 (IBM 0002419–430); and *Query By Image Content QBIC Demonstration Program*, IBM Research, Sept. 1998 (IBM000747). QBIC is available as prior art at least under 35 U.S.C. § 102(a), (b), and (g), having been known or used by others in the United States and publicly used or on sale in the United States by at least 1995 and certainly by November 5, 2000, including, for example, at <http://libra.uc.davis.edu> through the Art History Department at U.C. Davis; at [www.thinker.org/imagebase/indox-2 .htm](http://www.thinker.org/imagebase/indox-2.htm) through the Fine Arts Museum of San Francisco; through demos at <http://www.qbic.almaden.ibm.com>; and through IBM’s commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. *See generally* Deposition of IBM Corporate Representative Myron Flickner, *Nantworks, LLC and Nant Holdings IP, LLC v. Bank of America Corporation and Bank of America, N.A.*, 2:20-cv-07872-GW-PVC (C.D.C.A. 2020) (“Flickner 8/29/23 Depo”) at e.g., 32–33, 39–40, 44, 62–63, 66–67, 72–74, 103–107, 110–112, 127, 163–174, 183–189, 191–195, 215, 219–220, 241, 307–309, 311–317, Exs. 3–13; *see also* Deposition of IBM Corporate Representative Myron Flickner, *Network-1 Technologies, Inc., v. Google LLC and Youtube LLC*, 1:14-cv-09558-PGG (S.D.N.Y. 2019) (“Flickner Depo”), including, e.g., at 13, 14, 15–18, 29–30, 34, 36, 37, 43–46, 48, 58, 60, 61–62, 67–69, 72, 74–76, 84–86, 88–89, 98–100, 102, 106, 113, 125, 135, 152–154, 160–161, 170–172, 180–181, 194, 198–201, 203–205, 215–216, 220–221, and Exs. 1–16.

As shown in the chart below, QBIC anticipates asserted claim 1 of the ’036 Patent. The disclosures/exemplary citations for each element incorporate the disclosures citations of the proceeding limitations. To the extent QBIC is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent QBIC is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cited references and/or in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass

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the accused products, the claims must also be construed to have that same scope when considering whether they are invalid. The following chart incorporates by reference the analysis from Exhibit C-21 for each limitation.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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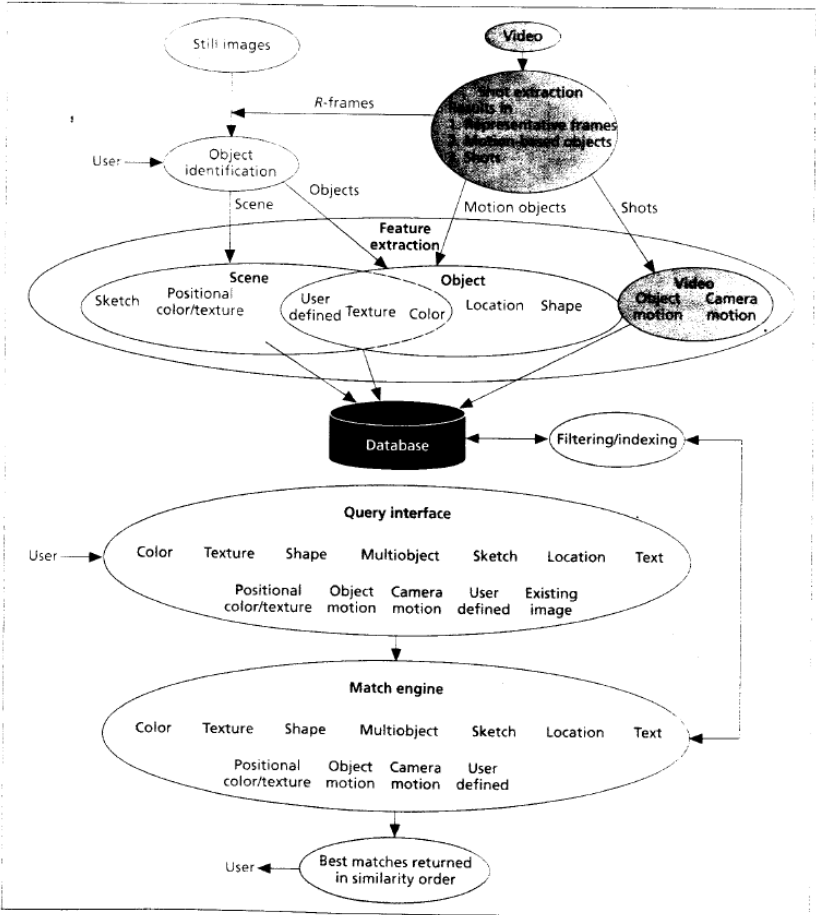
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**1. Claim 1**

Element	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	<p>QBIC discloses a content provisioning system.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 1</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images’ content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>2 shows the system architecture.” <i>Id.</i> at p. 3.</p>  <p>The diagram illustrates the QBIC system architecture, divided into database population (top) and query (bottom) phases.   <b>Database Population (Top):</b>           - <b>Input:</b> Still images and Video.           - <b>Object Identification:</b> A user provides input to an 'Object identification' block, which outputs 'Objects' and 'Scene'.           - <b>Feature Extraction:</b> 'Objects' and 'Scene' feed into 'Feature extraction', which outputs 'User defined' (Texture, Color), 'Object' (Location, Shape), and 'Video' (Object motion, Camera motion).           - <b>Database:</b> All extracted features are stored in a 'Database'.           - <b>Filtering/Indexing:</b> A 'Filtering/indexing' block interacts with the 'Database'.   <b>Query (Bottom):</b>           - <b>Query Interface:</b> A user provides input to a 'Query interface' with categories: Color, Texture, Shape, Multiobject, Sketch, Location, Text. Sub-categories include: Positional color/texture, Object motion, Camera motion, User defined, Existing image.           - <b>Match Engine:</b> The query interface feeds into a 'Match engine' with the same categories and sub-categories.           - <b>Output:</b> The match engine returns 'Best matches returned in similarity order' to the user.</p> <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>QBIC Demo (IBM000747):</b></p>  <p><b>QBIC Demo (IBM000747):</b></p> 

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Flicker Depo at 13:</p> <p>11           And what does QBIC stand for?</p> <p>12           A. Query by image content.</p> <p>Flickner Depo at 18</p> <p>14           A. Well, we did stuff with the San Francisco</p> <p>15           Museum, the stamps database, trademark database.</p> <p>16           So we did some of the stuff with Davis --</p> <p>17           Q. Okay.</p> <p>18           A. -- UC Davis. I remember we talked to a</p> <p>19           couple people at Davis.</p> <p>20           Q. So was this an active area of research in</p> <p>21           the 1990s?</p> <p>22           A. Yeah.</p> <p>Flickner Depo at 40:</p>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>3 Q. Okay. Could you take as -- as you did in</p> <p>4 the query by image search system, could you just</p> <p>5 search a video using this system?</p> <p>6 A. You could search for a key frame and that</p> <p>7 could point you to a video.</p> <p>8 Q. As an input into the system, could you</p> <p>9 search -- could you input a whole video and then</p> <p>10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which</p> <p>15 it did so, as you mentioned, was -- would it</p> <p>16 extract key frames from the video, extract features</p> <p>17 from those key frames, and then search those</p> <p>18 features; is that right?</p> <p>19 A. Correct.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 72:</p> <p>2 Q. And did the MediaMiner implement QBIC</p> <p>3 technology?</p> <p>4 MS. HAYDEN: Objection. Vague.</p> <p>5 THE DEPONENT: Yes.</p> <p>6 Q. (By Mr. Dang) How did it implement QBIC</p> <p>7 technology?</p> <p>8 A. It appears to have integrated the QBIC</p> <p>9 technology -- kind of the productization of the</p> <p>10 QBIC technology.</p> <p>11 Q. What do you mean by an approximation of</p> <p>12 the QBIC technology?</p> <p>13 A. An application.</p> <p>14 Q. Application of the QBIC technology.</p> <p>15 Okay.</p> <p>16 A. So there's an AIX running offering for</p> <p>17 doing content-based retrieval.</p> <p>Flickner Depo at 76:</p> <p>3 Q. Did the image extender incorporate QBIC</p> <p>4 technology?</p> <p>5 A. I believe it did.</p> <p>6 Q. Did the image extender allow a user of</p> <p>7 the Db2 universal database to search images by</p> <p>8 their content?</p> <p>9 A. I believe it did.</p> <p>Flickner Depo at 91:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>13 Q. And could you, in general terms, describe                      14 what Virage was?                      15 A. It was a content-based retrieval system                      16 tailored to secure surveillance information.                      17 Q. And you went to their website; was there                      18 something on their website, say, a demonstration?                      19 A. I don't remember.                      20 Q. Was their system commercially available                      21 during the 1990s?                      22 A. Yes.</p> <p>Flickner Depo at 95:                      7 Q. And in general terms, what was                      8 VisualSEEK?                      9 A. Another content-based retrieval system.</p> <p>Flickner Depo at 113:                      2 Q. I'm just trying to understand how                      3 Ultimedia Query, Ultimedia Manager and QBIC all fit                      4 together.                      5 And my question was, is Ultimedia Query                      6 something different than Ultimedia Manager?                      7 A. I think the underlying technology was the                      8 same, but I suspect the actual platforms were                      9 different.                      10 Q. And what do you mean by underlying                      11 technology?                      12 A. The ability to do content-based image                      13 retrieval.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 50:</p> <p>7 Q. And so if I clicked on this T, and it</p> <p>8 used the texture features, what would -- what would</p> <p>9 the system do?</p> <p>10 A. It would return the list of stamps based</p> <p>11 on similarity and texture.</p> <p>12 Q. And how would it decide which stamps were</p> <p>13 the most similar to that query image?</p> <p>14 A. It would use those texture features to</p> <p>15 compute it, and then it -- I think it was using L</p> <p>16 to distance.</p> <p>Flickner Depo at 54-55:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <hr/> <p style="text-align: right;">Page 54</p> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.                      17 Q. Was there any metadata returned with the                      18 trademarks?                      19 A. I'm sure there was.</p>

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		<p>Flickner Depo at 89-90:</p> <p>11 Q. Was that used to the QBIC system publicly                      12 available anywhere?</p> <p>13 A. You mean was the Fine Arts demo                      14 available?</p> <p>15 Q. Yes.</p> <p>16 A. I think it was on our site, but I can't                      17 remember for...</p> <p>18 Q. How did their system work to identify art                      19 prints?</p> <p>20 A. Art what?</p> <p>21 Q. How would one identify an art print using                      22 their system?</p> <p>2 THE DEPONENT: Well, you had a picture --                      3 you could take a picture of a painting and then you                      4 could use that as a query content. And you could,                      5 for example, determine its -- its heritage or its                      6 lineage.</p> <p>7 Q. (By Mr. Dang) So you could identify                      8 image about -- or you could identify information                      9 about the painting using the system?</p> <p>10 A. Right.</p> <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system):</p>

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		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>

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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p> <p style="text-align: right;">Page 62</p>
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		<p>10 Q. Say it returned the stills, could you use                      11 those stills to point you to a video?                      12 A. Yeah.                      13 Q. And how would you do that?                      14 A. Well, the -- each -- each key frame                      15 typically represents a frame in the video. So                      16 there's a -- the key frame is -- is one frame of                      17 the video so you just seek to that point.                      18 Q. So if I'm understanding this right, you                      19 could take a query video, the system would extract                      20 frames, which would then extract features from it,                      21 and then the system would return either shot clips                      22 or key frames; is that right?                      1 A. Right.</p> <p>Flickner 8/29/23 Depo at 42:</p>

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		<p>4 Q. So let's just start at a high level. Tell 5 me generally what is QBIC? 6 A. QBIC was a technology -- stands for query 7 by image content. It was a way of extracting 8 features of various types, putting those features in 9 a database and then searching the database to get 10 images that looked visually similar or semantically 11 similar. 12 Q. And when you say "semantically similar," 13 what do you mean? 14 A. You could query based on semantics. You 15 could ask for what does a microphone look like and 16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206:</p>

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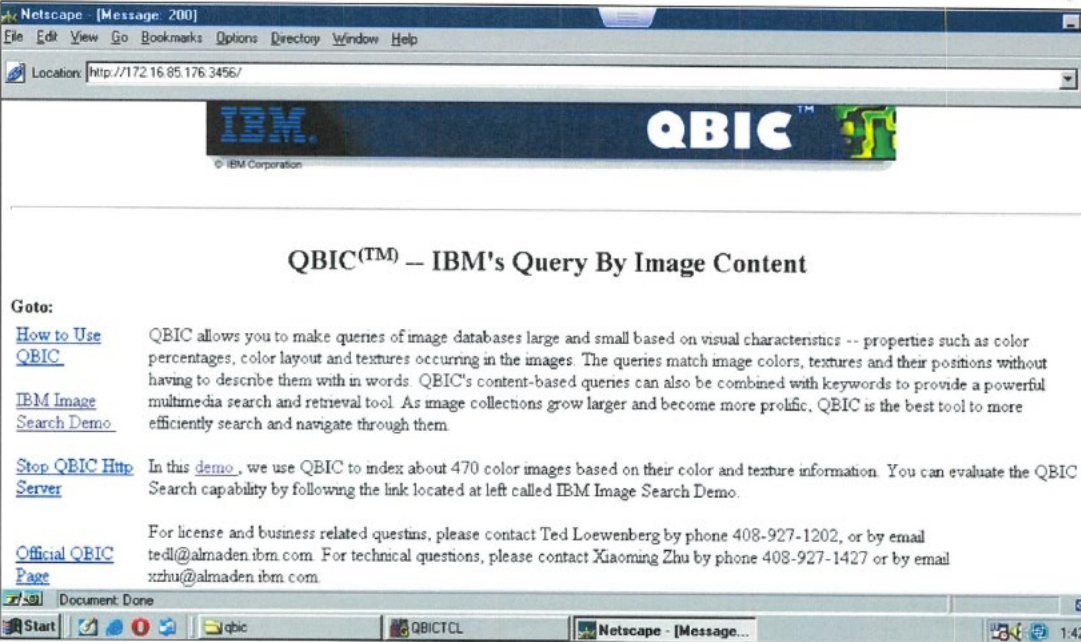
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		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.</p> <p>Flickner 8/29/23 Depo at Ex. 5:</p>

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		 <p>The QBIC system was implemented in IBM commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. <i>See, e.g.</i>, Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.</p>
[1A]	a target database storing known targets of different types and recognition parameters associated with the known targets;	<p>QBIC discloses a target database storing known targets and their associated recognition parameters.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape</p>

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		<p>(IBM 0002390–404) at 2390</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391:</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2391-92:</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>



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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93:</p>



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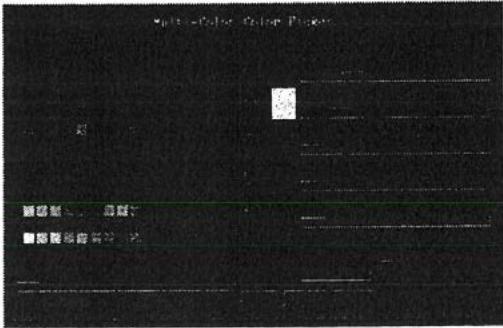
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>

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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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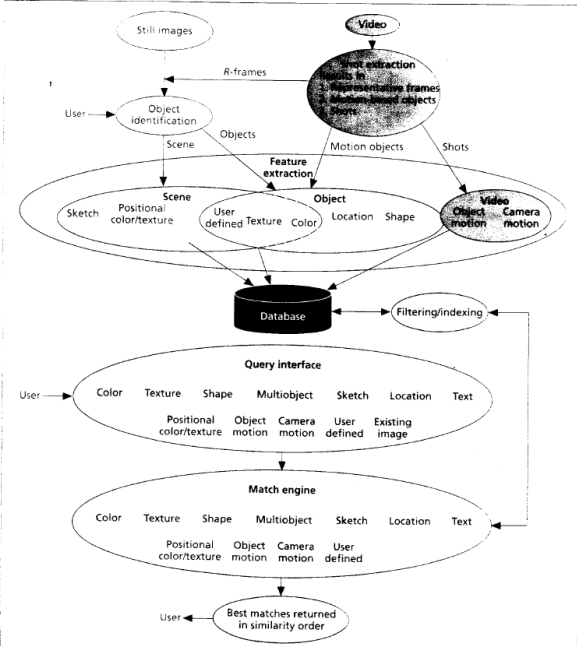
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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95:</p> <p>QBIC (Query by Image Content) (BOFA00001391–392) at 1:</p>

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		<p>Query by example using <i>color histograms</i></p> <ul style="list-style-type: none"> <li>• Example image:</li> </ul> <div> </div> <ul style="list-style-type: none"> <li>• One of the colour histograms for the example image is shown in Fig. 28.1.</li> </ul> <div> </div> <p><b>Colour Histogram of Image</b></p> <ul style="list-style-type: none"> <li>• Store a histogram vector for each image in the database,              compare images using mean squared difference,              return images sorted by this metric.</li> </ul> <p> <b>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</b>              “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching         </p>

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		<p>engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>  <p>Figure 2. QBIC database population (top) and query (bottom) architecture. <i>Id.</i> at Fig. 2.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are</p>

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		<p>generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“DATABASE POPULATION</b></p> <p>In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like ‘baby on beach,’ can be associated with an outlined object or with the scene as a whole.</p> <p><b>Object-outlining tools</b></p> <p>Ideally, object identification would be automatic, but this is generally difficult. The alternative—manual identification—is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised segmentation methods along with a foreground/background model to identify objects in a restricted class of images. The images, typical of museums and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.</p> <p>We also provide semiautomatic tools for identifying objects. One is an enhanced flood-fill technique. Flood-fill methods, found in most photo-editing programs, start from a single object pixel and repeatedly add adjacent pixels whose values</p>



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		<p>are within some given threshold of the original pixel. Selecting the threshold, which must change from image to image and object to object, is tedious. We automatically calculate a dynamic threshold by having the user click on background as well as object points. For reasonably uniform objects that are distinct from the background, this operation allows fast object identification without manually adjusting a threshold. The example in Figure 3 shows an object, a fox, identified by using only a few clicks.</p> <p>We designed another outlining tool to help users track object edges. This tool takes a user-drawn curve and automatically aligns it with nearby image edges. Based on the ‘snakes’ concept developed in recent computer vision research, the tool finds the curve that maximizes the image gradient magnitude along the curve.</p> <p>The spline snake formulation we use allows for smooth solutions to the resulting nonlinear minimization problem. The computation is done at interactive speeds so that, as the user draws a curve, it is ‘rubber-banded’ to lie along object boundaries.</p> <p>...</p> <p><b>Video data</b></p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p>

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		<p>“A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content. You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b>                      The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b>                      Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b>                      The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b>                      Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus</p>



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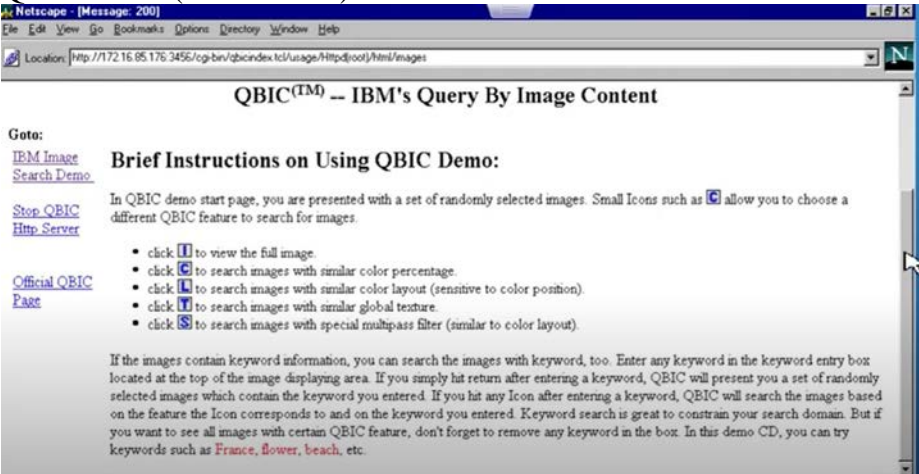
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p>

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		 <p><b>QBIC Demo (IBM000747):</b></p> 

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		<p>Flickner Depo at 20</p> <p>3 Q. Okay. And the steps that -- at least as</p> <p>4 I understand it -- is you'd have database</p> <p>5 population, feature calculation and image query; is</p> <p>6 that right?</p> <p>7 A. Uh-huh. Yes.</p> <p>8 Q. So let's -- let's start with database</p> <p>9 population.</p> <p>10 What was the database population step?</p> <p>11 A. It's a process of taking a set of images,</p> <p>12 and then putting them in -- into the database and</p> <p>13 the extracting the features and putting the</p> <p>14 features in the database.</p> <p>20 Q. And how large were these database</p> <p>21 structures?</p> <p>22 A. In the order of 15,000 images.</p> <p>Flickner Depo at 25-26:</p>

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		<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database, is that                    1 right?                  2 A. That's correct.</p> <p>Flickner Depo at 36:                  10 Q. So underlying this paper, you mentioned                  11 you did more work on the shape side of things; is                  12 that right?                  13 A. I did.                  14 Q. And what would that work have entailed?                  15 A. We wanted to query by shape.                  16 Q. Okay. And how would that have worked?                  17 A. We created features related to the shape                  18 of a -- the object of -- as it populated the                  19 database, and then we would query against those                  20 features.</p>

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		<p>Flickner Depo at 39-40:</p> <p>17 Q. Okay. So you would take -- you would use                      18 a histogram methodology to extract key frames from                      19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with                      22 those key frames?</p> <p>1 A. You just populate image database using                      2 those images.</p> <p>3 Q. Okay. Could you take as -- as you did in                      4 the query by image search system, could you just                      5 search a video using this system?</p> <p>6 A. You could search for a key frame and that                      7 could point you to a video.</p> <p>8 Q. As an input into the system, could you                      9 search -- could you input a whole video and then                      10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which                      15 it did so, as you mentioned, was -- would it                      16 extract key frames from the video, extract features                      17 from those key frames, and then search those                      18 features; is that right?</p> <p>19 A. Correct.</p>

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		<p>Flickner Depo at 78-79:</p> <p>6 Q. How would the Db2 universal search a                      7 query image using QBIC technology?                      8 A. You would create a -- create a manager                      9 QB- -- or create a QBIC catalog.                      10 Q. What's a QBIC catalog?                      11 A. It's an instance of a table that has a                      12 bunch of images in it.                      13 Q. And forgive me, what's an instance of a                      14 table?                      15 A. You create a table -- create a database,                      16 and then in the database you create a table and you                      17 have maybe like a file name, and then the actual                      18 image bits into it.                      19 Q. And how would you search for images using                      20 that table?                      21 A. You could search -- you could use                      22 whatever you wanted to for the -- the SQL query</p> <hr/> <p style="text-align: right;">Page 78</p> <p>1 to -- to filter, and then that would give you a                      2 list of results. And then you'd rank all of those                      3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 88-89:</p>

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		<p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.              16 Q. (By Mr. Dang) Were there any              17 circumstances under which the system would not              18 compute the distance for every image in the              19 database during a search?              20 A. If there was a text filter on it, we              21 didn't.              22 Q. Did the Fine Arts Museum of San Francisco</p> <hr/> <p style="text-align: right;">Page 88</p> <p>1 similarly use the QBIC system?              2 A. They did.              3 Q. When did they use the QBIC system?              4 A. It was in the '90s, if I recall right.              5 Q. How did they use the QBIC system?              6 A. Similar to the way Davis did, as I              7 recall.              8 Q. What sorts of images were they including              9 in their database?              10 A. Paintings.</p> <p>Flickner Depo at 142:</p>

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		<p>1 Q. Do you recall what type of indexing was                  2 used in the database associated with the 1998 demo                  3 version?                  4 A. Most likely, it was just a linear index.                  5 Q. And what do you mean by linear index?                  6 A. You just -- you -- you compute the                  7 features on every record in the database -- you                  8 compare the features against every record in the                  9 database.</p> <p>Flickner Depo at 168-169:                  16 Q. What do you mean that it lets you access                  17 the -- the neighbors to your query point?                  18 A. So your incoming query -- say it's an                  19 image -- you compute a feature vector. And then                  20 you compute some orthogonal transform of the                  21 feature vector such as a wave transform or                  22 wavelets. There's a variety --</p> <hr/> <p style="text-align: right;">Page 168</p> <p>1 MR. DeCLERCK: Slow down, please.                  2 THE DEPONENT: Wavelets, other types of                  3 features that do dimensionality reduction. And                  4 then you put the reduced dimensionality feature                  5 vector into the database, and then the database                  6 queries and R*-tree to be able to get points nearby                  7 to the -- in the lower dimensional space.</p>



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		<p>Flickner Depo at 181:</p> <p>5           A. I do not recall the -- the UI parts of 6           it.</p> <p>7           Q. And earlier you -- you mentioned a query 8           engine.</p> <p>9           What did you mean by that phrase?</p> <p>10          A. The architecture QBIC was client server. 11          There were -- there's an API to query the database, 12          and there was a GUI then to display and control 13          through the creation of the queries.</p> <p>14          The GUI evolved because when we started, 15          there was no Web. This would have been even 16          pre-1990. So all the original versions used the 17          X Window system. But as the Web came online, we -- 18          we migrated the -- the GUI part to the Web.</p> <p>Flickner Depo at 201:</p>

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		<p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p> <p>Flickner Depo at 91-92:</p>

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		<p>13 Q. And could you, in general terms, describe</p> <p>14 what Virage was?</p> <p>15 A. It was a content-based retrieval system</p> <p>16 tailored to secure surveillance information.</p> <p>17 Q. And you went to their website; was there</p> <p>18 something on their website, say, a demonstration?</p> <p>19 A. I don't remember.</p> <p>20 Q. Was their system commercially available</p> <p>21 during the 1990s?</p> <p>22 A. Yes.</p> <p>1 Q. How did their content-based retrieval</p> <p>2 system work?</p> <p>3 A. It was similar to QBIC.</p> <p>4 Q. Could you, say, extract features from a</p> <p>5 query image?</p> <p>6 A. Yes.</p> <p>7 Q. And could you search those features into</p> <p>8 some sort of reference database?</p> <p>9 A. Yes.</p> <p>Flickner Depo at 22-25:</p>

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		<p>1 Q. Okay. And what would you do with the 2 image after you hit and extracted the color 3 histogram from it? 4 A. Nothing. 5 Q. Would those features be stored in any 6 database or -- 7 A. Yes. 8 Q. Okay. And let's do -- what about 9 texture, could you extract texture features from an 10 image? 11 A. We did. 12 Q. And how would you do that? 13 A. I don't remember exact features we were 14 using. There were -- we published some papers on 15 them. 16 Q. Okay. Was there any reasoning behind 17 picking the features that you chose? 18 A. Yes. 19 Q. And what was that reasoning? 20 A. We wanted to make it so that the results 21 were perceptually good. 22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red 2 color in it or some sort red color histogram; is 3 that right? 4 A. Well, you -- you take specific -- you 5 search for a red color. You'd compute the 6 histogram and then basically match the histogram, 7 which would give you images that had more colors in 8 the reds. This is not -- it's not a unique thing. 9 Q. Were you always searching for a 10 particular feature, or could you just search some 11 sort of example image? 12 A. We could search an example image. 13 Q. And how would that process work? 14 A. Just extract the features from it. 15 Q. So let's break that down. 16 So you would submit an example image to 17 the -- to the system, right? 18 A. Uh-huh. 19 Q. And then how do the -- how -- how does 20 the system select which features to extract? 21 A. It would compute them all, typically, or 22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that 2 this is a better match, that the ordering was 3 reasonable and... 4 Q. So by that, do you mean that people would 5 view the results returned as the closest or close 6 matches to your -- to your image? 7 A. It was -- it would satisfy their query. 8 Q. Okay. So -- so you would have this set 9 of features in your database. 10 How would you search for those features? 11 A. Typically, we -- initially, we did linear 12 scan where you just actually evaluate the -- the 13 distance metric against all the features. 14 Q. So in linear scan, you would compare some 15 sort of search term against all the features in the 16 database? 17 A. Well, it depends on which features you're 18 using. You didn't have to use all the features. 19 You could use just color features or just texture 20 features or just... 21 Q. So to make sure I'm understanding this 22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with 2 those features that it had extracted from that 3 example? 4 A. Then it became the reference point to the 5 search. 6 Q. And by research point to the search, what 7 do you mean? 8 A. So you have a vector in -- in the 9 individual space. 10 (Reporter clarification.) 11 A. That -- that query represents a point in 12 that space, and you're looking for other things 13 near that space or ordered by that space. 14 Q. And by other things near that space, is 15 that the other features that are in the -- in the 16 database? 17 A. Yes. 18 Q. Okay. So at bottom then, you would -- 19 you would take the image, the system would extract 20 features from it, and then those features would be 21 searched against the reference database -- the 22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>

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		<p>Flickner Depo at 48-49:</p> <p><sup>4</sup> Q. What feature extraction methods did the  <sup>5</sup> UC Davis implementation of QBIC rely on?  <sup>6</sup> A. It was similar to the other texture,  <sup>7</sup> shape, color and layout.</p> <p>Flickner Depo at 159:</p> <p><sup>10</sup> Q. Would either version of the stamps demo  <sup>11</sup> allow a user to submit an unknown image as the  <sup>12</sup> query and ask the system to find images similar to  <sup>13</sup> that query image?  <sup>14</sup> A. I suspect it did.  <sup>15</sup> Q. Why do you suspect that?  <sup>16</sup> A. Because that's one of the nice things you  <sup>17</sup> can do with QBIC.</p> <p>Flickner Depo at 209-210:</p> <p><sup>13</sup> Q. Okay. Let me ask -- let me ask that  <sup>14</sup> question using -- using an example.  <sup>15</sup> Say I had a file that -- that was a  <sup>16</sup> snippet of a Star Wars movie.  <sup>17</sup> Could the CueVideo system take that  <sup>18</sup> snippet of the -- of a Star Wars movie and indicate  <sup>19</sup> to the user what Star Wars movie that snippet is  <sup>20</sup> from?  <sup>21</sup> A. Most likely, yes.  <sup>22</sup> Q. And how do you know that?  <sup>1</sup> A. Based on my knowledge in content-based  <sup>2</sup> imagery -- content-based retrieval, in general,  <sup>3</sup> that would be one of the first things you would try  <sup>4</sup> to implement in a video search system.</p>

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		<p><i>See also</i> Flickner Depo at 18, 54-55, 76.</p> <p>Flickner 8/29/23 Depo at 33–37:</p> <p>4 Q. And the second thing you mentioned was you                      5 were responsible for the architecture interface for                      6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to                      8 determine similarity. And to do that you would take                      9 the image and you'd transform -- you'd extract                      10 features from the image, then you would put the                      11 features in the database and you'd query the                      12 database for the features.</p> <p>13 Q. And when you say you are determining                      14 similarity, you mean similarity between features                      15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking                      18 at?</p> <p>19 A. We had features in color, in texture, in                      20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch                      25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p> <p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p> <p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p> <p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example,                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>

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		<p><i>Id.</i> at 52–56:</p> <p>12 Q. Underneath there's a sentence that says,                      13 "There are three logical steps in a QBIC                      14 application: Database population, feature                      15 calculation, and image query."                      16 Do you see that?                      17 A. Yeah.                      18 Q. You agree with that?                      19 A. Yeah.                      20 Q. All right. Well, let's talk about the                      21 first step, database population.                      22 What is database population?                      23 A. It's taking a set of images, extracting                      24 the features and putting them in a database.                      25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that                      2 in the database as well?                      3 A. Could be.                      4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      10 also add the image to the database, preparing a                      11 reduced thumbnail and adding any available text                      12 information to the database.                      13 A. Yep.                      14 Q. Is that correct?                      15 A. Yep.</p>



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		16 Q. And when it refers to "text information," 17 what is it referring to? 18 A. Anything that could be extracted in the 19 context of how the image was annotated. 20 Q. And when you say "annotated," annotated by 21 the user who was populating the database? 22 A. Could be. 23 Q. What else could it be? 24 A. It could be the supplier of the data. 25 Q. Okay. So you may have some annotations	

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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 60–61:</p> <p>25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done</p> <p>2 with those objects? Were they stored, for example,</p> <p>3 as a separate image or were they somehow linked to</p> <p>4 or associated with the image from which they were</p> <p>5 extracted?</p> <p>6 A. Typically they were linked.</p> <p>7 Q. They were linked to the source image?</p> <p>8 A. Yeah.</p> <p>9 Q. Okay. And this was done in the database?</p> <p>10 A. Could be done in the database.</p> <p>11 Q. How was it done?</p> <p>12 A. It was probably done in a text database or</p> <p>13 some sort of key index pair database. So database</p> <p>14 has a lot of different meanings.</p> <p>15 MR. HANSEN: Text database.</p> <p><i>Id.</i> at 62–63:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>22 Q. And we keep referring to a database that                  23 stores these images and thumbnails and associated                  24 information.                  25 Is there a -- was there a name for the</p> <p style="text-align: right;">Page 63</p> <p>1 database at IBM?                  2 A. It was -- we used a certain key index                  3 database, but I can't remember what the name of it                  4 is now.                  5 Q. Was the database referred to as DB2?                  6 A. There were some things done with DB2,                  7 yeah.                  8 Q. And what is DB2?                  9 A. DB2 is IBM's product relational database.                  10 Q. Were there any other -- and DB2 is a                  11 commercial product of --                  12 A. It is a commercial.                  13 (Reporter seeks clarification.)                  14 A. Yes. DB2 is a -- still is a commercial                  15 product.</p> <p><i>Id.</i> at 77:</p> <p>3 Q. And how many images could the data --                  4 could a database hold at the time?                  5 A. Hundreds of thousands. You're limited by                  6 disk.                  7 Q. Okay. So you could -- whatever the --                  8 whatever the maximum number a particular disk can                  9 hold?                  10 A. Yeah.</p> <p><i>Id.</i> at 77-78:</p>

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		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 99:</p> <p>Q. All right. And that was -- that methodology was implemented to calculate shape on a query image and an image stored in the database post this article?</p> <p>A. Yes.</p> <p><i>Id.</i> at 103:</p>

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		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p> <p><i>Id.</i> at 161:</p>

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		<p>1 Q. And does the thumbnail also provide links                      2 to information about the image that was associated                      3 with the image in the database?                      4 A. Yes.                      5 Q. And, again, that can be that -- whatever                      6 information that the user inputted or was associated                      7 with the image from the source?                      8 A. Yes.                      9 Q. Could the results also display a matching                      10 score so the user could see how well the particular                      11 result matched to the -- to the query image?                      12 A. It could.</p> <p><i>Id.</i> at 174–182:</p>

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		<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p style="text-align: right; margin: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p style="text-align: right; margin: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. So the image itself is not put into a                  15 database. A handle is put in the database that                  16 points to the image?                  17 A. Correct.                  18 MR. HANSEN: Objection; lacks foundation.                  19 BY MR. EDWARDS:                  20 Q. And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p> </td> </tr> <tr> <td style="vertical-align: top; padding: 5px;"> <p style="text-align: right; margin: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"?                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p> </td> <td style="vertical-align: top; padding: 5px;"> <p style="text-align: right; margin: 0;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. 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HANSEN: Same objection.                  16 THE WITNESS: The QBIC catalog is the file in                  17 the file system or in the database system that                  18 contains all the metadata and the handle points to                  19 all the metadata.                  20 BY MR. EDWARDS:                  21 Q. Okay. So there's a handle in the -- in                  22 the table --                  23 A. Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p>
<p style="text-align: right; margin: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p>	<p style="text-align: right; margin: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. So the image itself is not put into a                  15 database. A handle is put in the database that                  16 points to the image?                  17 A. Correct.                  18 MR. HANSEN: Objection; lacks foundation.                  19 BY MR. EDWARDS:                  20 Q. And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p>					
<p style="text-align: right; margin: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"?                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p>	<p style="text-align: right; margin: 0;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. How is the -- how is the catalog different                  10 from the table?                  11 MR. HANSEN: Objection; lacks foundation.                  12 BY MR. EDWARDS:                  13 Q. That we talked about that has the handle                  14 that points to the image?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: The QBIC catalog is the file in                  17 the file system or in the database system that                  18 contains all the metadata and the handle points to                  19 all the metadata.                  20 BY MR. EDWARDS:                  21 Q. Okay. So there's a handle in the -- in                  22 the table --                  23 A. Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p>					



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		<p style="text-align: right;">Page 178</p> <p>1 the image as well?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: It points to the file that's the                  4 QBIC catalog.                  5 BY MR. EDWARDS:                  6 Q. Can you walk us through that one more                  7 time? And just be a little bit louder, sorry.                  8 MR. HANSEN: Same objection.                  9 THE WITNESS: So the QBIC catalog is a set of                  10 files that hold data about visual features in the                  11 image.                  12 (Reporter seeks clarification.)                  13 THE WITNESS: Visual features. The image                  14 extender lets you search against that database,                  15 against that object.                  16 BY MR. EDWARDS:                  17 Q. The image extender lets you search against                  18 that catalog, the name of that catalog?                  19 A. The catalog, yeah.                  20 Q. Okay. And it does so by using a pointer                  21 from the handle in the table?                  22 MR. HANSEN: Objection; lacks foundation.                  23 THE WITNESS: Correct.                  24 BY MR. EDWARDS:                  25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold                  2 data for the following image features: Average                  3 color, Histogram color, Positional color and                  4 Texture."                  5 Is that right?                  6 A. Yep.                  7 Q. Okay. We spoke about average color,                  8 histogram color and texture; correct?                  9 A. Right.                  10 Q. What is positional color?                  11 A. We talked about it briefly. It's color in                  12 particular locations in the image.                  13 Q. Ah. Understood.                  14 That is -- that is similar to L in the                  15 demo that we looked at, which is called color                  16 layout.                  17 A. Okay, yes.                  18 Q. Is that correct?                  19 A. I don't remember if it's called L. Sounds                  20 right.                  21 Q. If you look at --                  22 MR. EDWARDS: If you can show -- give him                  23 Exhibit 6.                  24 THE WITNESS: Oh, this L. Yes.                  25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.                  3 MR. HANSEN: Objection; lacks foundation, calls                  4 for speculation.                  5 MR. EDWARDS: You can put that enormous exhibit                  6 aside.                  7 THE WITNESS: Test 1, 2, 3.                  8 BY MR. EDWARDS:                  9 Q. Go back to Exhibit 3, please. If you                  10 could turn to the page Bates-labeled IBM 894 with                  11 the architecture picture.                  12 A. Okay.                  13 Q. So I just -- I just want to kind of walk                  14 the -- through this architecture, Mr. Flickner. But                  15 as a high level, I just want to understand, is                  16 this -- is this a high-level architecture that would                  17 generally be used for any implementation of QBIC?                  18 A. Yes.                  19 Q. All right. So first step is you submit                  20 still images or r-frames for feature extraction; is                  21 that correct?                  22 A. Correct.                  23 Q. Okay. Features are extracted, such as                  24 color, texture, shape, sketch and text; correct?                  25 A. Location, yep.</p>

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		<p style="text-align: right;">Page 182</p> <p>1 Q. And location. Including the ones that I                  2 listed; correct?                  3 A. Yep.                  4 Q. Okay. After feature extraction is done,                  5 the images and those features for the database                  6 images are stored in the database; correct?                  7 A. Correct.                  8 Q. And then once those are stored, a user can                  9 query using some sort of a user interface; is that                  10 right?                  11 A. Correct.                  12 Q. And the user can query based on color,                  13 texture, shape, multi-object, sketch, location or                  14 text; is that right?                  15 A. Correct.                  16 Q. Okay. Those features are then decomposed                  17 and extracted from the query image and then a                  18 matching engine is used to compare those similarly                  19 extracted features from the stored images; is that                  20 correct?                  21 A. Correct.                  22 Q. And then the best matches are returned in                  23 similarity of order back to the user; is that right?                  24 A. Correct.                  25 Q. Okay. Thank you for that.</p> <p><i>Id.</i> at 188–189:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>21 Q. Okay. So let's go to IBM 2264.</p> <p>22 A. Okay.</p> <p>23 Q. And there's a section called "Image</p> <p>24 Classification."</p> <p>25 Do you see that?</p> <hr/> <p style="text-align: right;">Page 189</p> <p>1 A. Yep.</p> <p>2 Q. It says [as read], "With Image Classifier,</p> <p>3 you can create visual indexes based on color, shape,</p> <p>4 category, and layout elements, which are areas of</p> <p>5 the image containing the patterns you want to use</p> <p>6 for searches. You could store these elements in</p> <p>7 catalogs in DB2 for OS/2 databases."</p> <p>8 Did I read that correctly?</p> <p>9 A. Yeah.</p> <p>10 Q. Are you familiar with Image Classifier?</p> <p>11 A. Yeah.</p> <p>12 Q. What is its general function?</p> <p>13 A. It's basically a QBIC functionality.</p> <p>14 Q. It's basically a QBIC functionality?</p> <p>15 A. Yeah.</p> <p>16 Q. Okay. And it's the QBIC functionality</p> <p>17 that actually takes extracted features and stores</p> <p>18 them in a database for later searching?</p> <p>19 A. Yeah.</p> <p><i>Id.</i> at 205–206:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <hr/> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.                      12 Q. Okay. So the database population step,                      13 that's loading the images into a database?                      14 A. Correct.</p> <p><i>Id.</i> at 305:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>7 So these articles describe various              8 features of various versions of QBIC; right?              9 A. Correct.              10 Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13 A. That weren't described in the articles?              14 No.</p> <p><i>Id.</i> at 35:              6 Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11 A. Yeah. We call them features.              12 Q. Features. Okay.              13 So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16 A. For example.              17 Q. Any other ones you can think of?              18 A. Nothing comes to mind.              19 Q. But when you refer to features they at              20 least include those four; is that correct?              21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1     A. Correct.</p> <p>2     Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5     A. I have them here.</p> <p>6     MR. STRAUSSMAN: Okay.</p> <p>7     THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9     Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12    A. Yes.</p> <p>13    Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16    MR. HANSEN: Objection; vague and ambiguous.</p> <p>17    THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19    Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23    A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

Element	'036 Claim Recitation	Exemplary Citations in Reference																																									
		<p>IBM000039 – 41</p> <div style="text-align: right;"> <p><b>Data structures</b></p> </div> <p><b>Handles</b></p> <p>When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a <b>handle</b> to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object's attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.</p> <p>User Table</p> <table border="1"> <thead> <tr> <th>ID</th> <th>Name</th> <th>Picture</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Handle 1</td> </tr> <tr> <td></td> <td></td> <td>Handle 2</td> </tr> </tbody> </table> <p>Administrative Support Tables</p> <table border="1"> <thead> <tr> <th colspan="4">Common Attributes</th> </tr> <tr> <th>Handle</th> <th>Importer</th> <th>Updater</th> <th></th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Unique Attributes</th> </tr> <tr> <th>Handle</th> <th>Width</th> <th>Height</th> <th>Numcolors</th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>  <p>Figure 8. Handles</p> <p><b>QBIC catalogs</b></p> <p>A <b>QBIC catalog</b> is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.</p> <p>You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p style="text-align: right;">Chapter 2. DB2 extender concepts 19 IBM 000039</p>	ID	Name	Picture			Handle 1			Handle 2	Common Attributes				Handle	Importer	Updater		Handle 1				Handle 2				Unique Attributes				Handle	Width	Height	Numcolors	Handle 1				Handle 2			
ID	Name	Picture																																									
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		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® D82® Universal Database: Image, Audio, and Video Extenders</p> <p>IBM 000040</p>

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		<p style="text-align: center;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot catalog file name</li> <li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li> <li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li> <li>• Shot number</li> <li>• Starting frame number</li> <li>• Ending frame number</li> <li>• Representative frame number</li> <li>• Name of a file that contains the contents of the representative frame</li> </ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot handle</li> <li>• Video table name</li> </ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts 21                  IBM 000041</p> <p>IBM0002264</p>

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		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Description</b> </div> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Classification</b> </div> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Query</b> </div> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p style="text-align: right;">and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Formats</b> </div> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCK</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Product Positioning</b> </div> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <p style="font-size: small; margin-top: 20px;">285-042 <span style="float: right;">-2-</span></p> <p style="text-align: right; margin-top: 10px;">IBM 0002264</p>

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		<p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b>                      You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b>                      This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"> <li>• Improved installation procedures</li> <li>• Additional connectors for relational databases                      Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li> <li>• Advanced information mining and search capabilities                      Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li> <li>• Workflow capabilities                      By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li> <li>• Federated level access control                      You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li> <li>• Additional support for Content Manager:                         <ul style="list-style-type: none"> <li>- List, add, retrieve, update, and delete of content class</li> <li>- Asynchronous retrieval of object content</li> </ul> </li> </ul> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other</p>




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		<p>prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>an identification platform coupled with the target database, and that</p>	<p>QBIC discloses an identification platform coupled with the target database.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391:</p> <p style="text-align: center;">~</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391-92:</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2392-93:</p>



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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16\text{M}</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2393-95:</p>

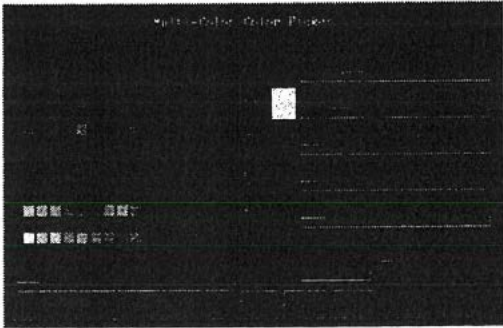
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>

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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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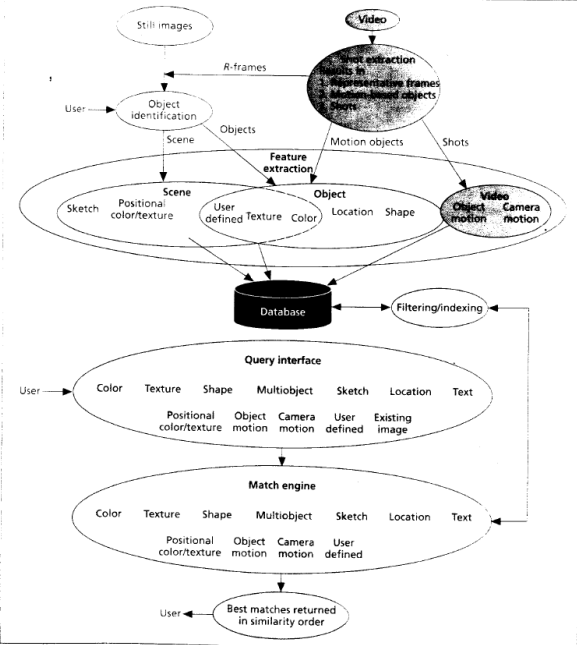
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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>



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		 <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p> <p>                     “For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed                 </p>

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		<p>on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions-which we call objects-in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color queries return items with matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p> <p>Figure 7 shows a histogram query on still images and a color query on video r-</p>

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		<p>frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right.</p> <p>Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture (pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object).</p> <p>An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects and features to implement logical And semantics.</p> <p>....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based</p>




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		<p>segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.” <i>Id.</i> at pp. 7–8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>

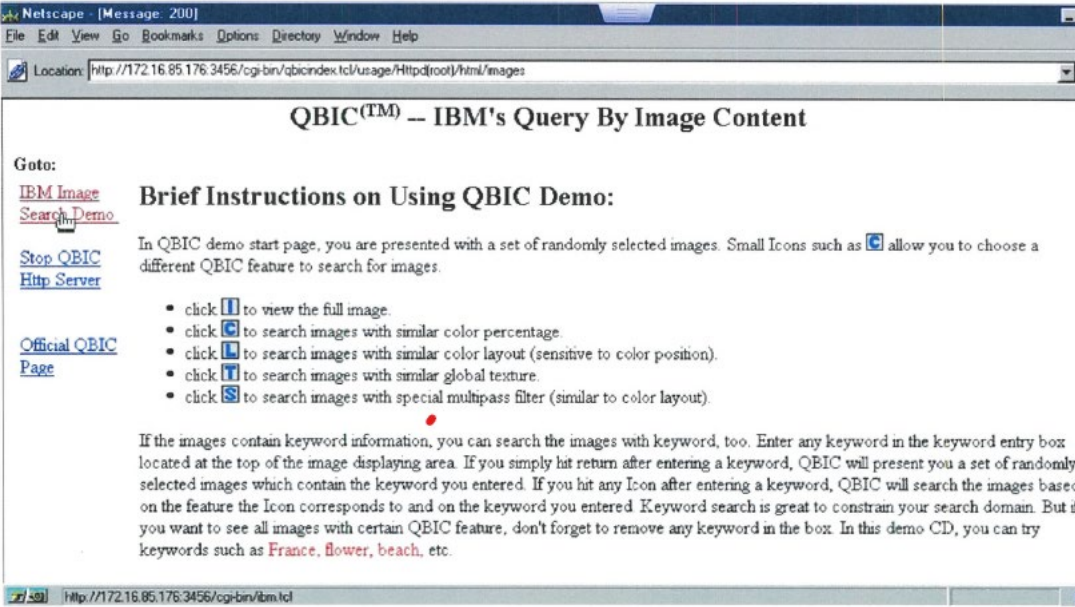
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		<p>QBIC Demo (IBM000747):</p>  <p>Flickner 8/29/23 Depo at Ex. 6 at 1:</p>


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Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2:</p>

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		 <p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9           A. Correct.              10          Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13          A. That weren't described in the articles?              14          No.</p> <p><i>Id.</i> at 35:</p>

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		<p>6 Q. Okay. And the analytics that you're</p> <p>7 talking about, where you extract these characters</p> <p>8 from the image, that is -- those run on both the</p> <p>9 query image and the images that are stored in the</p> <p>10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.</p> <p>13 So when you say "features," you're talking</p> <p>14 about the features that we talked about before:</p> <p>15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at</p> <p>20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

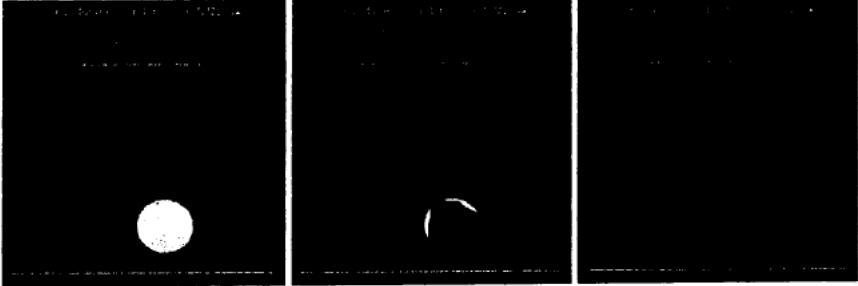
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		<p><i>See also</i> Flickner Depo at 39-40, 54-55, 76, 88-89, 159; Flickner 8/29/23 Depo at 62-63, 74, 166-174, 180-181, 189, 193, 202, 316-317</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.i]	communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;	<p>QBIC discloses an identification platform that communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391:</p>

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		<p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2391-92:</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16\text{M}</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <i>m</i> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <i>w</i> the width of the image in pixels and <i>h</i> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93:</p>

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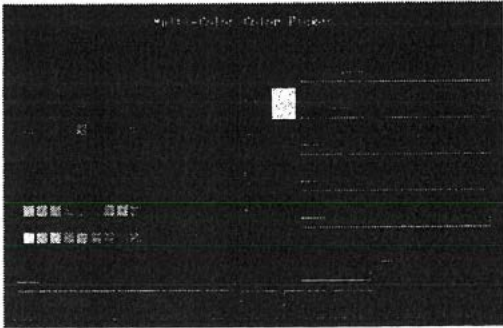
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content (“QBIC”) System

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95:</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. . . . For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.” <i>Id.</i> at p. 3.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog. When you search for an image by content, your query identifies one or</p>



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		<p>more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC could integrate with a camera, such as a portable camera; a user could take an image using a portable camera and submit that image to the QBIC system for query.</p> <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p>

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		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>

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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p> <p style="text-align: right;">Page 62</p>
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		<p>10 Q. Say it returned the stills, could you use                      11 those stills to point you to a video?                      12 A. Yeah.                      13 Q. And how would you do that?                      14 A. Well, the -- each -- each key frame                      15 typically represents a frame in the video. So                      16 there's a -- the key frame is -- is one frame of                      17 the video so you just seek to that point.                      18 Q. So if I'm understanding this right, you                      19 could take a query video, the system would extract                      20 frames, which would then extract features from it,                      21 and then the system would return either shot clips                      22 or key frames; is that right?                      1 A. Right.</p> <p>Flickner 8/29/23 Depo at 53:</p>

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		<p>4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      0 also add the image to the database, preparing a                      1 reduced thumbnail and adding any available text                      2 information to the database.                      3 A. Yep.                      4 Q. Is that correct?                      5 A. Yep.</p> <p><i>Id.</i> at 60–61:</p>

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		<p>13 Q. Okay. Did you do that type of                      14 segmentation to differentiate foreground objects                      15 from the background in this database population                      16 step?                      17 A. We did research prototypes of it. I don't                      18 know what all went out.                      19 Q. You don't know whether those made it into                      20 a commercial product?                      21 A. I would say they probably didn't.                      22 Q. Okay. Were they in the -- were they used                      23 in the -- in demo applications that you referred to?                      24 A. They might have been.                      25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                      2 with those objects? Were they stored, for example,                      3 as a separate image or were they somehow linked to                      4 or associated with the image from which they were                      5 extracted?                      6 A. Typically they were linked.                      7 Q. They were linked to the source image?                      8 A. Yeah.</p> <p><i>Id.</i> at 32–33:</p>

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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p><i>Id.</i> at 74–75:</p>

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		<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300:                  6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312:</p>

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		<p style="text-align: right;">Page 312</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p> <p><i>Id.</i> at 305:</p> <p>7 So these articles describe various                  8 features of various versions of QBIC; right?                  9 A. Correct.                  10 Q. Do they describe any features -- does the                  11 demo you operated include any features that weren't                  12 described in these articles?                  13 A. That weren't described in the articles?                  14 No.</p>

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		<p><i>Id.</i> at 35:</p> <p>6 Q. Okay. And the analytics that you're                      7 talking about, where you extract these characters                      8 from the image, that is -- those run on both the                      9 query image and the images that are stored in the                      10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.                      13 So when you say "features," you're talking                      14 about the features that we talked about before:                      15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at                      20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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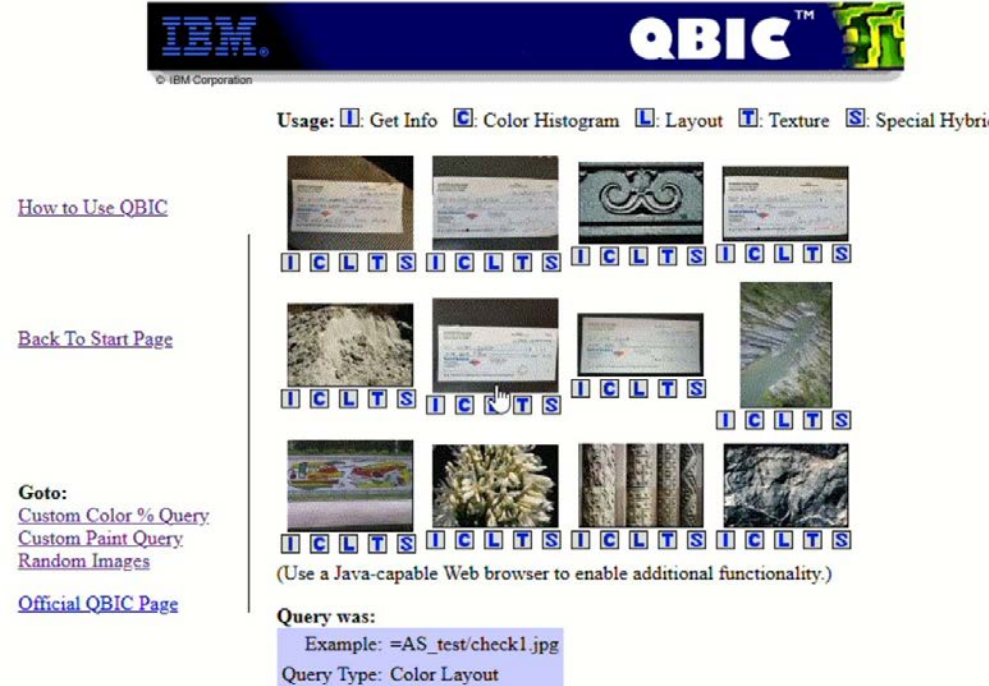
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>









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		<p>QBIC Demo (IBM000747) – showing compatibility with images captured by a mobile phone camera</p>  <p>The screenshot displays the QBIC demo interface. At the top, there is an IBM logo and the QBIC trademark. Below this, a navigation bar includes buttons for 'Usage', 'Get Info', 'Color Histogram', 'Layout', 'Texture', and 'Special Hybrid'. The main area features a grid of image thumbnails, each with a set of selection buttons (I, C, L, T, S) below it. On the left side, there are links for 'How to Use QBIC', 'Back To Start Page', and a 'Goto:' section with links for 'Custom Color % Query', 'Custom Paint Query', 'Random Images', and 'Official QBIC Page'. At the bottom, a 'Query was:' section shows an example query: '=AS_test/check1.jpg' and the query type: 'Color Layout'.</p>

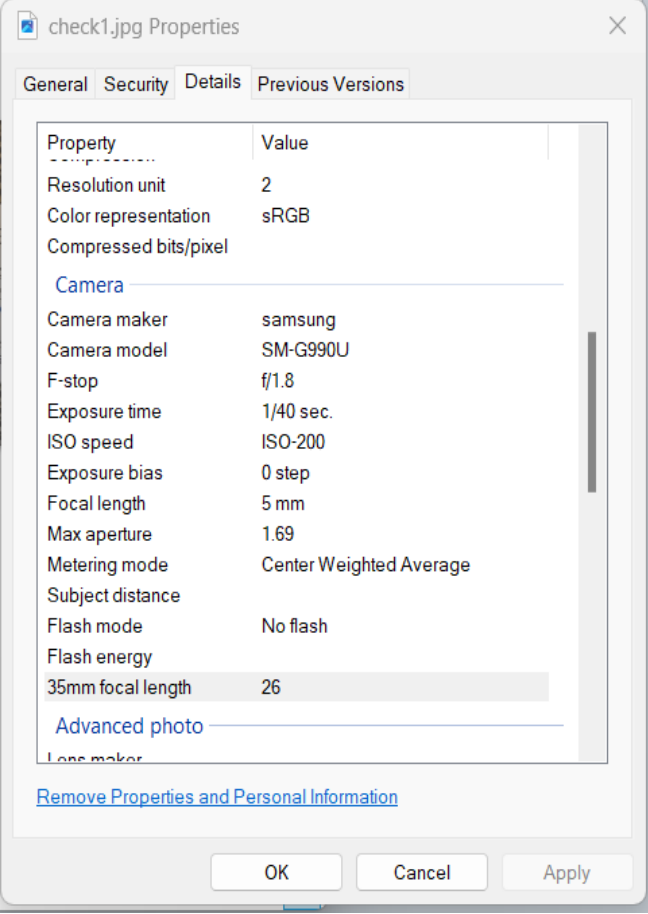
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		<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>check1.jpg.thumb0.jpg</p> </div> <div style="text-align: center;">  <p>check2_orig.jpg.thumb0.jpg</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <p>check3.jpg.thumb0.jpg</p> </div> <div style="text-align: center;">  <p>check4.jpg.thumb0.jpg</p> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;">  <p>check5.jpg.thumb0.jpg</p> </div> <div style="text-align: center;">  <p>check5_rotate_crop_fix.jpg.thumb0.jpg</p> </div> </div>

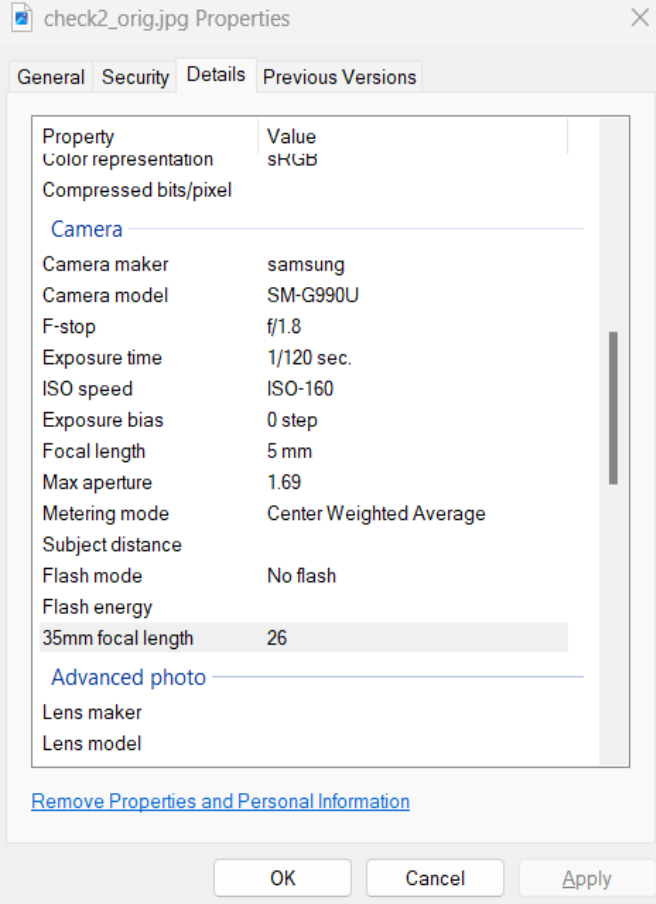
*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content (“QBIC”) System

Element	'036 Claim Recitation	Exemplary Citations in Reference																																								
		 <p>The screenshot shows the 'check1.jpg Properties' dialog box, specifically the 'Details' tab. It displays a list of properties and their values for a photograph. The 'Camera' section is expanded, showing the following metadata:</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Resolution unit</td> <td>2</td> </tr> <tr> <td>Color representation</td> <td>sRGB</td> </tr> <tr> <td>Compressed bits/pixel</td> <td></td> </tr> <tr> <td colspan="2"><b>Camera</b></td> </tr> <tr> <td>Camera maker</td> <td>samsung</td> </tr> <tr> <td>Camera model</td> <td>SM-G990U</td> </tr> <tr> <td>F-stop</td> <td>f/1.8</td> </tr> <tr> <td>Exposure time</td> <td>1/40 sec.</td> </tr> <tr> <td>ISO speed</td> <td>ISO-200</td> </tr> <tr> <td>Exposure bias</td> <td>0 step</td> </tr> <tr> <td>Focal length</td> <td>5 mm</td> </tr> <tr> <td>Max aperture</td> <td>1.69</td> </tr> <tr> <td>Metering mode</td> <td>Center Weighted Average</td> </tr> <tr> <td>Subject distance</td> <td></td> </tr> <tr> <td>Flash mode</td> <td>No flash</td> </tr> <tr> <td>Flash energy</td> <td></td> </tr> <tr> <td>35mm focal length</td> <td>26</td> </tr> <tr> <td colspan="2"><b>Advanced photo</b></td> </tr> <tr> <td>Lens maker</td> <td></td> </tr> </tbody> </table> <p>At the bottom of the dialog box, there is a link that says 'Remove Properties and Personal Information' and three buttons: 'OK', 'Cancel', and 'Apply'.</p>	Property	Value	Resolution unit	2	Color representation	sRGB	Compressed bits/pixel		<b>Camera</b>		Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/40 sec.	ISO speed	ISO-200	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26	<b>Advanced photo</b>		Lens maker	
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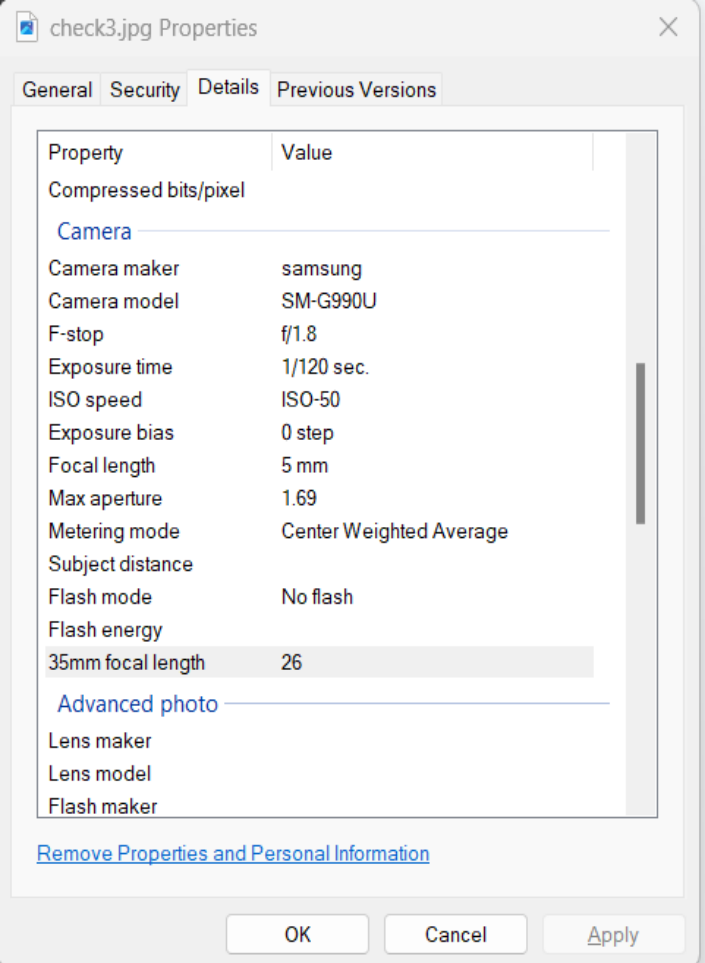
Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content (“QBIC”) System

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		 <p>The screenshot shows the 'check2_orig.jpg Properties' dialog box with the 'Details' tab selected. It displays EXIF metadata for a Samsung SM-G990U camera. The 'Camera' section includes: Camera maker (samsung), Camera model (SM-G990U), F-stop (f/1.8), Exposure time (1/120 sec.), ISO speed (ISO-160), Exposure bias (0 step), Focal length (5 mm), Max aperture (1.69), Metering mode (Center Weighted Average), Subject distance, Flash mode (No flash), and Flash energy. The 'Advanced photo' section includes: Lens maker and Lens model. A '35mm focal length' bar is shown at 26. At the bottom, there are 'OK', 'Cancel', and 'Apply' buttons, and a link to 'Remove Properties and Personal Information'.</p>

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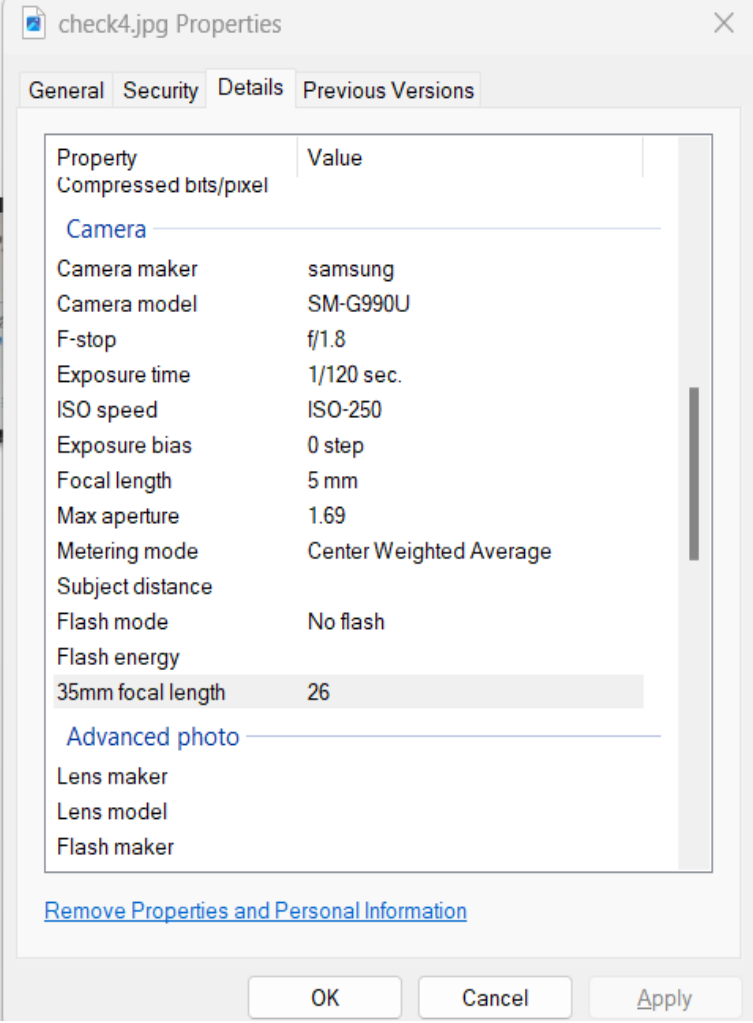
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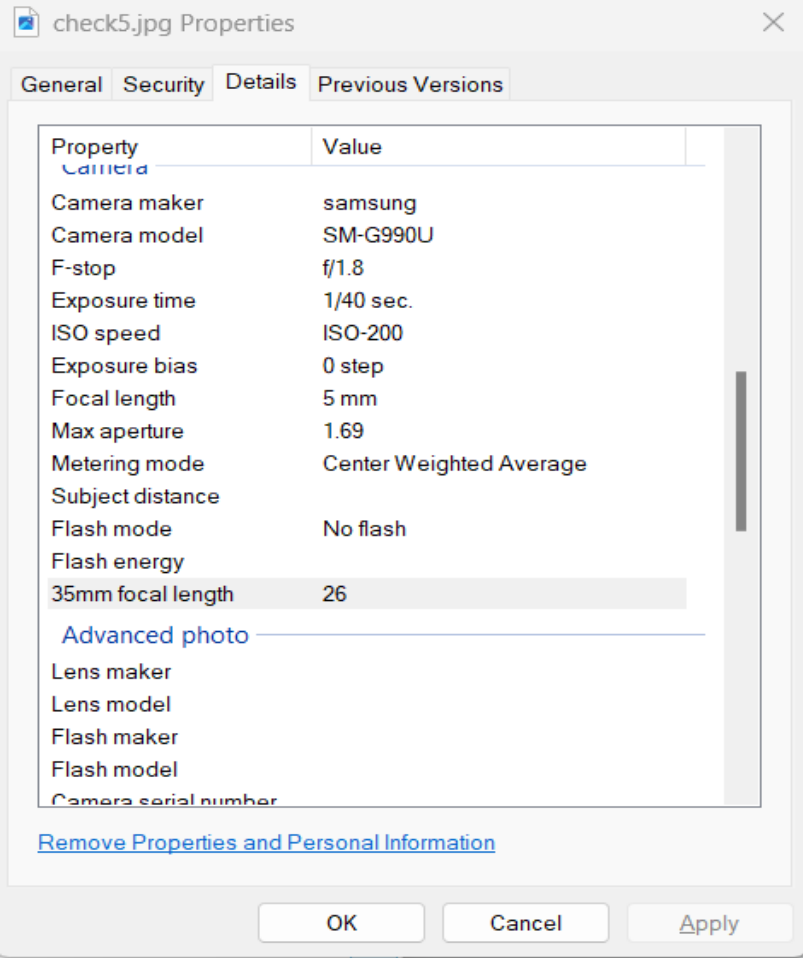
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Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content (“QBIC”) System

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		 <p>The screenshot shows the 'check5.jpg Properties' dialog box with the 'Details' tab selected. It displays a list of camera properties and their values:</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Camera maker</td> <td>samsung</td> </tr> <tr> <td>Camera model</td> <td>SM-G990U</td> </tr> <tr> <td>F-stop</td> <td>f/1.8</td> </tr> <tr> <td>Exposure time</td> <td>1/40 sec.</td> </tr> <tr> <td>ISO speed</td> <td>ISO-200</td> </tr> <tr> <td>Exposure bias</td> <td>0 step</td> </tr> <tr> <td>Focal length</td> <td>5 mm</td> </tr> <tr> <td>Max aperture</td> <td>1.69</td> </tr> <tr> <td>Metering mode</td> <td>Center Weighted Average</td> </tr> <tr> <td>Subject distance</td> <td></td> </tr> <tr> <td>Flash mode</td> <td>No flash</td> </tr> <tr> <td>Flash energy</td> <td></td> </tr> <tr> <td>35mm focal length</td> <td>26</td> </tr> </tbody> </table> <p>Below the list, there is an 'Advanced photo' section with fields for Lens maker, Lens model, Flash maker, Flash model, and Camera serial number. At the bottom, there is a link 'Remove Properties and Personal Information' and buttons for 'OK', 'Cancel', and 'Apply'.</p>	Property	Value	Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/40 sec.	ISO speed	ISO-200	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26
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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the</p>																												

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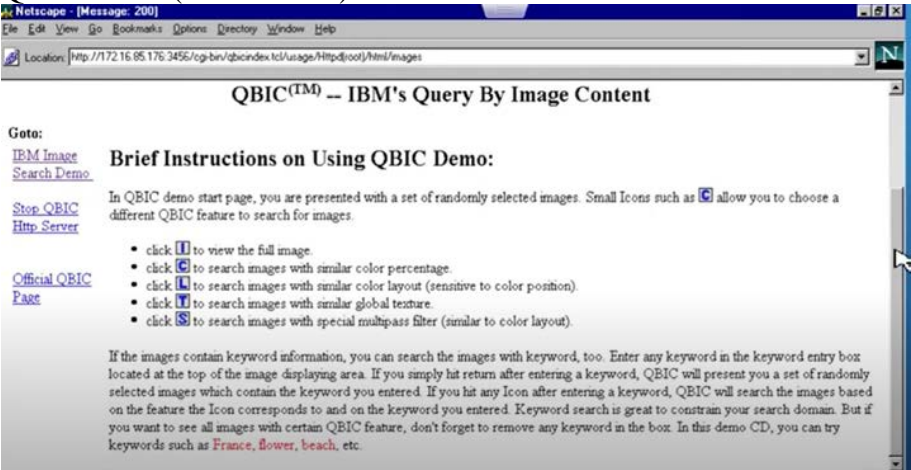
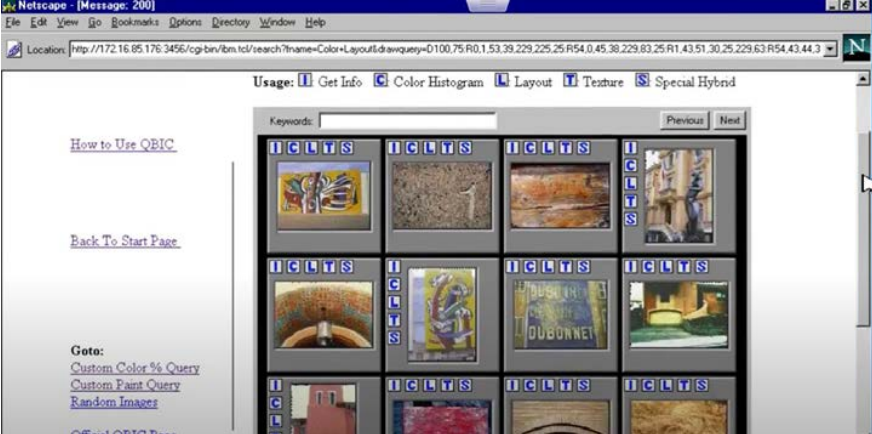
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		<p>knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.ii]	<p>receives the digital representation from the mobile device; and</p>	<p>QBIC discloses an identification platform that receives the digital representation from the mobile device.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture. . . . For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.” <i>Id.</i> at p. 3.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog. When you search for an image by content, your query identifies one or</p>



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		<p>more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p>  <p>QBIC Demo (IBM000747):</p> 

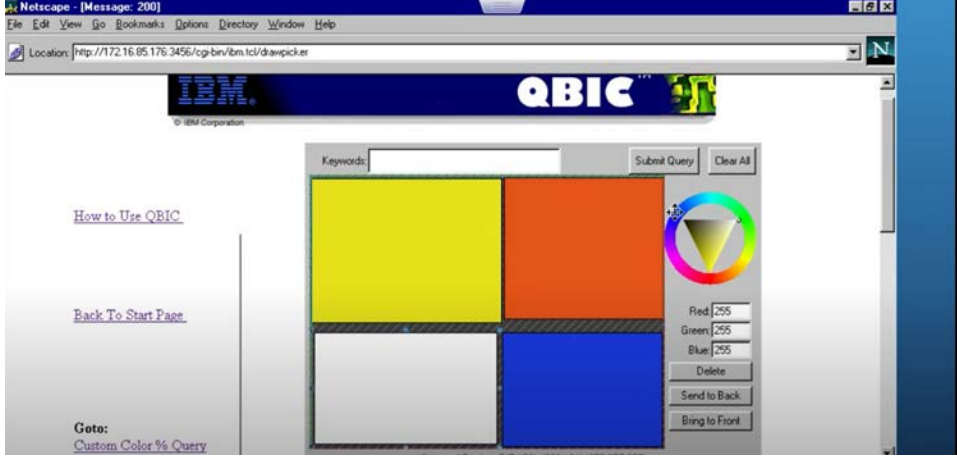

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		<p>Flickner 8/29/23 Depo at 53:</p> <p>4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      0 also add the image to the database, preparing a                      1 reduced thumbnail and adding any available text                      2 information to the database.                      3 A. Yep.                      4 Q. Is that correct?                      5 A. Yep.</p> <p>Flickner 8/29/23 Depo at 60–61:</p>

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		<p>13 Q. Okay. Did you do that type of</p> <p>14 segmentation to differentiate foreground objects</p> <p>15 from the background in this database population</p> <p>16 step?</p> <p>17 A. We did research prototypes of it. I don't</p> <p>18 know what all went out.</p> <p>19 Q. You don't know whether those made it into</p> <p>20 a commercial product?</p> <p>21 A. I would say they probably didn't.</p> <p>22 Q. Okay. Were they in the -- were they used</p> <p>23 in the -- in demo applications that you referred to?</p> <p>24 A. They might have been.</p> <p>25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done</p> <p>2 with those objects? Were they stored, for example,</p> <p>3 as a separate image or were they somehow linked to</p> <p>4 or associated with the image from which they were</p> <p>5 extracted?</p> <p>6 A. Typically they were linked.</p> <p>7 Q. They were linked to the source image?</p> <p>8 A. Yeah.</p> <p>Flickner 8/29/23 Depo at 32–33:</p>

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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p>Flickner 8/29/23 at 74–75:</p>

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			<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114:</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202:</p>



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		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300:                  6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312:</p>

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 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content (“QBIC”) System

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 312</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p> <p><i>Id.</i> at 305:</p> <p>7 So these articles describe various                  8 features of various versions of QBIC; right?                  9 A. Correct.                  10 Q. Do they describe any features -- does the                  11 demo you operated include any features that weren't                  12 described in these articles?                  13 A. That weren't described in the articles?                  14 No.</p>

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		<p><i>Id.</i> at 35:</p> <p>6 Q. Okay. And the analytics that you're                      7 talking about, where you extract these characters                      8 from the image, that is -- those run on both the                      9 query image and the images that are stored in the                      10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.</p> <p>13 So when you say "features," you're talking                      14 about the features that we talked about before:                      15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at                      20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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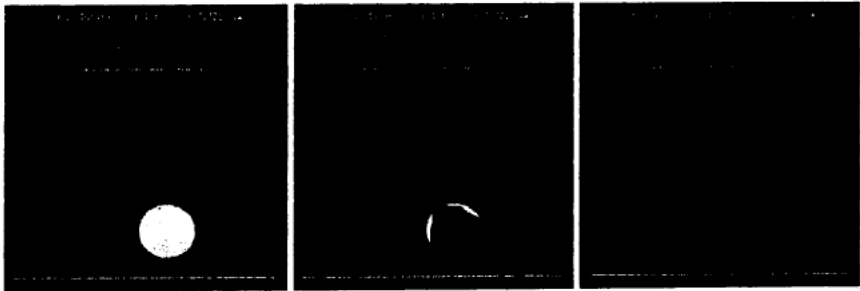
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		<p><i>See also</i> Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	<p>recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets; and</p>	<p>QBIC discloses the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391:</p>



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		<p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2391-92:</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93:</p>

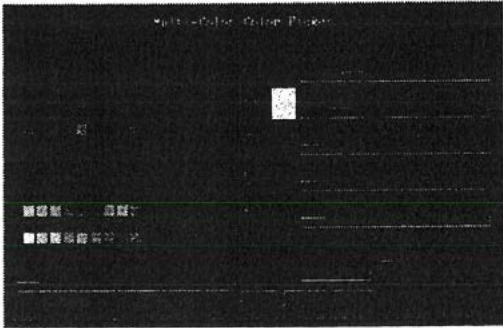
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>

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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>



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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95:                      QBIC (Query by Image Content) (BOFA00001391–392) at 1:</p>

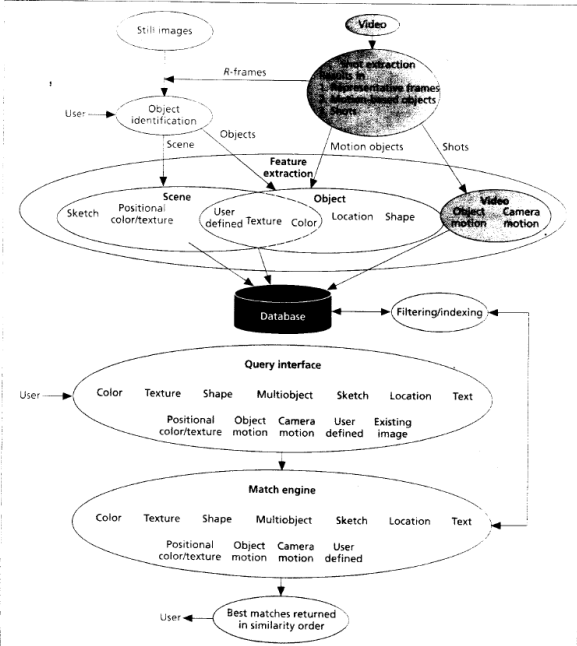
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		<p>Query by example using <i>color histograms</i></p> <ul style="list-style-type: none"> <li>Example image:                     <div> </div> </li> <li>One of the colour histograms for the example image is shown in Fig. 28.1.                     <div> </div> </li> </ul> <p><b>Colour Histogram of Image</b></p> <ul style="list-style-type: none"> <li>Store a histogram vector for each image in the database,                      compare images using mean squared difference,                      return images sorted by this metric.</li> </ul> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching</p>

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		<p>engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>  <p>Figure 2. QBIC database population (top) and query (bottom) architecture. <i>Id.</i> at Fig. 2.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are</p>




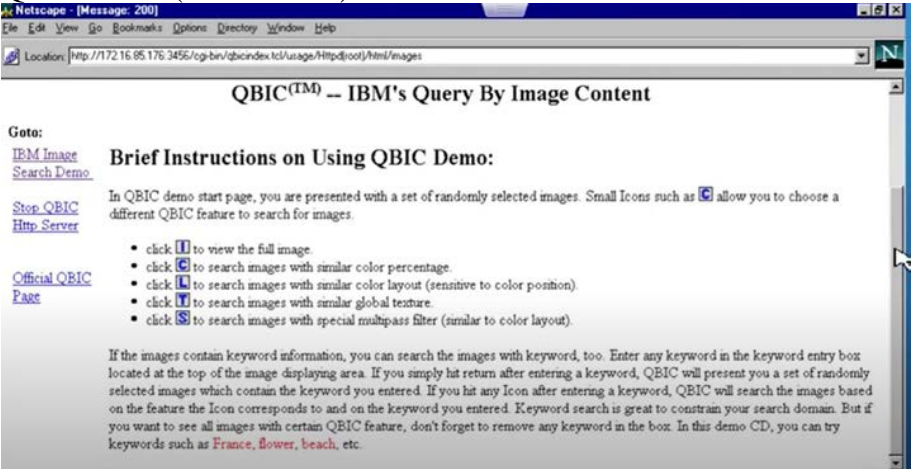
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		<p>generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p>



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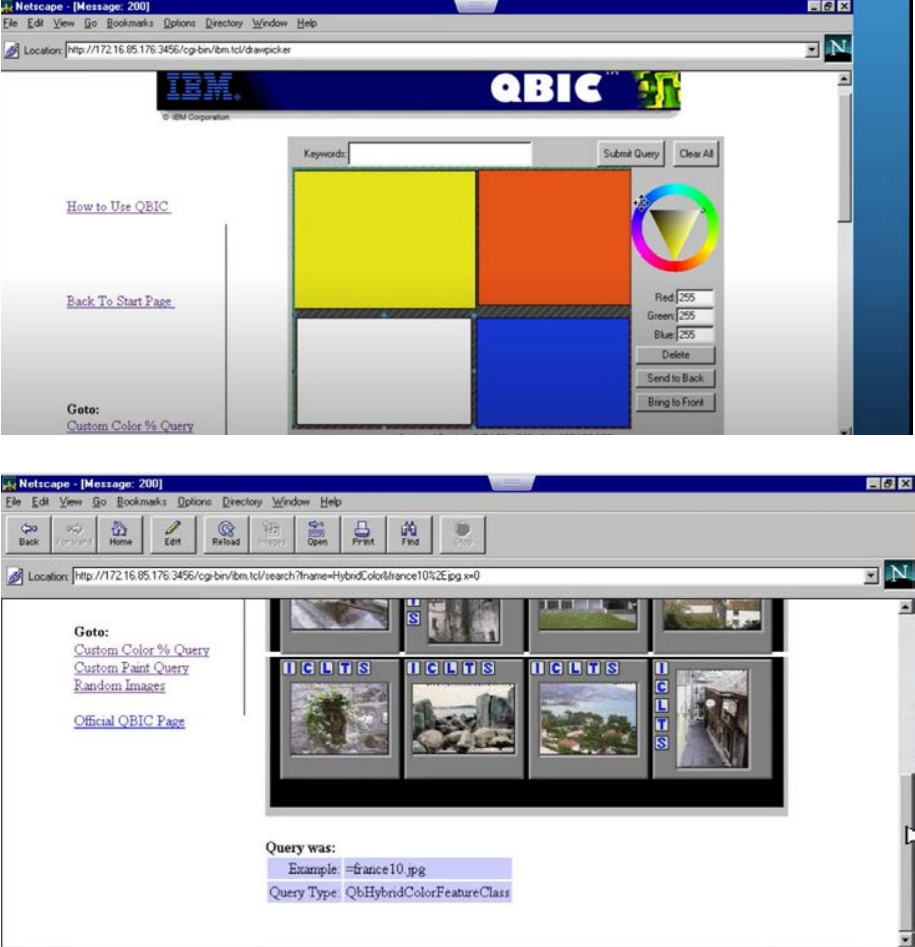
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		 <p>The top screenshot shows the QBIC web application interface. It features a navigation menu with links for "How to Use QBIC" and "Back To Start Page". A central area contains a color selection tool with a color wheel and a grid of four colored squares (yellow, orange, white, blue). To the right of the color tool are input fields for Red (255), Green (255), and Blue (255), along with buttons for "Delete", "Send to Back", and "Bring to Front".</p> <p>The bottom screenshot shows the search results page. It displays a grid of image thumbnails and a "Query was:" section with the following details:</p> <ul style="list-style-type: none"> <li>Example: =france10.jpg</li> <li>Query Type: QbHybridColorFeatureClass</li> </ul>

Flickner Depo at 21:

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		<p>1 Q. And you mentioned that you would extract                  2 features from the images?                  3 A. We did.                  4 Q. How would you do that?                  5 A. We ran algorithms on the pixels of the                  6 image and from that we created a feature.                  7 Q. What sort of features would you extract                  8 from the images?                  9 A. A QBIC system did color, shape and                  10 texture.                  11 Q. Okay. So let's take color.                  12 How would you, say, extract a color                  13 feature from an image?                  14 A. We typically would compute -- compute a                  15 color histogram.                  16 Q. And what's a color histogram?                  17 A. It's a measure of -- it's an estimate of                  18 the probability density of a color being in an                  19 image.                  20 Q. So you would take an image and extract                  21 that color histogram from it?                  22 A. Yup.</p> <p>Flickner Depo at 88:                  7 Q. (By Mr. Dang) Suppose you search for a                  8 set of features or you search using a query image                  9 in this demonstration, what would the system do?                  10 MS. HAYDEN: Objection. Foundation.                  11 THE DEPONENT: The system would                  12 compute -- in the query image case, the system                  13 would compute the features on that -- that image                  14 and then compute the distance associated with each                  15 one of the images in the database.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 25-26:</p> <p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that                    1 right?                  2 A. That's correct.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 75-76</p> <p>11 Q. What's a Db2 universal extender?</p> <p>12 A. It's the extension of Db2 for other media</p> <p>13 types, for other types of data.</p> <p>14 Q. What do you mean by extension?</p> <p>15 Would it add functionality to the Db2</p> <p>16 database?</p> <p>17 A. Correct.</p> <p>18 Q. Is one of those added functionalities the</p> <p>19 image extender?</p> <p>20 A. Most likely.</p> <p>21 Q. What's an image extender?</p> <p>22 A. It's ability to image queries or</p> <p>1 similarity queries on image data -- on image</p> <p>2 datasets.</p> <p>3 Q. Did the image extender incorporate QBIC</p> <p>4 technology?</p> <p>5 A. I believe it did.</p> <p>6 Q. Did the image extender allow a user of</p> <p>7 the Db2 universal database to search images by</p> <p>8 their content?</p> <p>9 A. I believe it did.</p> <p>Flickner Depo at 40-42:</p>

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		<p>3 Q. Okay. Could you take as -- as you did in 4 the query by image search system, could you just 5 search a video using this system? 6 A. You could search for a key frame and that 7 could point you to a video. 8 Q. As an input into the system, could you 9 search -- could you input a whole video and then 10 the system would extract the key frames and then -- 11 A. Yes. 12 Q. -- search that using that? 13 A. If I recall correctly, yes. 14 Q. Okay. And the way -- the method by which 15 it did so, as you mentioned, was -- would it 16 extract key frames from the video, extract features 17 from those key frames, and then search those 18 features; is that right? 19 A. Correct. 20 Q. Okay. Other than the use of shots and 21 key frames, is there any difference between the 22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p> <hr/> <p>1 query by image search system? 2 A. There may have been. 3 Q. Can you think of any now? 4 A. No. 5 Q. When you searched for -- or when you 6 searched a video using this system, what would 7 the -- or what would the system return? 8 A. I don't remember if we returned the 9 stills or a small -- small video clip. 10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p>
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>1 A. Right.</p> <p>Flickner Depo at 87:</p> <p>4 Q. What feature extraction methods did the 5 UC Davis implementation of QBIC rely on?</p> <p>6 A. It was similar to the other texture, 7 shape, color and layout.</p> <p>8 Q. Was there any indexing scheme used?</p> <p>9 A. There may have been some text indexing 10 scheme used.</p> <p>Flickner 8/29/23 Depo at 33–37:</p>

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		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>	

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		<p><i>Id.</i> at 52–53:</p> <p>12 Q. Underneath there's a sentence that says,                      13 "There are three logical steps in a QBIC                      14 application: Database population, feature                      15 calculation, and image query."                      16 Do you see that?                      17 A. Yeah.                      18 Q. You agree with that?                      19 A. Yeah.                      20 Q. All right. Well, let's talk about the                      21 first step, database population.                      22 What is database population?                      23 A. It's taking a set of images, extracting                      24 the features and putting them in a database.                      25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that                      2 in the database as well?                      3 A. Could be.                      4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      10 also add the image to the database, preparing a                      11 reduced thumbnail and adding any available text                      12 information to the database.                      13 A. Yep.                      14 Q. Is that correct?                      15 A. Yep.</p> <p><i>Id.</i> at 77–78:</p>

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		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99:</p> <p>20 Q. So for each of color, texture, shape,</p> <p>21 sketch, there are algorithms that are performing</p> <p>22 some mathematical computation to calculate those</p> <p>23 features; is that right?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's talk about the color</p>

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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two  2 different color computations that are done. One is  3 average color, the other is color histogram; is that  4 right?  5 A. There certainly are those two.  6 Q. Say again.  7 A. There certainly are those two.  8 Q. Okay. And for average color, let's talk  9 about that first, it says [as read], "We compute the  10 average," and it lists four things, "(R, G, B), (Y,  11 i, q), (L, a, b), and MTM coordinates of each object  12 and image."  13 You see that?  14 A. Yep.  15 Q. So does that mean that it does -- every  16 time it -- if it computes average color, it computes  17 all four of those things? Or are those optional,  18 meaning that it can compute one as opposed -- or  19 some combination of those four?  20 A. Some combination of those four.  21 Q. Okay. Are there different algorithms for  22 each of those four or is it the same algorithm?  23 A. RGB, Yiq and LAB are all linear  24 transformations.  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed  2 over time going forward from 1993?  3 A. Most likely they did.  4 Q. Do you recall any details for how they may  5 have changed?  6 A. No.  7 Q. Do you know if functionality was added to  8 compute average color?  9 A. No.  10 Q. Do you -- do you recall any other  11 algorithms or methodologies that were used besides  12 the four that are listed here?  13 A. No.  14 Q. Okay. Second methodology to compute color  15 is referred to as color histogram here; is that  16 correct?  17 A. Yes.  18 Q. And so at a high level can you explain to  19 me what a color histogram is?  20 A. A histogram is a count of each value. And  21 so, for example, if you have 1, 2, 3 as a value and  22 you say 1, 2, 3 again, the histogram would say 2  23 because there are two 1s, two 2s, and two 3s. So  24 it's a count of the number of values across the  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my  2 head.  3 Q. That's something different from a linear  4 transformation?  5 A. It might be a different linear  6 transformation. I don't recall.  7 Q. Okay. So for average color, the  8 algorithms will compute that based on some  9 combination of those four methodologies?  10 A. Yes.  11 Q. Okay. Do you know if those methodologies  12 evolved over time? So this -- so, for example, this  13 argu-- excuse me -- article was written in 1993.  14 Do you know if the way in which QBIC computed  15 average color changed over time or did it stay the  16 same?  17 MR. STRAUSSMAN: Objection; compound.  18 MR. EDWARDS: Let me rephrase.  19 THE WITNESS: I don't recall.  20 MR. EDWARDS: Let me rephrase.  21 BY MR. EDWARDS:  22 Q. So this article was written in 1993, and  23 it lists four methodologies for computing average  24 color features.  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?  2 A. Pixels, color.  3 Q. So is it measuring the probability  4 density --  5 A. It's a --  6 Q. -- of a color being in an image?  7 A. It's a PDF estimator.  8 Q. And what does PDF stand for?  9 A. Probability density function.  10 Q. Okay. Once the color histogram is  11 computed, is it normalized after that?  12 A. Yes, it was normalized.  13 Q. And why did you normalize the color  14 histogram?  15 A. Because different images would have  16 different color balances.  17 (Reporter seeks clarification.)  18 A. Balances, yeah.  19 Q. Is a -- is a reason why you normalize the  20 color histogram in -- for stored images -- well,  21 strike that.  22 Did you -- did you normalize color  23 histograms when you extract -- strike that.  24 When you calculated the color histogram  25 features from a query image and a stored image, is</p>

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>



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Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content ("QBIC") System

		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or                  2 more of these features than the other?                  3 A. Yes.                  4 Q. Which one?                  5 A. Shape.                  6 Q. Okay.                  7 (Witness reviews document.)                  8 A. So one thing I can state is originally I                  9 couldn't remember the name of the edge operator --                  10 and the name is Canny, the Canny edge operator --                  11 when we were talking about finding edges.                  12 Q. Okay. So this -- the paragraph on                  13 IBM 2393 refreshed your memory that shape                  14 calculation used Canny edge detection?                  15 A. No, that's sketch.                  16 Q. Oh, I'm sorry.                  17 A. I'm just stating that originally I was                  18 asked a question about standard edge operators. I                  19 couldn't remember the name. The name was Canny.                  20 Q. Canny. And Canny is used in the sketch                  21 calculation?                  22 A. Yeah, it's used in the sketch calculation.                  23 Q. Understood. Okay. Let's go back to                  24 shape.                  25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.                  2 Q. Can you say the name of the word again?                  3 A. I think it's called perround.                  4 Q. Per round?                  5 A. Yeah.                  6 Q. Those -- are those two words, p-e-r,                  7 r-o-u-n-d?                  8 A. P-e-r -- one word.                  9 Q. Okay. Perround, one word.                  10 A. It's basically the perimeter squared over                  11 area.                  12 (Reporter seeks clarification.)                  13 A. Perimeter squared over area.                  14 (Reporter seeks clarification.)                  15 A. Length of the -- over area.                  16 Q. Okay. So let's step back a little bit.                  17 So it says -- the second paragraph says [as read],                  18 "Our shape features are based on a combination of                  19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features                  20 area, circularity, eccentricity, major access                  21 orientation and a set of algebraic moment                  22 invariants," i-n-v-a-r-i-a-n-t-s.                  23 Did I read that correctly?                  24 A. Um-hum.                  25 Q. Okay. For circularity, that is computed</p>	
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.                  2 To calculate the shape feature in a query                  3 image or a stored database image, is the first step                  4 to convert that image into a binary image?                  5 A. I don't think so.                  6 Q. So if you look at the second paragraph --                  7 and the reason why I ask is -- it's the second                  8 sentence in the second paragraph under "Shape                  9 features." It says [as read], "All shapes are                  10 assumed to be non-occluded planar shapes allowing                  11 for each shape to be represented as a binary image."                  12 See that?                  13 A. Yeah.                  14 Q. And then the next sentence says [as read],                  15 "The area is computed as the number of pixels set in                  16 the binary image."                  17 A. Right.                  18 Q. So that's why I ask is it the first step                  19 in calculating shape to convert the image to binary?                  20 A. Yes.                  21 Q. And then once you convert it to binary                  22 image, then what do you do next in order to                  23 calculate the shape?                  24 A. You're computing something called                  25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?                  2 A. Right.                  3 Q. All right. Area is the number of pixels                  4 in the binary image?                  5 A. In the binary blob.                  6 Q. In the binary what?                  7 A. Blob.                  8 Q. Blob. And when you say "blob," what does                  9 that refer to?                  10 A. The outline of the object that you're                  11 doing a shape query on.                  12 Q. And so are each of these, area,                  13 circularity, eccentricity, major axis orientation                  14 and algebraic moment invariants, are those each                  15 different algorithms or is it all the same                  16 algorithm?                  17 A. It's different algorithms.                  18 Q. Okay. And since you worked on the shape                  19 feature the most, do you recall any other details                  20 that are not disclosed in this paragraph?                  21 A. Well, this evolved and we ended up doing                  22 an implementation of something that's not in here.                  23 Q. Okay. And what was that implementation?                  24 A. Something called turning angle per round,                  25 turning angle, which is -- it looks at the tangent</p>	



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			<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So 2 you're computing the turning angle. You're 3 computing this angle that represents a shape in a 4 very interesting way. 5 They don't seem to be very good for 6 human -- so if you asked a human whether these two 7 shapes are similar, they would say "yes," but under 8 that feature set. 9 Q. And you call that something per round? 10 What was the name of it? Started with a T. 11 Turrent? 12 A. Turning angle. 13 Q. Oh, turning angle. 14 A. Yeah. 15 Q. Well, it said -- your answer -- you did 16 say turning angle, but you said something called 17 something per round, and it started with a T. I 18 thought you said turrent, but maybe I misunderstood. 19 MR. STRAUSSMAN: Tangent? 20 THE WITNESS: Tangent angle, yeah. 21 BY MR. EDWARDS: 22 Q. Okay. So something called tangent per 23 round, is that what you would call it, this -- 24 A. No. 25 Q. -- this implementation?</p>	
			<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle. 2 Q. Okay. So the name of the new 3 implementation you're talking about for shape 4 calculation is called turning angle? 5 A. It used turning angle as a major feature. 6 Q. Okay. Was there any other name it went 7 by? 8 A. I don't recall. 9 Q. All right. And that was -- that 10 methodology was implemented to calculate shape on a 11 query image and an image stored in the database post 12 this article? 13 A. Yes. 14 Q. Was that the -- did that -- did that 15 implementation, the turning angle, did that replace 16 the methodology in this article or was it 17 supplementing the metho- -- 18 A. Supplementing. 19 Q. Okay. Other than turning angle, were 20 there any other methodologies used after this 21 article? 22 A. Not that I recall. 23 Q. Okay. Okay. Let's go sketch features, if 24 you take a look at that and then let me know when 25 you're done reading it.</p>	

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Element	'036 Claim Recitation	Exemplary Citations in Reference				
		<p><i>Id.</i> at 119–128</p> <table border="0"> <tr> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p> </td> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p> </td> </tr> </table>	<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>	<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. 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<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>					
<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p>					

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then  2 you're looking for blue water, white sand.  3 BY MR. EDWARDS:  4 Q. Do you recall what the methodologies  5 used -- that were used to calculate the orientation  6 of those colors in the image?  7 MR. HANSEN: Objection; lacks foundation.  8 THE WITNESS: There's no orientation per se.  9 It's just position.  10 BY MR. EDWARDS:  11 Q. Well, then position. Do you recall what  12 the methodologies are to calculate the position?  13 MR. HANSEN: Same objection.  14 THE WITNESS: Position is something the user  15 inputs.  16 BY MR. EDWARDS:  17 Q. Something you use what?  18 A. The user had to input.  19 Q. Okay. And then let's move on to the next  20 one, T. It says, "Click T to search images with  21 similar global texture."  22 A. Yeah.  23 Q. Do you recall, in your work on the QBIC  24 project, a feature called global texture that could  25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?  2 A. G-a-b-o-r.  3 Q. So switch over and look at the second page  4 of this Exhibit 6.  5 So -- well, first back -- go back to -- go  6 back to the first page. If you see on the left-hand  7 side it says, "Goto: IBM Image Search Demo," and a  8 little finger there is clicking it.  9 You see it's in red?  10 A. Yeah.  11 Q. Okay. So that's clicking on that link.  12 And then the second page is going to the IBM image  13 search demo.  14 A. Okay.  15 Q. Okay? On the second page it is showing  16 thumbnails with the different icons that we just  17 walked through, I, C, L, T, S, on each of those  18 icons.  19 Do you see that?  20 A. Yep.  21 Q. Do you recognize this as a similar layout  22 to the QBIC demos you hosted in the '90s?  23 A. I don't.  24 Q. You don't?  25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .  2 Q. Say again?  3 A. I missed one of your words. A feature  4 called what?  5 Q. I said do you recall in your work on the  6 QBIC project a feature called global texture that  7 was extracted from the image?  8 A. Yes.  9 Q. Okay. Is that -- is that akin to texture  10 that we looked at earlier?  11 A. Yes.  12 Q. Okay. And the last one is S. It's,  13 "Search images with special multipass filter."  14 Do you recall, in your work on the QBIC  15 project, being able to calculate a feature called  16 multipass filter?  17 A. Probably Gabor functions.  18 Q. Say again?  19 A. Gabor functions.  20 Q. One more time and louder.  21 A. Gabor functions.  22 Q. Gabor functions. Okay. What are Gabor  23 functions?  24 A. Gabor functions are a way of producing  25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM  2 website that was the AIX operating system in  3 Exhibit 3, that did not have a similar thumbnail  4 layout like this?  5 A. A thumbnail, yes. I don't recall it had  6 the buttons, the I, C, L, T, S.  7 Q. You don't recall it had all the buttons or  8 some of the buttons?  9 A. All the buttons.  10 Q. Okay. So you don't recall that it had any  11 buttons?  12 A. I don't -- yeah. I don't recall.  13 Q. It could have, it couldn't have, you just  14 don't remember?  15 A. I just don't remember, yeah.  16 Q. Okay. But the one that you hosted on  17 IBM's website, it did have thumbnails in a similar  18 format here?  19 A. Yeah, it had thumbnails.  20 Q. And these thumbnails represent the images  21 that are stored in the database?  22 A. Yes.  23 Q. Okay. Here, the 470 images would be  24 reflected at least -- one, two, three, four, five,  25 six, seven -- eight of them right here in this</p>

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<p><i>Id.</i> at 135 – 136:</p>						

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 Central District of California, No. 2:20-cv-7872

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p><i>Id.</i> at 139–165:</p>

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		<p>5 Q. And for the image that you use as a base</p> <p>6 for the query, the things we all talked about in</p> <p>7 terms of feature extraction for average color, color</p> <p>8 histogram, shape, texture, sketch, all of those</p> <p>9 things, the same algorithms would be used in order</p> <p>10 to extract those features from the image query?</p> <p>11 A. They're different algorithms. You would</p> <p>12 use an algorithm.</p> <p>13 Q. I'm sorry. Say that again?</p> <p>14 A. The algorithms are different between the</p> <p>15 shape features and the color features and sketch</p> <p>16 features.</p> <p>17 Q. Yeah. Understood. What I'm trying --</p> <p>18 what I'm trying to understand is, the process that</p> <p>19 we talked about before, when you populate the</p> <p>20 database and you extract the features from the</p> <p>21 images that are stored in the database.</p> <p>22 You know, we went through all those</p> <p>23 different algorithms that are used for shape, color,</p> <p>24 both average color and histogram, texture and</p> <p>25 sketch.</p>

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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>

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		<p style="text-align: right;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm</p> <p>2 talking about for a query, so I'm taking an image</p> <p>3 and submitting it to a system as a query.</p> <p>4 A. Query by example.</p> <p>5 Q. Query by example. Okay. Once those</p> <p>6 features extracted for that image, what happens next</p> <p>7 in the process?</p> <p>8 A. You take the feature vector and you</p> <p>9 present it to the database and say return the best</p> <p>10 matches to this feature vector.</p> <p>11 Q. Okay. So the system would compare -- the</p> <p>12 QBIC system would compare the features that are</p> <p>13 calculated from the input image to stored calculated</p> <p>14 features of the images in the database and come up</p> <p>15 with a match?</p> <p>16 A. Yes.</p> <p>17 Q. Okay. And those matches would be sorted</p> <p>18 or arranged in order of most similar?</p> <p>19 A. Yes.</p> <p>20 Q. And would algorithms do these comparisons?</p> <p>21 A. Yes.</p> <p>22 Q. Would it be a different algorithm for each</p> <p>23 of the features? So, for example, would there be an</p> <p>24 algorithm that does the comparison for color</p> <p>25 histogram and then there's a different algorithm</p>	<p style="text-align: right;">Page 145</p> <p>1 So if you turn to page IBM 2393 and</p> <p>2 rolling over to IBM 2395, that's a discussion on the</p> <p>3 image query. And so what I want to do -- I have a</p> <p>4 couple high-level questions, but then I want to walk</p> <p>5 through each one. Color starts on 2394, then</p> <p>6 texture and then shape and sketch are on 2395.</p> <p>7 So in terms of the -- in terms of the</p> <p>8 distance measure, Mr. Flickner, if -- I know you</p> <p>9 said that the results are termed based on those that</p> <p>10 are most similar but it could come up with something</p> <p>11 that's an exact match; is that right?</p> <p>12 A. It's possible.</p> <p>13 Q. Like the distance measure, the result</p> <p>14 would be zero if it was an exact match; right?</p> <p>15 A. Typically you'd get that only if you had</p> <p>16 the query image the same as a result image.</p> <p>17 Q. Right. But that's a possibility?</p> <p>18 A. Yeah.</p> <p>19 Q. Okay. So let's take a look at color --</p> <p>20 it's on -- starting at the top of 2394. You know,</p> <p>21 take your time and read that and then I want to ask</p> <p>22 you some questions about it.</p> <p>23 (Witness reviews document.)</p> <p>24 A. Okay.</p> <p>25 Q. Okay. So let's first start with average</p>



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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between</p> <p>2 the query image and the database image using</p> <p>3 weighted Euclidean distance; is that right?</p> <p>4 A. Yep.</p> <p>5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.</p> <p>6 And can you just tell us at a high level</p> <p>7 what -- if you can -- what Euclidean distance is?</p> <p>8 A. So if you have multiple features or</p> <p>9 multiple scaler features, you have to ask the</p> <p>10 question I'm trying to build a distance from that</p> <p>11 vector to a query vector.</p> <p>12 And as you build that -- the distance, you</p> <p>13 have -- you may want to weight different elements of</p> <p>14 the vector differently. And we found out that using</p> <p>15 variance normalization, where weights of the</p> <p>16 variance of the feature, gave good aesthetic</p> <p>17 results.</p> <p>18 (Reporter seeks clarification.)</p> <p>19 A. Aesthetic results.</p> <p>20 Q. And I apologize, I couldn't hear what you</p> <p>21 said. You said, "And we found out that using</p> <p>22 variance" . . .</p> <p>23 A. So you normalize each feature with its</p> <p>24 variance.</p> <p>25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)</p> <p>2 Q. Well, let me ask my -- let me get my</p> <p>3 question out first.</p> <p>4 So we talked about the features for</p> <p>5 average color before are RGB, Yiq, LAB and MTM.</p> <p>6 A. Correct.</p> <p>7 Q. And so, for example, for the RGB, you're</p> <p>8 saying that you would take the R and you would</p> <p>9 divide it by the variants of red and green, for</p> <p>10 example --</p> <p>11 A. Just variants of red.</p> <p>12 Q. Okay. And so you could do the same for</p> <p>13 the others, for Yiq or LAB?</p> <p>14 A. Exactly.</p> <p>15 Q. Okay. You do that for both the image</p> <p>16 input query and the stored image; correct?</p> <p>17 A. Correct.</p> <p>18 Q. And then you're calculating the distance</p> <p>19 between them, so determining how similar they are</p> <p>20 based on the distance?</p> <p>21 A. Yeah, or vector distance.</p> <p>22 Q. Understood.</p> <p>23 A. Two vectors of differences --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. Two vectors with a distance calculation on</p>	
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.</p> <p>2 Q. With its variance.</p> <p>3 A. And then compute the average.</p> <p>4 Q. Okay.</p> <p>5 A. Or, I'm sorry, compute the weighted sum.</p> <p>6 So red divided by the variants of red, plus green</p> <p>7 divided by the variants of green --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 A. Red divided by the variants of red, green</p> <p>10 divided by the variants of green, L divided by the</p> <p>11 variants of L, that's how you combine the various</p> <p>12 features.</p> <p>13 Q. Understand. And L represents what?</p> <p>14 A. Luminance.</p> <p>15 Q. Okay. And this is -- you're talking</p> <p>16 specifically with respect to average color?</p> <p>17 A. Well, the variance normalization is well</p> <p>18 known in terms of multidimensional feature merging.</p> <p>19 Q. But for average color, you wouldn't use</p> <p>20 luminance, right, as a -- as a variant?</p> <p>21 A. Luminance would just -- you wouldn't use</p> <p>22 just luminance. You could use luminance . . .</p> <p>23 Q. Well, so the color features we talked</p> <p>24 about before would be RGB, Yiq, LAB --</p> <p>25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.</p> <p>2 Q. You're going to have to repeat that and be</p> <p>3 just a little bit louder, Mr. Flickner. Sorry.</p> <p>4 A. That's all right. Let me get my thoughts</p> <p>5 together.</p> <p>6 So we have multiple dimensional features.</p> <p>7 It's not unusual to take each dimension and</p> <p>8 normalize it by the variance because that gives</p> <p>9 you -- what that does is if you have tight variances</p> <p>10 you divide it by, you get bigger numbers. So you</p> <p>11 have more information close by.</p> <p>12 Q. What was the word you said before "close</p> <p>13 by"?</p> <p>14 A. I don't remember.</p> <p>15 THE REPORTER: Information?</p> <p>16 THE WITNESS: Information close by?</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Okay. So now let's talk about</p> <p>19 color histograms.</p> <p>20 A. Okay.</p> <p>21 Q. Okay? Well, stop. Let's go back to</p> <p>22 average color. So is there -- you described the</p> <p>23 weighted Euclidean distance that's calculated</p> <p>24 between the query image and the database image for</p> <p>25 average color.</p>	

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall                  2 that's not disclosed in the paragraph at IBM 2394?                  3 A. Not that I recall.                  4 Q. Okay. Do you recall whether this distance                  5 methodology changed after this article or it stayed                  6 the same?                  7 A. It changed.                  8 Q. Are you certain or do you know?                  9 A. I'm not certain, but I'm pretty certain.                  10 Q. And how did it change?                  11 A. Different features were shaped like an                  12 inch in color. The algorithm evolved. It wasn't                  13 static.                  14 Q. And how did it evolve?                  15 A. I don't recall all the details.                  16 Q. Do you recall whether it supplemented the                  17 weighted Euclidean distance or replaced it?                  18 A. I don't recall.                  19 Q. Is it fair to say there was always some                  20 distance measurement to determine similarity for                  21 average color in the QBIC system?                  22 A. There's some measurement, yeah.                  23 Q. Okay. Let's talk about color histogram.                  24 So in order to determine the similarity                  25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was                  2 determined by weighted Euclidean distance; is that                  3 right?                  4 MR. HANSEN: Same objection.                  5 THE WITNESS: Correct.                  6 BY MR. EDWARDS:                  7 Q. And how did -- how was that weighted                  8 Euclidean distance determined?                  9 A. It was inverse variance.                  10 (Reporter seeks clarification.)                  11 A. Variance.                  12 Q. And it was inverse variance for components                  13 like coarseness, contrast and directionality?                  14 A. Correct.                  15 Q. Okay. And do you recall if that                  16 methodology changed or stayed the same after this                  17 article for the QBIC system?                  18 A. Most likely it evolved.                  19 Q. Do you know for sure?                  20 A. No.                  21 Q. Do you recall any details?                  22 A. No.                  23 Q. All right. Let's talk about shape next.                  24 The similarity between the query image and                  25 the database image also used weighted Euclidean</p>
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines                  2 distance between normalized histograms?                  3 A. Correct.                  4 Q. Do you recall any details of how that                  5 worked?                  6 A. Not off the top of my head.                  7 Q. Do you recall whether that methodology                  8 evolved for matching color histograms after this                  9 article?                  10 A. Not that I recall.                  11 Q. Okay. All right. Let's talk about                  12 texture next. And I don't know if you've read that,                  13 but that's at the bottom of 2394 and it goes to just                  14 barely at the top of 2395.                  15 (Witness reviews document.)                  16 A. Okay.                  17 Q. So for texture, the similarity is                  18 determined by the distance or the weighted Euclidean                  19 distance between the query object and -- the query                  20 object image and the database object image; is that                  21 right?                  22 MR. HANSEN: Objection; vague and ambiguous.                  23 THE WITNESS: Can you repeat.                  24 BY MR. EDWARDS:                  25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?                  2 A. Correct.                  3 Q. And do you recall how that worked?                  4 A. There's computing moments. And we used                  5 the shape measure, which I mentioned earlier,                  6 curvature and turning angle.                  7 (Reporter seeks clarification.)                  8 A. Curvature and turning angle.                  9 Q. And the curvature and turning angle would                  10 be compared between the image query and the database                  11 image; correct?                  12 A. Correct.                  13 Q. And do you recall if that methodology                  14 changed after this article came out in '93?                  15 A. Yes, it did.                  16 Q. How so?                  17 A. Well, in the IEEE computer paper, we                  18 described a different way of doing shape measures.                  19 And they included the moment calculations.                  20 Q. And you use the moment calculations to                  21 determine a distance between the image query and                  22 the -- and the database image?                  23 A. Yes.                  24 Q. Sorry?                  25 A. Yeah. Yes.</p>

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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?          2 A. Given a binary blob, certain high-level          3 moments and then you create -- compute the          4 eigenvectors of certain matrices that are created --          5 (Reporter seeks clarification.)          6 A. Eigenvectors, e-i-g-e -- i-n -- to compute          7 the eigenvectors of certain matrices. And that          8 would give you translation and rotation and          9 variance.          10 Q. And so after the Exhibit 3 1995 IEEE          11 article, did that methodology change to compute the          12 distance for shape?          13 A. I don't recall.          14 Q. So the methodology for shape that you just          15 described using moment calculations, that is          16 different from what is described in the 1993 article          17 for weighted Euclidean distance?          18 A. We still might have used weighted          19 Euclidean distance when the underlying features are          20 different.          21 Q. Understood.          22 And the underlying features are different          23 in the sense that in the 1995 article you're using          24 what features?          25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment          2 invariants.          3 (Witness reviews document.)          4 A. Is there any other papers that we have          5 here?          6 Q. Nope.          7 A. Everything else is screenshots?          8 MR. STRAUSSMAN: I don't think you introduced          9 any other papers.          10 THE WITNESS: I saw it earlier today.          11 BY MR. EDWARDS:          12 Q. Why don't we do it this way. In terms of          13 the feature calculations that were -- for shape on          14 page IBM 900 of Exhibit 3 versus page --          15 A. So if you look at 2393.          16 Q. What page are you directing me to?          17 A. 2393.          18 Q. Okay.          19 A. So it talks about the moment invariants as          20 well.          21 Q. Okay.          22 A. These are those matrices that you compute          23 eigenvectors of.          24 (Reporter seeks clarification.)          25 A. Matrices that you compute eigenvectors of.</p>	
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)          2 Q. I think the page you may be looking for is          3 IBM 900 on the left side.          4 (Witness reviews document.)          5 A. What else do we have here?          6 Q. So if you'll look at -- if you'll -- if          7 you'll compare page IBM 900 from Exhibit 3 to page          8 IBM 2393 from Exhibit 2, those are the descriptions          9 in both articles about the features that are          10 calculated.          11 A. I'm trying to remember what --          12 MR. STRAUSSMAN: Can you direct him a little          13 closer?          14 BY MR. EDWARDS:          15 Q. Can I show you? Do you mind?          16 I believe this is what you're looking for.          17 So if you look right here (indicating).          18 (Witness reviews document.)          19 A. That's the same as this one (indicating).          20 We had another -- there's another discussion about          21 moments.          22 Q. So if you look at -- under "Shape          23 features" at 2393, right there, where you're looking          24 at --          25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment          2 invariants in the 1993 SPIE article?          3 A. Correct.          4 Q. Right. And then if you go to the IEEE          5 article that you primarily co-authored, on page 900,          6 it refers to shape queries using area, circularity,          7 eccentricity, major-axis direction and features          8 derived from the object moments.          9 A. Right.          10 Q. Is that the same thing as algebraic moment          11 invariants?          12 A. Right.          13 Q. So it looks like the methodologies are the          14 same for the features that are extracted between the          15 papers; is that right?          16 A. I thought one paper had algebraic moments          17 and one had turning angle. Maybe they both had          18 turning angle.          19 (Reporter seeks clarification.)          20 A. Turning angle. Algebraic moments.          21 Turning angles.          22 Q. The 1993 paper refers to algebraic moment          23 invariants. The IEEE paper, on IBM 900, refers to          24 features derived from object moments.          25 Are those the same thing?</p>	

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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.  2 Q. Okay. And so turning angles, which you've  3 previously testified on, do you think that  4 calculating shape features based on turning angles  5 came after these papers?  6 A. No. They're mentioned in these papers.  7 Q. Okay. So they're included in these  8 papers?  9 A. Yes.  10 Q. And so any distance measurement using  11 weighted Euclidean distance would have taken into  12 account turning angles?  13 A. As a feature, yeah. Yes.  14 Q. For both -- for both papers?  15 A. For both papers.  16 Q. Okay. Let's talk about sketch, which  17 is -- if you'll just stick with 2395, which is  18 Exhibit 2.  19 MR. STRAUSSMAN: Can you direct him?  20 THE WITNESS: I found it.  21 MR. STRAUSSMAN: Okay.  22 (Witness reviews document.)  23 BY MR. EDWARDS:  24 Q. Let me know when you're finished reading  25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the  2 best matches based on order of similarity?  3 A. Um-hum.  4 Q. Does iterated query refinement mean that I  5 can further refine that query to search for things  6 like shape, like a -- you know, some shape in the --  7 in the query image, like a logo or an icon, and that  8 will further refine the results to give me things  9 that have that similar shape inside the results of  10 the color histogram?  11 A. Yes.  12 Q. And then I can -- I can keep doing that, I  13 can further even refine that result by using a  14 keyword, for example?  15 A. Yes. Or you could do it all at once.  16 Q. Okay. So the results of the query -- so  17 we talked about before that the results of the  18 queries display thumbnails of the database images  19 based on similarity of which they match; correct?  20 A. Correct.  21 Q. And then those thumbnails can provide  22 links to the original image or, if it was an  23 r-frame, it could be -- you could provide a link to  24 the video; correct?  25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.  2 Q. For sketch, the similarity between the  3 query image and the database image uses an algorithm  4 that performs logical binary correlation of the  5 binary image?  6 A. Yes.  7 Q. Are there any other details you recall for  8 the sketch comparison beyond what's disclosed in  9 this paragraph on IBM 2395?  10 A. Not that I recall.  11 Q. Do you recall the methodology for  12 determining similarity of the input image and the  13 database image for sketch changing after this  14 article?  15 A. Not that I recall.  16 Q. So if you go to the next page,  17 Mr. Flickner, which is 2396, the Section 4.2 talks  18 about performing queries.  19 A. Um-hum.  20 Q. And in the last sentence it refers to  21 something called iterated query refinement.  22 A. Yes.  23 Q. And what does that refer to?  24 A. It's a way you can refine the query.  25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links  2 to information about the image that was associated  3 with the image in the database?  4 A. Yes.  5 Q. And, again, that can be that -- whatever  6 information that the user inputted or was associated  7 with the image from the source?  8 A. Yes.  9 Q. Could the results also display a matching  10 score so the user could see how well the particular  11 result matched to the -- to the query image?  12 A. It could.  13 Q. Okay.  14 MR. EDWARDS: I'm going to hand you the next  15 exhibit, Mr. Flickner.  16 (Deposition Exhibit 10 was marked.)  17 MR. EDWARDS: Handing you what's been marked as  18 Exhibit 10.  19 For the record, it's IBM Bates Nos. 002418  20 to 2430.  21 BY MR. EDWARDS:  22 Q. The title of this article is "Updates to  23 the QBIC system."  24 Do you see that?  25 A. Yes.</p>

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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?</p> <p>2 A. Yes.</p> <p>3 Q. You are listed as a co-author of this</p> <p>4 article; is that correct?</p> <p>5 A. Yes.</p> <p>6 Q. And it is a paper that is published in the</p> <p>7 SPIE; correct?</p> <p>8 A. Correct.</p> <p>9 Q. In 1997; correct?</p> <p>10 A. Yes. It was 1997 or 1998.</p> <p>11 Q. No later than 1998; correct?</p> <p>12 A. Correct.</p> <p>13 Q. So just want to kind of orient you to the</p> <p>14 first page, which is IBM 2419.</p> <p>15 A. It's '98 because '97 is a different paper.</p> <p>16 Q. Well, if you turn the page, look at the</p> <p>17 footer on the right-hand side.</p> <p>18 Are you familiar that SPIE usually</p> <p>19 includes footers with the volume and the date at the</p> <p>20 bottom?</p> <p>21 A. Yeah.</p> <p>22 Q. And if you look at the footer kind of</p> <p>23 towards the right it says -786X-97-\$10 [sic]?</p> <p>24 A. Yeah.</p> <p>25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?</p> <p>2 A. Yep.</p> <p>3 Q. Okay. So let's -- I'm going to have you</p> <p>4 jump around, so I apologize in advance. Let's go to</p> <p>5 the -- kind of the back, IBM 2428.</p> <p>6 A. Okay.</p> <p>7 Q. Is that example of the stamps demo that</p> <p>8 was available on IBM's website?</p> <p>9 A. Yes.</p> <p>10 Q. All right. And if you look at the top in</p> <p>11 the location URL it has the almaden.ibm website</p> <p>12 address; correct?</p> <p>13 A. Correct.</p> <p>14 Q. All right. Let's flip forward to 2429.</p> <p>15 And is 2429 a screenshot of a trademark</p> <p>16 demo that was also available in the Almaden --</p> <p>17 excuse me -- almaden.ibm website?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And that demo looks like the</p> <p>20 trademark query is based on shape; is that right?</p> <p>21 A. It uses shape as one similarity feature.</p> <p>22 Q. Right. So the trademarks are converted to</p> <p>23 a binary image, like we talked before -- talked</p> <p>24 about before, and then they're -- the matching</p> <p>25 process is done based on those binary images?</p>	
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the</p> <p>2 conference was in '98.</p> <p>3 Q. Submission was in '97. So the paper was</p> <p>4 published in '97 and then the conference you</p> <p>5 presented it at was in 1998?</p> <p>6 A. That's possible.</p> <p>7 Q. Do you recall presenting this paper at a</p> <p>8 conference in 1998?</p> <p>9 A. No, I don't.</p> <p>10 Q. So the first page refers to the Photonics</p> <p>11 West 1999 -- excuse me. Photonics West 1998</p> <p>12 Electronic Imaging Conference in San Jose.</p> <p>13 Do you recall attending that conference?</p> <p>14 A. It's likely I did, but I don't recall.</p> <p>15 Q. Okay. But you would agree with me this</p> <p>16 paper was made available at least as early as 1998;</p> <p>17 correct?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. So the first page, IBM 2419. Under</p> <p>20 "Introduction," at the time of this paper it says,</p> <p>21 last line on the first paragraph, "Several online</p> <p>22 demos of QBIC are available at</p> <p>23 <a href="http://www.qbic.almaden.ibm.com">http://www.qbic.almaden.ibm.com</a>."</p> <p>24 Do you see that?</p> <p>25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p>22 Q. Okay. So 39 would be the -- so the first</p> <p>23 image at the top left is a 39, the one next to it is</p> <p>24 a 46, so the 39 would be a closer match than the 46;</p> <p>25 correct?</p>	

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Element	'036 Claim Recitation	Exemplary Citations in Reference		
		<p><i>Id.</i> at 174–182:</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; border-right: 1px solid black; padding-right: 10px;"> <p style="text-align: right; margin: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"??                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p> </td> <td style="width: 50%; vertical-align: top; padding-left: 10px;"> <p style="text-align: right; margin: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. So the image itself is not put into a                  15 database. A handle is put in the database that                  16 points to the image?                  17 A. Correct.                  18 MR. HANSEN: Objection; lacks foundation.                  19 BY MR. EDWARDS:                  20 Q. And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p> <p style="text-align: right; margin: 0;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. How is the -- how is the catalog different                  10 from the table?                  11 MR. HANSEN: Objection; lacks foundation.                  12 BY MR. EDWARDS:                  13 Q. That we talked about that has the handle                  14 that points to the image?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: The QBIC catalog is the file in                  17 the file system or in the database system that                  18 contains all the metadata and the handle points to                  19 all the metadata.                  20 BY MR. EDWARDS:                  21 Q. Okay. So there's a handle in the -- in                  22 the table --                  23 A. Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p> </td> </tr> </table>	<p style="text-align: right; margin: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"??                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p>	<p style="text-align: right; margin: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. So the image itself is not put into a                  15 database. A handle is put in the database that                  16 points to the image?                  17 A. Correct.                  18 MR. HANSEN: Objection; lacks foundation.                  19 BY MR. EDWARDS:                  20 Q. And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p> <p style="text-align: right; margin: 0;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. How is the -- how is the catalog different                  10 from the table?                  11 MR. HANSEN: Objection; lacks foundation.                  12 BY MR. EDWARDS:                  13 Q. That we talked about that has the handle                  14 that points to the image?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: The QBIC catalog is the file in                  17 the file system or in the database system that                  18 contains all the metadata and the handle points to                  19 all the metadata.                  20 BY MR. EDWARDS:                  21 Q. Okay. So there's a handle in the -- in                  22 the table --                  23 A. Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p>
<p style="text-align: right; margin: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"??                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p>	<p style="text-align: right; margin: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. So the image itself is not put into a                  15 database. A handle is put in the database that                  16 points to the image?                  17 A. Correct.                  18 MR. HANSEN: Objection; lacks foundation.                  19 BY MR. EDWARDS:                  20 Q. And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p> <p style="text-align: right; margin: 0;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. How is the -- how is the catalog different                  10 from the table?                  11 MR. HANSEN: Objection; lacks foundation.                  12 BY MR. EDWARDS:                  13 Q. That we talked about that has the handle                  14 that points to the image?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: The QBIC catalog is the file in                  17 the file system or in the database system that                  18 contains all the metadata and the handle points to                  19 all the metadata.                  20 BY MR. EDWARDS:                  21 Q. Okay. So there's a handle in the -- in                  22 the table --                  23 A. Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p>			



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		<p style="text-align: right;">Page 178</p> <p>1 the image as well?  2 MR. HANSEN: Objection; lacks foundation.  3 THE WITNESS: It points to the file that's the  4 QBIC catalog.  5 BY MR. EDWARDS:  6 Q. Can you walk us through that one more  7 time? And just be a little bit louder, sorry.  8 MR. HANSEN: Same objection.  9 THE WITNESS: So the QBIC catalog is a set of  10 files that hold data about visual features in the  11 image.  12 (Reporter seeks clarification.)  13 THE WITNESS: Visual features. The image  14 extender lets you search against that database,  15 against that object.  16 BY MR. EDWARDS:  17 Q. The image extender lets you search against  18 that catalog, the name of that catalog?  19 A. The catalog, yeah.  20 Q. Okay. And it does so by using a pointer  21 from the handle in the table?  22 MR. HANSEN: Objection; lacks foundation.  23 THE WITNESS: Correct.  24 BY MR. EDWARDS:  25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:  2 Q. So take a look at the bottom of IBM  3 page 40 to the top of 41.  4 So it says, "When you search for an image  5 by content, your query identifies one or more  6 features for the search (such as average color), a  7 source for each feature (such as an example image),  8 and a target set of cataloged images. The Image  9 Extender computes the feature value of the source  10 and compares it to the cataloged feature values for  11 the target images. It then computes a score that  12 indicates how similar the feature values of the  13 target images are to the source. You can have the  14 Image Extender return the images whose features are  15 most similar to the source. The Image Extender will  16 return the handle of each image and the image  17 score."  18 Did I read that correctly?  19 A. Yes.  20 Q. So if you were to use the image extender  21 in the DB2 universal database when you search for an  22 image by content using a query image, it will  23 extract the features for whatever you want, compare  24 that to the features of images in a database, return  25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold  2 data for the following image features: Average  3 color, Histogram color, Positional color and  4 Texture."  5 Is that right?  6 A. Yep.  7 Q. Okay. We spoke about average color,  8 histogram color and texture; correct?  9 A. Right.  10 Q. What is positional color?  11 A. We talked about it briefly. It's color in  12 particular locations in the image.  13 Q. Ah. Understood.  14 That is -- that is similar to L in the  15 demo that we looked at, which is called color  16 layout.  17 A. Okay, yes.  18 Q. Is that correct?  19 A. I don't remember if it's called L. Sounds  20 right.  21 Q. If you look at --  22 MR. EDWARDS: If you can show -- give him  23 Exhibit 6.  24 THE WITNESS: Oh, this L. Yes.  25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?  2 A. Correct.  3 MR. HANSEN: Objection; lacks foundation, calls  4 for speculation.  5 MR. EDWARDS: You can put that enormous exhibit  6 aside.  7 THE WITNESS: Test 1, 2, 3.  8 BY MR. EDWARDS:  9 Q. Go back to Exhibit 3, please. If you  10 could turn to the page Bates-labeled IBM 894 with  11 the architecture picture.  12 A. Okay.  13 Q. So I just -- I just want to kind of walk  14 the -- through this architecture, Mr. Flickner. But  15 as a high level, I just want to understand, is  16 this -- is this a high-level architecture that would  17 generally be used for any implementation of QBIC?  18 A. Yes.  19 Q. All right. So first step is you submit  20 still images or r-frames for feature extraction; is  21 that correct?  22 A. Correct.  23 Q. Okay. Features are extracted, such as  24 color, texture, shape, sketch and text; correct?  25 A. Location, yep.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 182</p> <p>1 Q. And location. Including the ones that I                  2 listed; correct?                  3 A. Yep.                  4 Q. Okay. After feature extraction is done,                  5 the images and those features for the database                  6 images are stored in the database; correct?                  7 A. Correct.                  8 Q. And then once those are stored, a user can                  9 query using some sort of a user interface; is that                  10 right?                  11 A. Correct.                  12 Q. And the user can query based on color,                  13 texture, shape, multi-object, sketch, location or                  14 text; is that right?                  15 A. Correct.                  16 Q. Okay. Those features are then decomposed                  17 and extracted from the query image and then a                  18 matching engine is used to compare those similarly                  19 extracted features from the stored images; is that                  20 correct?                  21 A. Correct.                  22 Q. And then the best matches are returned in                  23 similarity of order back to the user; is that right?                  24 A. Correct.                  25 Q. Okay. Thank you for that.</p> <p><i>Id.</i> at 190–191:                  22 Q. So [as read], "Once the image catalogs are                  23 created, you can use the Image Query component to                  24 find image and business information. Business                  25 information, such as character and numeric data, are</p>



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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 198 – 199:</p> <p>15 Q. Okay. And then if we can go to IBM 849.                      16 There?                      17 A. Yeah.                      18 Q. Top of the page says, "Adding image search                      19 to your Content Manager."                      20 Do you see that?                      21 A. Yeah. Yeah.                      22 Q. And the first paragraph starts -- talks                      23 about QBIC.                      24 Do you see that?                      25 A. Yeah.</p> <hr/> <p style="text-align: right;">Page 199</p> <p>1 Q. It says, "The image search server uses                      2 IBM's QBIC (query by image content) technology to                      3 help you search for objects by certain visual                      4 properties, such as color and texture."                      5 Did I read that correctly?                      6 A. Yes.                      7 Q. It says [as read], "The image search                      8 server analyzes images and stores the image                      9 information in a database. Then users can run image                      10 queries, which use the visual properties of image,                      11 to match colors, textures, and their positions                      12 without describing them -- describing them in                      13 words."                      14 Did I read that correctly?                      15 A. Yes.                      16 Q. And that's consistent with the features                      17 and functionalities that we have talked about in the                      18 1993 SPIE and 1995 IEEE article; correct?                      19 A. Correct.</p> <p><i>Id.</i> at 312 – 313:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>21 Q. For every implementation of QBIC, if an                      22 input image has an object and the object has colors,                      23 the color histogram feature would match those stored                      24 image that include objects with similar colors;                      25 correct?</p> <hr/> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 317–322:                      22 Q. Okay. So for every commercial                      23 implementation of QBIC as of the IEEE 1995 article                      24 in Exhibit 3, those implementation calculated                      25 features of a query image and stored image; is that</p>

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		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>	
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query."</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>	

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 322</p> <p>1 indicates how confident the system is that the</p> <p>2 features of the stored image match the features of</p> <p>3 the input image; correct?</p> <p>4 A. Correct.</p> <p><i>Id.</i> at 305:</p> <p>7 So these articles describe various</p> <p>8 features of various versions of QBIC; right?</p> <p>9 A. Correct.</p> <p>10 Q. Do they describe any features -- does the</p> <p>11 demo you operated include any features that weren't</p> <p>12 described in these articles?</p> <p>13 A. That weren't described in the articles?</p> <p>14 No.</p> <p><i>Id.</i> at 35:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>6 Q. Okay. And the analytics that you're</p> <p>7 talking about, where you extract these characters</p> <p>8 from the image, that is -- those run on both the</p> <p>9 query image and the images that are stored in the</p> <p>10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.</p> <p>13 So when you say "features," you're talking</p> <p>14 about the features that we talked about before:</p> <p>15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at</p> <p>20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p> </p> <p><i>Id.</i> at 109-110:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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Invalidity Chart for U.S. Patent 8,478,036 based on the Query by Image and Video Content (“QBIC”) System

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>



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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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		<p>IBM000001 at 39 – 41</p> <div> <p style="text-align: right;"><b>Data structures</b></p> <p><b>Handles</b></p> <p>When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a <b>handle</b> to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object's attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.</p> <p>User Table</p> <table border="1"> <thead> <tr> <th>ID</th> <th>Name</th> <th>Picture</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Handle 1</td> </tr> <tr> <td></td> <td></td> <td>Handle 2</td> </tr> </tbody> </table> <p>Administrative Support Tables</p> <table border="1"> <thead> <tr> <th colspan="4">Common Attributes</th> </tr> <tr> <th>Handle</th> <th>Importer</th> <th>Updater</th> <th></th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Unique Attributes</th> </tr> <tr> <th>Handle</th> <th>Width</th> <th>Height</th> <th>Numcolors</th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>  <p>Figure 8. Handles</p> <p><b>QBIC catalogs</b></p> <p>A <b>QBIC catalog</b> is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.</p> <p>You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> </div> <p style="text-align: right;">Chapter 2. DB2 extender concepts 19 IBM 000039</p>	ID	Name	Picture			Handle 1			Handle 2	Common Attributes				Handle	Importer	Updater		Handle 1				Handle 2				Unique Attributes				Handle	Width	Height	Numcolors	Handle 1				Handle 2			
ID	Name	Picture																																									
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		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® D82® Universal Database: Image, Audio, and Video Extenders</p> <p>IBM 000040</p>

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		<p style="text-align: center;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot catalog file name</li> <li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li> <li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li> <li>• Shot number</li> <li>• Starting frame number</li> <li>• Ending frame number</li> <li>• Representative frame number</li> <li>• Name of a file that contains the contents of the representative frame</li> </ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot handle</li> <li>• Video table name</li> </ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts 21                  IBM 000041</p> <p>IBM0002263 at 226</p>

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		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Description</b> </div> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Classification</b> </div> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Query</b> </div> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p style="text-align: right;">and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Image Formats</b> </div> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCK</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"> <b>Product Positioning</b> </div> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <p style="font-size: small; margin-top: 20px;">285-042 <span style="float: right;">-2-</span> <span style="float: right;">IBM 0002264</span></p>

IBM000777 at 794

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		<p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b>                      You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b>                      This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"> <li>• Improved installation procedures</li> <li>• Additional connectors for relational databases                      Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li> <li>• Advanced information mining and search capabilities                      Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li> <li>• Workflow capabilities                      By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li> <li>• Federated level access control                      You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li> <li>• Additional support for Content Manager:                         <ul style="list-style-type: none"> <li>- List, add, retrieve, update, and delete of content class</li> <li>- Asynchronous retrieval of object content</li> </ul> </li> </ul> <p><i>See also</i> Flickner Depo at 22-25, 36, 54-55, 89-90, 78-79, 159, 201, 209-210</p>



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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	<p>a content service coupled with the identification platform, and that:</p>	<p>QBIC discloses a content service coupled with the identification platform.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 8  <b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of <math>(R, G, B)</math> sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <math>n</math>th best match (<math>n</math> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p>



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		<p style="text-align: center;"><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):          “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.          For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects-for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and 15-percent blue colors’), shots (‘Find all shots</p>

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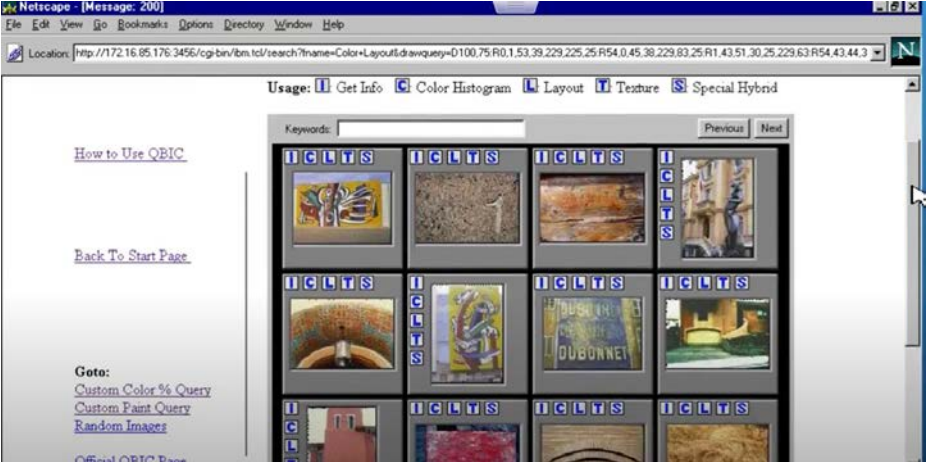
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions-which we call objects-in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>

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		<p>QBIC Demo (IBM000747):</p>  <p>Flickner 8/29/23 Depo at 53 – 56:</p> <p>16 Q. And when it refers to "text information,"</p> <p>17 what is it referring to?</p> <p>18 A. Anything that could be extracted in the</p> <p>19 context of how the image was annotated.</p> <p>20 Q. And when you say "annotated," annotated by</p> <p>21 the user who was populating the database?</p> <p>22 A. Could be.</p> <p>23 Q. What else could it be?</p> <p>24 A. It could be the supplier of the data.</p> <p>25 Q. Okay. So you may have some annotations</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference	
		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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		<p><i>Id.</i> at 60 – 62:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: right;">25</td> <td>Q. Okay. And so let's say that objects were</td> </tr> <tr> <td></td> <td style="text-align: right;">Page 61</td> </tr> <tr> <td>1</td> <td>identified within a particular image, what were done</td> </tr> <tr> <td>2</td> <td>with those objects? Were they stored, for example,</td> </tr> <tr> <td>3</td> <td>as a separate image or were they somehow linked to</td> </tr> <tr> <td>4</td> <td>or associated with the image from which they were</td> </tr> <tr> <td>5</td> <td>extracted?</td> </tr> <tr> <td>6</td> <td>A. Typically they were linked.</td> </tr> <tr> <td>7</td> <td>Q. They were linked to the source image?</td> </tr> <tr> <td>8</td> <td>A. Yeah.</td> </tr> <tr> <td>9</td> <td>Q. Okay. And this was done in the database?</td> </tr> <tr> <td>10</td> <td>A. Could be done in the database.</td> </tr> <tr> <td>11</td> <td>Q. How was it done?</td> </tr> <tr> <td>12</td> <td>A. It was probably done in a text database or</td> </tr> <tr> <td>13</td> <td>some sort of key index pair database. So database</td> </tr> <tr> <td>14</td> <td>has a lot of different meanings.</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: right;">14</td> <td>Q. Yeah, that was a bad question.</td> </tr> <tr> <td>15</td> <td>Once the objects are identified within a</td> </tr> <tr> <td>16</td> <td>particular source image that's stored in the</td> </tr> <tr> <td>17</td> <td>database, how are the objects linked to the source</td> </tr> <tr> <td>18</td> <td>image in the key --</td> </tr> <tr> <td>19</td> <td>A. The key would have been, like, the image</td> </tr> <tr> <td>20</td> <td>name and the value would have been the definition of</td> </tr> <tr> <td>21</td> <td>the -- of the objects.</td> </tr> </table> <p><i>Id.</i> at 103:</p>	25	Q. Okay. And so let's say that objects were		Page 61	1	identified within a particular image, what were done	2	with those objects? Were they stored, for example,	3	as a separate image or were they somehow linked to	4	or associated with the image from which they were	5	extracted?	6	A. Typically they were linked.	7	Q. They were linked to the source image?	8	A. Yeah.	9	Q. Okay. And this was done in the database?	10	A. Could be done in the database.	11	Q. How was it done?	12	A. It was probably done in a text database or	13	some sort of key index pair database. So database	14	has a lot of different meanings.	14	Q. Yeah, that was a bad question.	15	Once the objects are identified within a	16	particular source image that's stored in the	17	database, how are the objects linked to the source	18	image in the key --	19	A. The key would have been, like, the image	20	name and the value would have been the definition of	21	the -- of the objects.
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		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p> <p><i>Id.</i> at 129 – 131:</p>

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		<p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes.</p> <p>2 Q. Okay. And so when a user clicks the I,</p> <p>3 you can see the I is highlighted in red?</p> <p>4 A. Yeah.</p> <p>5 Q. Was there a -- was there a similar</p> <p>6 functionality on the one on the website, where you</p> <p>7 clicked something and it lit up to tell the user</p> <p>8 that they were actually clicking the button?</p> <p>9 A. Yeah.</p> <p>10 Q. Okay. And then you go to the second page,</p> <p>11 and that is the full image of the thumbnail; is that</p> <p>12 correct?</p> <p>13 A. It's not of the thumbnail, it's the</p> <p>14 full-size image.</p> <p>15 Q. Well, yeah, it's the -- it's the</p> <p>16 full-sized image representation of the thumbnail on</p> <p>17 the first page; right?</p> <p>18 A. I would phrase it as the thumbnail is a</p> <p>19 representation of the full-sized image.</p> <p>20 Q. Understood. The first page is a</p> <p>21 thumbnail. You click on "Info" and then it returns</p> <p>22 to you the full-sized image?</p> <p>23 A. Yeah.</p> <p>24 Q. And that's reflected on the second page?</p> <p>25 A. Yeah.</p>	<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that?</p> <p>2 A. That would be the file name of the image.</p> <p>3 Q. Okay. And so if you go back to the first</p> <p>4 page, when the pointer is pointed to I and it clicks</p> <p>5 on that, that is actually directing -- is going to</p> <p>6 direct the user to a separate link, correct, where</p> <p>7 the full-sized image is?</p> <p>8 A. Yes.</p> <p>9 Q. And the address of that link's on the</p> <p>10 second page at the top that says "Location";</p> <p>11 correct?</p> <p>12 A. Yeah, the URL.</p> <p>13 Q. Right. And so that would be similar to</p> <p>14 how the demo is on the website, it would go to a</p> <p>15 specific URL that's linked to where that image is</p> <p>16 stored?</p> <p>17 A. Yes.</p> <p>18 Q. Right? And that's how it would work on</p> <p>19 any implementation, any commercial implementation;</p> <p>20 correct?</p> <p>21 A. Yeah.</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 MR. EDWARDS: So we've been going for about an</p> <p>24 hour. How do you -- how are you feeling?</p> <p>25 THE WITNESS: I'm all right.</p>
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		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321:</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p> <p><i>Id.</i> at 305:</p>

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		<p>7 So these articles describe various</p> <p>8 features of various versions of QBIC; right?</p> <p>9 A. Correct.</p> <p>10 Q. Do they describe any features -- does the</p> <p>11 demo you operated include any features that weren't</p> <p>12 described in these articles?</p> <p>13 A. That weren't described in the articles?</p> <p>14 No.</p> <p><i>Id.</i> at 35:</p> <p>6 Q. Okay. And the analytics that you're</p> <p>7 talking about, where you extract these characters</p> <p>8 from the image, that is -- those run on both the</p> <p>9 query image and the images that are stored in the</p> <p>10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.</p> <p>13 So when you say "features," you're talking</p> <p>14 about the features that we talked about before:</p> <p>15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at</p> <p>20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><i>See also</i> Flickner Depo at 40, 50, 54-55, 72, 76, 89-90, 91, 95, 113; Flickner 8/29/23 Depo at 62-63, 74, 166-174, 180-181, 189, 193, 202, 316-317</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.i]	obtains content information related to the known target; and	<p>QBIC discloses a content service coupled with the identification platform] that obtains content information related to the known target.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390-404) at 8</p>

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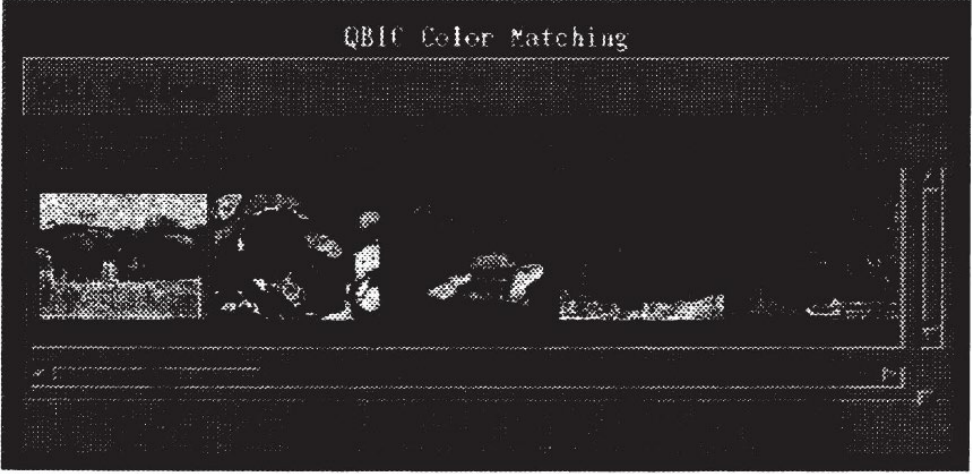
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		<p><b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of <math>(R, G, B)</math> sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <math>n</math>th best match (<math>n</math> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9</p>



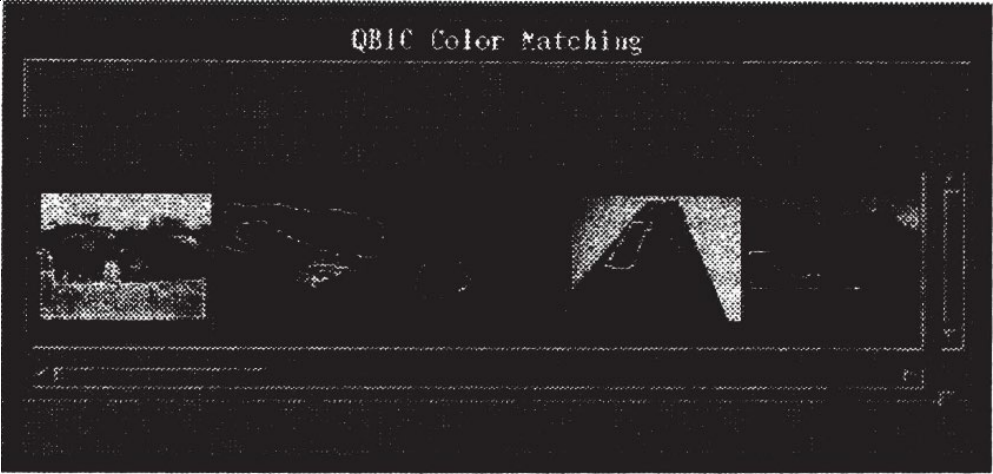
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		 <p>Figure 7: Result of query by example using color only.</p>

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		 <p>Figure 8: Result of query by example using texture only.</p>

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		 <p>Figure 9: Result of query by example using color and texture.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An</p>

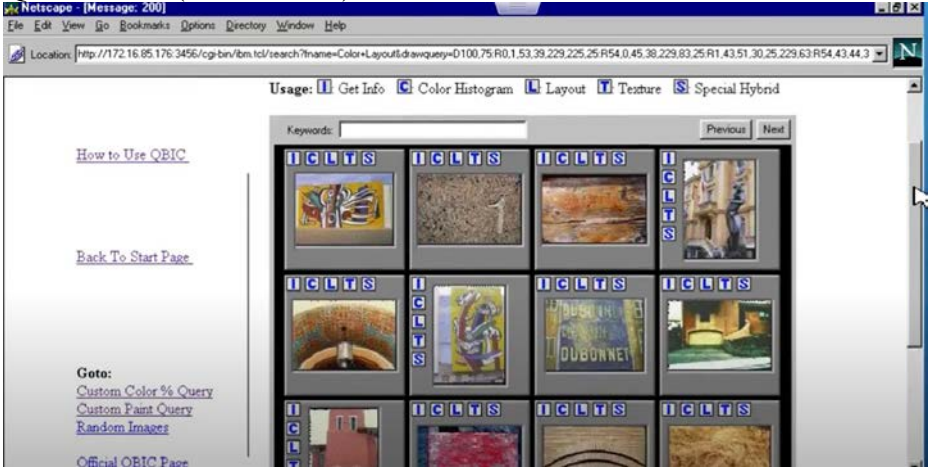
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		<p>object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and 15-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more</p>


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		<p>features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p><b>QBIC Demo (IBM000747):</b></p> 

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		<p>QBIC Demo (IBM000747):</p>  <p>Flickner Depo at 88:</p> <p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.</p> <p>Flickner 8/29/23 Depo at 53 – 56:</p>

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		16 Q. And when it refers to "text information," 17 what is it referring to? 18 A. Anything that could be extracted in the 19 context of how the image was annotated. 20 Q. And when you say "annotated," annotated by 21 the user who was populating the database? 22 A. Could be. 23 Q. What else could it be? 24 A. It could be the supplier of the data. 25 Q. Okay. So you may have some annotations



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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>



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		<p><i>Id.</i> at 60 – 62:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: right;">25</td> <td>Q. Okay. And so let's say that objects were</td> </tr> <tr> <td></td> <td style="text-align: right;">Page 61</td> </tr> <tr> <td>1</td> <td>identified within a particular image, what were done</td> </tr> <tr> <td>2</td> <td>with those objects? Were they stored, for example,</td> </tr> <tr> <td>3</td> <td>as a separate image or were they somehow linked to</td> </tr> <tr> <td>4</td> <td>or associated with the image from which they were</td> </tr> <tr> <td>5</td> <td>extracted?</td> </tr> <tr> <td>6</td> <td>A. Typically they were linked.</td> </tr> <tr> <td>7</td> <td>Q. They were linked to the source image?</td> </tr> <tr> <td>8</td> <td>A. Yeah.</td> </tr> <tr> <td>9</td> <td>Q. Okay. And this was done in the database?</td> </tr> <tr> <td>10</td> <td>A. Could be done in the database.</td> </tr> <tr> <td>11</td> <td>Q. How was it done?</td> </tr> <tr> <td>12</td> <td>A. It was probably done in a text database or</td> </tr> <tr> <td>13</td> <td>some sort of key index pair database. So database</td> </tr> <tr> <td>14</td> <td>has a lot of different meanings.</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: right;">14</td> <td>Q. Yeah, that was a bad question.</td> </tr> <tr> <td>15</td> <td>Once the objects are identified within a</td> </tr> <tr> <td>16</td> <td>particular source image that's stored in the</td> </tr> <tr> <td>17</td> <td>database, how are the objects linked to the source</td> </tr> <tr> <td>18</td> <td>image in the key --</td> </tr> <tr> <td>19</td> <td>A. The key would have been, like, the image</td> </tr> <tr> <td>20</td> <td>name and the value would have been the definition of</td> </tr> <tr> <td>21</td> <td>the -- of the objects.</td> </tr> </table> <p><i>Id.</i> at 103:</p>	25	Q. Okay. And so let's say that objects were		Page 61	1	identified within a particular image, what were done	2	with those objects? Were they stored, for example,	3	as a separate image or were they somehow linked to	4	or associated with the image from which they were	5	extracted?	6	A. Typically they were linked.	7	Q. They were linked to the source image?	8	A. Yeah.	9	Q. Okay. And this was done in the database?	10	A. Could be done in the database.	11	Q. How was it done?	12	A. It was probably done in a text database or	13	some sort of key index pair database. So database	14	has a lot of different meanings.	14	Q. Yeah, that was a bad question.	15	Once the objects are identified within a	16	particular source image that's stored in the	17	database, how are the objects linked to the source	18	image in the key --	19	A. The key would have been, like, the image	20	name and the value would have been the definition of	21	the -- of the objects.
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		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p> <p><i>Id.</i> at 129 – 131:</p>

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		<p>9 Q. Okay? And if you want to compare, or you                      10 can take my word for it, the image in the top left                      11 corner, the querying image, is the same one that was                      12 on Exhibit 7.                      13 A. Yes.                      14 Q. Okay. And here the user's clicking the I                      15 icon, which stands for "Get Info."                      16 Do you see that?                      17 A. Um-hum.                      18 Q. On the first page?                      19 A. Yeah.                      20 Q. And the second page is doing what?                      21 A. Is presenting the image at full                      22 resolution.                      23 Q. Okay. And was there a similar                      24 functionality on the demo app on the -- on the                      25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>
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		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321:</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p> <p><i>Id.</i> at 305:</p>

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		<p>7 So these articles describe various</p> <p>8 features of various versions of QBIC; right?</p> <p>9 A. Correct.</p> <p>10 Q. Do they describe any features -- does the</p> <p>11 demo you operated include any features that weren't</p> <p>12 described in these articles?</p> <p>13 A. That weren't described in the articles?</p> <p>14 No.</p> <p><i>Id.</i> at 35:</p> <p>6 Q. Okay. And the analytics that you're</p> <p>7 talking about, where you extract these characters</p> <p>8 from the image, that is -- those run on both the</p> <p>9 query image and the images that are stored in the</p> <p>10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.</p> <p>13 So when you say "features," you're talking</p> <p>14 about the features that we talked about before:</p> <p>15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at</p> <p>20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>



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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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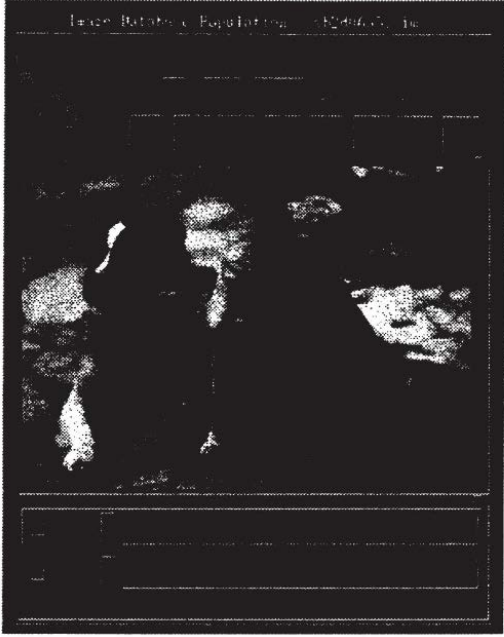
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		<p><i>See also</i> Flickner Depo at 22-25, 25-26, 54-55, 76, 78-79, 89-90, 159, 201-202, 209-210</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.ii]	sends the content information to at least one of the identification platform and the mobile device.	<p>QBIC discloses [a content service coupled with the identification platform] that sends the content information to at least one of the identification platform and the mobile device.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 8  <b>4.1. Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. The interface is made up of four parts (listed from top to bottom): the window menu, the tool selection button, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Fig. 4</p>

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		 <p>Figure 4: Object Identification Tool. Note for example, the right dog's ear, which has been outlined.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390-404) at 8</p>

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		<p><b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of <math>(R, G, B)</math> sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <math>n</math>th best match (<math>n</math> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>QBIC (Query by Image Content) (BOFA00001391–392) at 2:</p>

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		<div> </div> <p><b>Result of QBIC Search</b></p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>

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		<p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p>



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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p> 



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		<p><b>QBIC Demo (IBM000747):</b></p>  <p><b>Flickner Depo at 41-42:</b></p> <p>18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>2 Q. Okay. And how many key frames would be 3 returned?</p> <p>4 A. It depends how many you requested.</p> <p>5 Q. Could you alter how many you request?</p> <p>6 A. Probably.</p> <p>7 Q. Could you return key frames based on some 8 defined threshold of the distance?</p> <p>9 A. Probably.</p>

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		<p>Flickner Depo at 162-163</p> <p>15 Q. How did the trade -- how did the                      16 technology implemented in the trademark demo decide                      17 how many results to return to the user?</p> <p>18 A. So it was -- it was an exact match or a                      19 binary search for the text fields using some                      20 metric, like string at a distance, or something                      21 like that, and that would give you a list and a                      22 rank by the image features.</p> <p>7 Q. Okay. What about the -- the stamps demo,                      8 going back to that, did the stamps demo return a                      9 set number of results for each query?</p> <p>10 For example, was it always the original                      11 image and 11 results?</p> <p>12 A. Again, the output -- the number of                      13 results output was probably a parameterized                      14 option -- option, and I don't recall having text                      15 ability on the stamp demo.</p> <p>16 Q. So you think that the user may have been                      17 able to indicate to the QBIC system how many                      18 results he wanted to see?</p> <p>19 A. The user could configure the -- the GUI                      20 to display a certain number of results.</p>

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		<p>Flickner Depo at 201-202:</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p> <p>1 with -- where you already -- you had already seeked</p> <p>2 to the -- the point of the -- of the match.</p> <p>3 Q. Would it return the same video as the</p> <p>4 query video?</p> <p>5 A. It would -- it would return snippets, as</p> <p>6 I recall.</p> <p>7 Q. And snippets of which videos?</p> <p>8 A. Of the video that's -- the -- that the</p> <p>9 database has been created with.</p> <p>Flickner Depo at 131-132:</p> <p>14 Q. An action that the QBIC system would</p> <p>15 automatically take based on the results it would</p> <p>16 return.</p> <p>17 A. So you're saying as you return results,</p> <p>18 you do some post-filtering on the image or the --</p> <p>19 what -- what kind of --</p> <p>20 Q. Perhaps not -- not post-filtering.</p> <p>21 But, for example, displaying a hyperlink</p> <p>22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p> <p>Flickner 8/29/23 Depo at 68-72:</p>

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		<p>22 Q. Okay. And in what form would those                      23 results be displayed to me? For images would they                      24 be displayed as a thumbnail?                      25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those                      2 be displayed to you?                      3 A. It could be as a thumbnail or as a short                      4 video clip or as a single representative frame.                      5 Q. Okay. So they could be -- so for a video,                      6 there's a video that matched the image query of an                      7 r-frame, the results I could get back could include                      8 three things. It could be a still image, it could                      9 be a thumbnail, or it could be an r-frame                      10 representation?                      11 A. R-frame, I think, is representative frame.                      12 So it was a key frame in that video sequence,                      13 summary frame.                      14 Q. Once I ran a query on an r-frame; right?                      15 Well, let's stop there.                      16 If I run a query on still images,                      17 typically the results I would get back are                      18 thumbnails that are most similar to the                      19 characteristics which I queried from the query                      20 image; right?                      21 A. You could get thumbnails back. You could                      22 also get the full-sized image back.                      23 Q. Okay.                      24 A. Thumbnail is a tool for helping you return                      25 lots of results and quickly scan it.</p>

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		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I                  2 have to click on the thumbnail in order to bring up                  3 the full-sized image?                  4 A. You could.                  5 Q. Otherwise I could automatically receive                  6 the full-sized image as part of the result?                  7 A. You could.                  8 Q. Okay. So walk through that process if I'm                  9 using an r-frame of a video. If I do a -- if I run                  10 a query on an r-frame of a video as a -- an image                  11 query, how could I get the results back?                  12 MR. HANSEN: Objection; vague and ambiguous.                  13 BY MR. EDWARDS:                  14 Q. In what form would I get the results back?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: You could get back the still                  17 r-frame, representative frame, you could get back                  18 the thumbnail, or you could get back the entire                  19 video clip that that r-frame represents, a few                  20 frames.                  21 BY MR. EDWARDS:                  22 Q. If I received a thumbnail or the r-frame,                  23 would there be some sort of link I could click on to                  24 get the underlying full video?                  25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic                  2 units initially returned in a video query."                  3 Meaning the r-frames?                  4 A. Correct.                  5 Q. "For example, in a query for shots that                  6 are dominantly red, a set of r-frames will be                  7 displayed. To see the actual video shot, the user                  8 clicks on the displayed r-frame icon."                  9 A. Yep.                  10 Q. And that was one of the ways you were                  11 describing that the results of a r-frame query would                  12 be returned to the user?                  13 A. Right.                  14 Q. Do you know if that was the preferred way                  15 that was used in demos in commercial applications?                  16 MR. HANSEN: Objection; vague and ambiguous,                  17 lacks foundation.                  18 MR. STRAUSSMAN: You can answer.                  19 THE WITNESS: I don't know.                  20 BY MR. EDWARDS:                  21 Q. But, Mr. Flickner, this -- generally this                  22 article represents the status of the QBIC technology                  23 as of the date of this publication, which is                  24 September 1995; is that right?                  25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.                  2 THE WITNESS: As I recall -- I'm not sure                  3 definitely, but, yes, this is -- you could do that.                  4 BY MR. EDWARDS:                  5 Q. So let's go to page IBM 898.                  6 So if you'll take -- just read that                  7 paragraph that starts with the header                  8 "Representative Frame Generation."                  9 MR. STRAUSSMAN: And if you need to read                  10 anything else to put it in context, feel free to do                  11 so.                  12 THE WITNESS: Okay.                  13 (Witness reviews document.)                  14 THE WITNESS: So what was your question, again?                  15 BY MR. EDWARDS:                  16 Q. If you go to the sentence that says,                  17 "First" -- it's the second sentence in that                  18 paragraph. It says, "First, during database                  19 population, r-frames are treated as still images."                  20 See that?                  21 A. Yeah.                  22 Q. And that's what you told me earlier;                  23 correct?                  24 A. Yeah.                  25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --                  2 Q. Okay.                  3 A. -- there's an editorial process.                  4 Q. Say that last part?                  5 A. There's an editorial process. You submit                  6 it, they edit and make changes and eventually it                  7 appears.                  8 Q. Right. So what you're saying is there's                  9 some lag between the time that you wrote the article                  10 and the time it was published?                  11 A. Yeah.                  12 Q. So this article -- but this article                  13 represents the state of the QBIC technology at least                  14 as of September 1995?                  15 A. Yeah. Yes.                  16 Q. And then let's go to IBM 900.                  17 And take your time to orient yourself on                  18 that page, but what I really want to ask you about                  19 is the last paragraph on the left-hand column going                  20 up to the top of the right-hand column.                  21 A. Yep.                  22 Q. So it says this paper describes [as read],                  23 "a prototype system that uses image and video                  24 content as the basis for retrievals."                  25 Is that right?</p>

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		<p><i>Id.</i> at 129–131:</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321:</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p> <p><i>Id.</i> at 305:</p>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>7 So these articles describe various</p> <p>8 features of various versions of QBIC; right?</p> <p>9 A. Correct.</p> <p>10 Q. Do they describe any features -- does the</p> <p>11 demo you operated include any features that weren't</p> <p>12 described in these articles?</p> <p>13 A. That weren't described in the articles?</p> <p>14 No.</p> <p><i>Id.</i> at 35:</p> <p>6 Q. Okay. And the analytics that you're</p> <p>7 talking about, where you extract these characters</p> <p>8 from the image, that is -- those run on both the</p> <p>9 query image and the images that are stored in the</p> <p>10 database; is that right?</p> <p>11 A. Yeah. We call them features.</p> <p>12 Q. Features. Okay.</p> <p>13 So when you say "features," you're talking</p> <p>14 about the features that we talked about before:</p> <p>15 Color, texture, shape, sketch?</p> <p>16 A. For example.</p> <p>17 Q. Any other ones you can think of?</p> <p>18 A. Nothing comes to mind.</p> <p>19 Q. But when you refer to features they at</p> <p>20 least include those four; is that correct?</p> <p>21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313–317:</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1     A. Correct.</p> <p>2     Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5     A. I have them here.</p> <p>6     MR. STRAUSSMAN: Okay.</p> <p>7     THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9     Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12    A. Yes.</p> <p>13    Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16    MR. HANSEN: Objection; vague and ambiguous.</p> <p>17    THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19    Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23    A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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		<p><i>See also</i> Flickner Depo at 25-26, 50, 54-55, 209-210</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**Exhibit C-31**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, CoolTown was made, known or used by others in the United States no later than July 10, 2000. *See generally* T. Kindberg et al., A Web-Based Nomadic Computing System; J. Barton et al., The Cooltown User Experience; cooltown developer’s network, coolbase overview; cooltown developer’s network, people, places, things: web presence for the real world. CoolTown is available as prior art at least under 35 U.S.C. § 102(a). On information and belief, HP was using CoolTown and made it available to the public in the United States by releasing the website on the Internet (and accessible to U.S. users) by at least March 2000, making the software available on the HP website by March 2000, and making available on the Internet (and accessible to U.S. users) the open source code, which reflects the functionality of CoolTown by at least March 2000. *See e.g.*, HP000043–044; HP000045–046; HP000060–061; *see also* <https://www.zdnet.com/article/hp-brings-open-source-to-cooltown/>. Therefore, HP Cooltown was at least known, used, and/or sold to the public by at least 2000. On information and belief, CoolTown is also available as prior art under 102(g). BofA is diligently investigating CoolTown and will supplement with additional information, if necessary.

As shown in the chart below, CoolTown anticipates asserted claim 1 of the ’036 Patent. To the extent CoolTown is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent CoolTown is found not to anticipate any asserted claims or claim elements of the ’036 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products

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infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

**1. Claim 1**

Element	'036 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A content provisioning system comprising:	<p>CoolTown discloses a content provisioning system.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p style="padding-left: 40px;">The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1</p> <p><b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology, wireless networks and portable devices. This paper describes how CoolTown ties web resources to physical objects and places, and how users interact with resources using the information appliances they carry, from laptops to smart watches. Enabling the automatic discovery of URLs from our physical surroundings, and using localized web servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we leverage device connectivity to support communication services.</p>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Coolbase<sup>1</sup> Overview at 1                      coolbase overview</p> <p>The coolbase platform consists of several sub-projects which combine to form a coherent framework for bringing together all the elements necessary to build a cooltown service or application. These sub-projects include software for enabling smart, connected web devices; software for representing people, places and things and their contextual relationships; some supporting hardware and software elements; and sample applications that illustrate the use of these various elements.</p>
[1A]	<p>a target database storing known targets of different types and recognition parameters associated with the known targets;</p>	<p>CoolTown discloses a target database storing known targets of barcodes.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a 'glyph' [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p>

<sup>1</sup> See <https://web.archive.org/web/20011030090650/http://cooltown.hp.com/dev/coolbase-overview.asp>

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		<p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b>                      Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b>                      To get an idea of some of the issues in defining place contexts, imagine that Acme Software Inc. sets up a stand at the Wireless Web World exhibition (Figure 4). Acme has to define its own context within the exhibition, which it uses to provide information, printing, purchasing and other services to users who walk up to the stand. Visitors must be able to discover the Acme context when they walk up, distinguish it from that of neighboring exhibits, and, through their devices, these visitors must be able to browse and access the resources that Acme provides within that context. We are mainly interested here in resources that are based around the physical entities found at the exhibition stand. When the visitor reads a barcode attached, say, to a printer or a guest book on display, they are automatically shown the Acme web page offering them a service connected with it.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b>  <b>Place Managers</b>                      Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place's web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p><i>A place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 8</p>

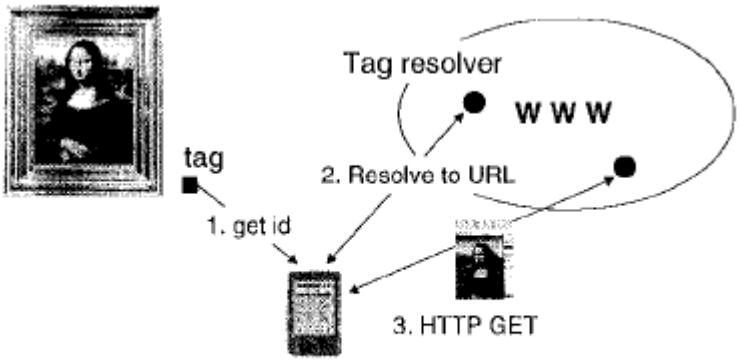
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		<p><b>Indirect Sensing</b></p> <p>In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s Web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding Web page. Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p> <p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings’ URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore’s web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user’s client device obtains a value that it has to look up</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>  <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p>

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		<p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	an identification platform coupled with the target	CoolTown discloses an identification platform coupled with the target database.

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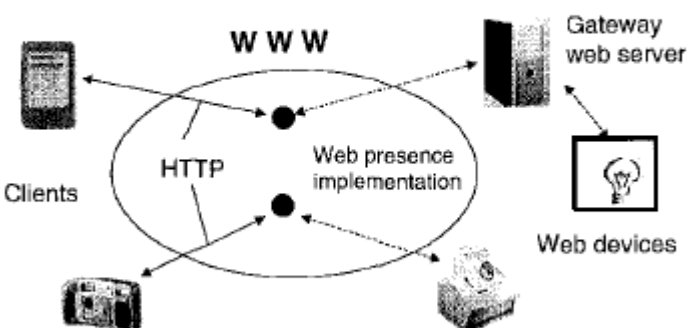
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Element	'036 Claim Recitation	Exemplary Citations in Reference
	<p>database, and that</p>	<p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p> <p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p>



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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p>

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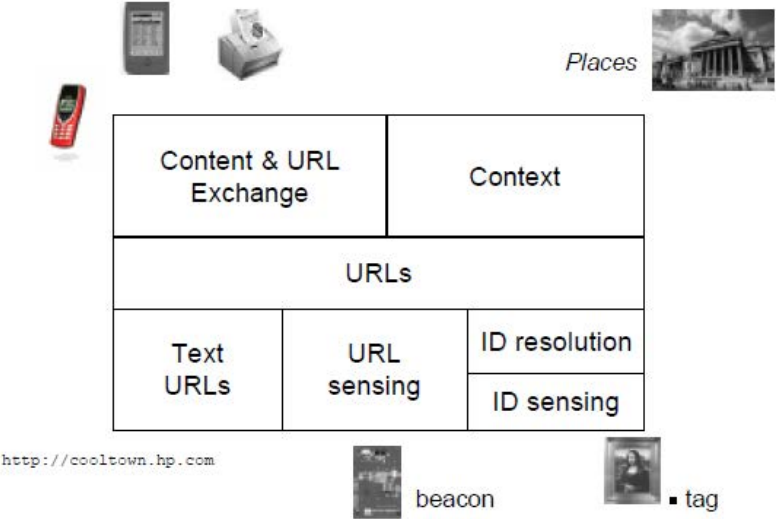
Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1  <b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology networks and portable devices. This paper describes how CoolTown ties web resources to physical of places, and how users interact with resources using the information appliances they carry, from laptop watches. Enabling the automatic discovery of URLs from our physical surroundings, and using local servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we device connectivity to support communication services.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</p> <p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the “web server” level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like a barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic users carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p>



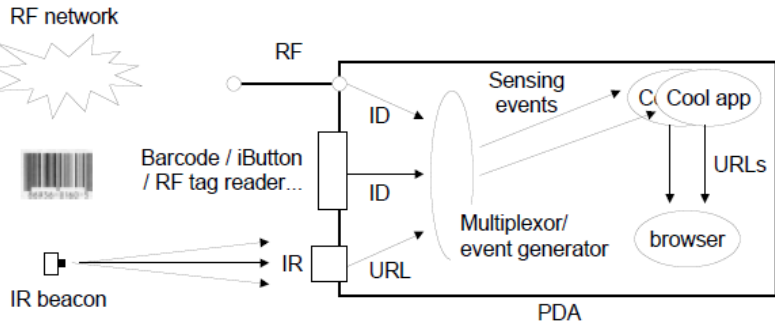
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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Present-day users of portable wireless devices view them as either adjuncts to larger desktop or workstation computers or as portable communications devices (phones or for e-mail). We view them as portable viewers of web pages and as sources of content, or as clipboards for URLs pointing to discovered content. Then we add support for obtaining location-dependent web pages and for moving content between mobile and fixed but online devices. Figure 2 shows how this support is organized.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p>  <p>The diagram illustrates the component relationships in a web-based nomadic computing system. At the top, there are icons for a mobile phone, a laptop, and a keyboard. To the right is a 'Places' image showing a classical building. Below these is a central flow diagram. A box labeled 'URLs' is connected to two boxes: 'Content &amp; URL Exchange' and 'Context'. Below the 'URLs' box are four boxes: 'Text URLs', 'URL sensing', 'ID resolution', and 'ID sensing'. Arrows indicate the flow of information from these boxes to the 'URLs' box. At the bottom, there is a URL 'http://cooltown.hp.com', a 'beacon' icon, and a 'tag' icon with a small square next to it.</p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition.</i> The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b></p> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p>

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		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 8                      To accomplish direct content transfer we need only have a simple push interaction: the content source opens a connection to the sink and writes the content (See Figure 5a). The only agreement we need between sources and sinks is the format of the data. Many imaging devices support JPEG format: it serves as the common format for images today. Since devices may use other common formats and since formats do evolve, effective interaction requires some introductory content preceding the data that identifies its format. The format of this introductory or</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p> <p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p>

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		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.i]	<p>communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target;</p>	<p>CoolTown discloses an identification platform coupled with the target database that communicates with a mobile device capable of acquiring a digital representation of a scene containing at least a portion of a target.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1  <b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology networks and portable devices. This paper describes how CoolTown ties web resources to physical places, and how users interact with resources using the information appliances they carry, from laptop watches. Enabling the automatic discovery of URLs from our physical surroundings, and using local servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we device connectivity to support communication services.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p>

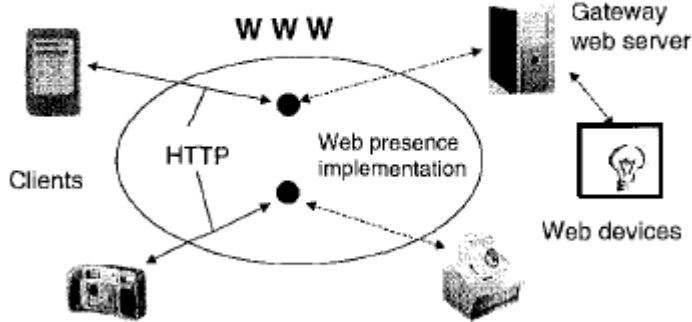
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</p> <p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the "web server" level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic user-carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p> <p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the</p>



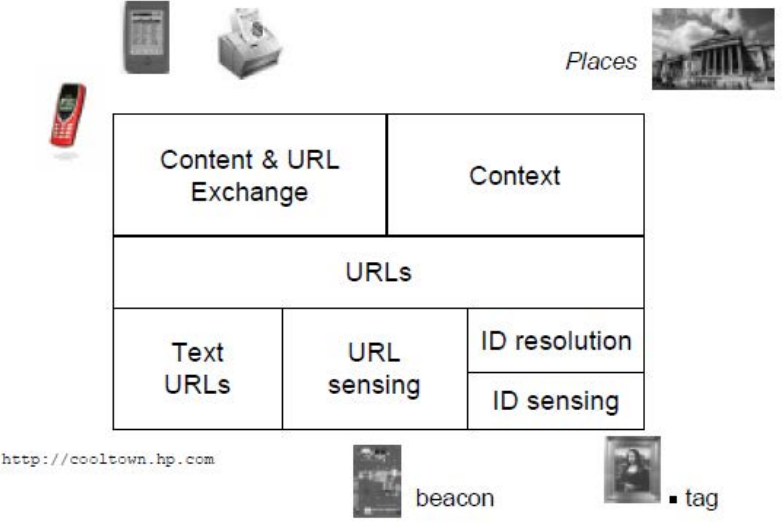
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p>The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</p>

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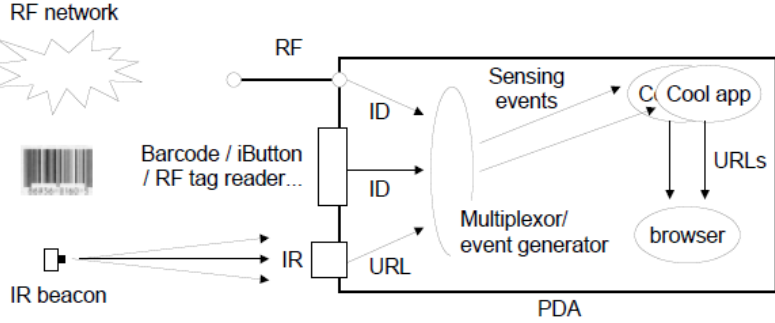
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the “web server” level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like a barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic users carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p>  <p>The diagram illustrates the component relationships of the CoolTown system. At the top, there are icons for a PDA, a cellular phone, and a camera. Below these is a table with two columns: 'Content &amp; URL Exchange' and 'Context'. Below this table is a row labeled 'URLs'. From the 'URLs' row, three arrows point to a second table with three columns: 'Text URLs', 'URL sensing', and 'ID resolution'. Below the 'ID resolution' column, there is a sub-row labeled 'ID sensing'. To the right of the diagram, there is a small image of a classical building labeled 'Places'. Below the diagram, there is a URL 'http://cooltown.hp.com', a 'beacon' icon, and a 'tag' icon.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



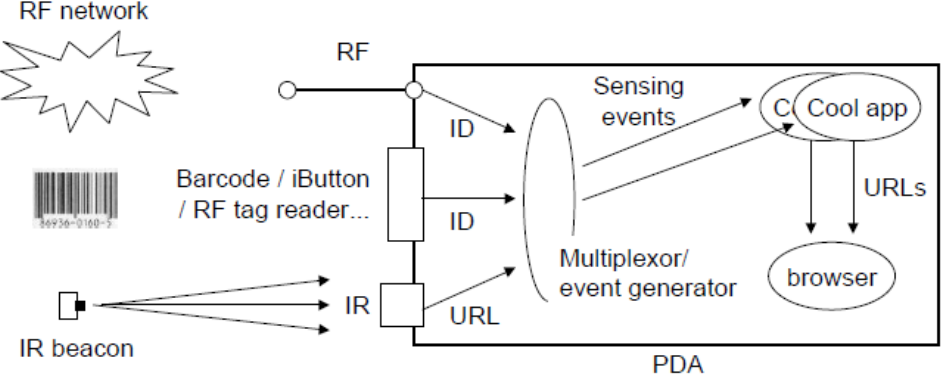
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.ii]	receives the digital representation from the mobile device; and	<p>CoolTown discloses an identification platform coupled with the target database that receives the digital representation from the mobile device.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</p>

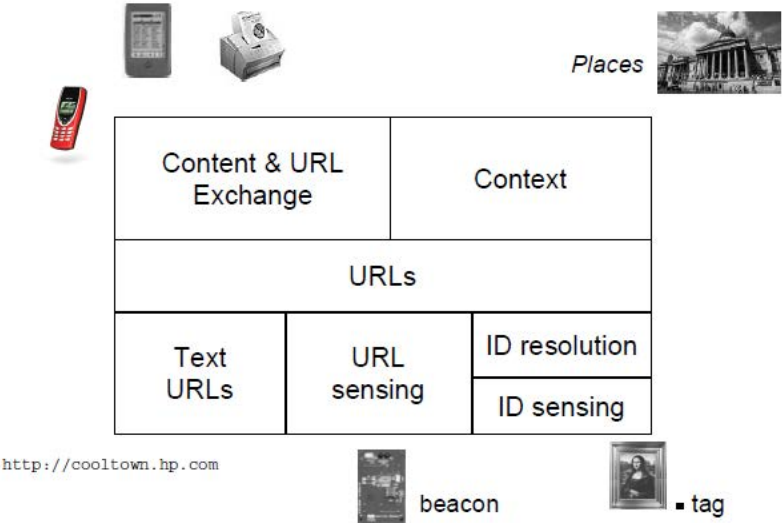
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		<p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the "web server" level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic user carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b>              In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b>              Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b></p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a 'glyph' [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.iii]	recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets; and	<p>CoolTown discloses recognizes the target as a known target from the target database based on comparing parameters derived from the digital representation to recognition parameters associated with the known targets.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a 'glyph' [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b>          Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b>          To get an idea of some of the issues in defining place contexts, imagine that Acme Software Inc. sets up a stand at the Wireless Web World exhibition (Figure 4). Acme has to define its own context within the exhibition, which it uses to provide information, printing, purchasing and other services to users who walk up to the stand. Visitors must be able to discover the Acme context when they walk up, distinguish it from that of neighboring exhibits, and, through their devices, these visitors must be able to browse and access the resources that Acme provides within that context. We are mainly interested here in resources that are based around the physical entities found at the exhibition stand. When the visitor reads a barcode attached, say, to a printer or a guest book on display, they are automatically shown the Acme web page offering them a service connected with it.</p>

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		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The ‘local resolver’ that we described in the previous section is an example of a resource that can be looked up automatically from the place’s context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 8</p> <p><b>Indirect Sensing</b></p> <p>In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s Web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding Web page.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>



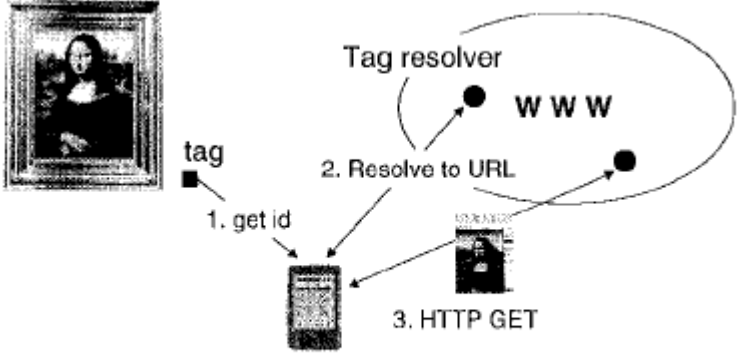
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		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting's tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>



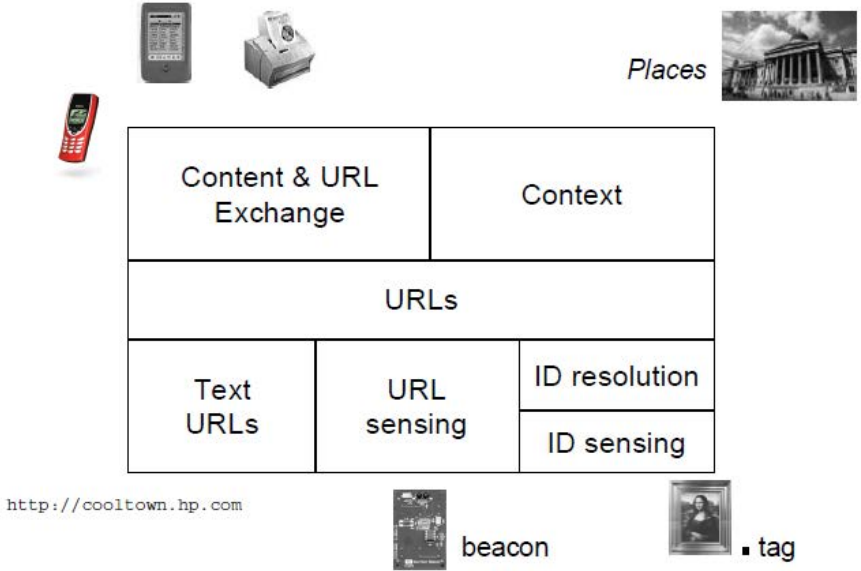
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	<p>a content service coupled with the identification platform, and that:</p>	<p>CoolTown discloses a content service coupled with the identification platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>

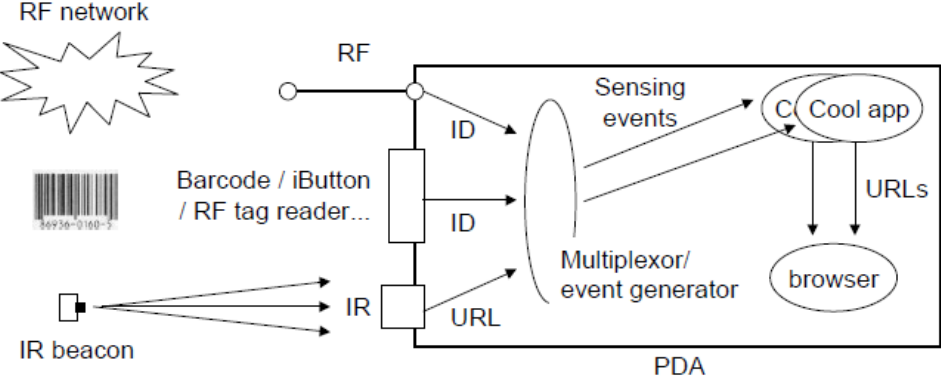
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p> <p>The critical element of the system is the movement of URLs acting as Internet pointers. Components in the lower parts of the diagram provide addresses used in the upper layers. Keyboards and beacons provide URLs directly; tags on objects in the physical world are “resolved” to produce URLs. This layer is discussed in Section 3. The resolution of identifiers into URLs is context dependent and some of the URLs sensed in the environment lead to web servers</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4–5</b></p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local library. It could lead to a catalog entry if resolved with the user's favorite bookseller's resolver. Or it could lead to the publisher's description of the book if resolved at the publisher's resolver.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p> <p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place's context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>

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		<p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or</p>

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		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025-34) (HP000025-34) at 23</p>

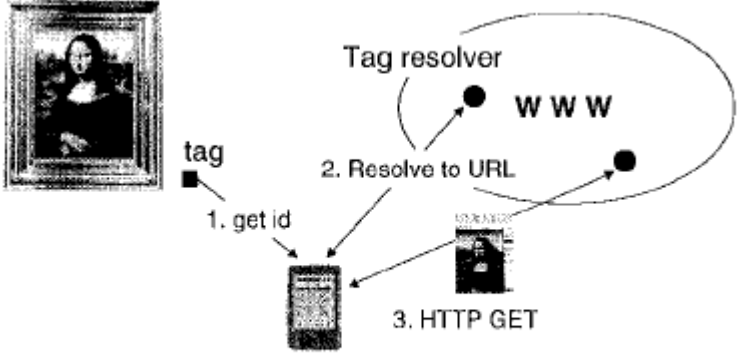
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		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting's tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>The Cooltown User Experience (HP000088 – 093) at 3</p>



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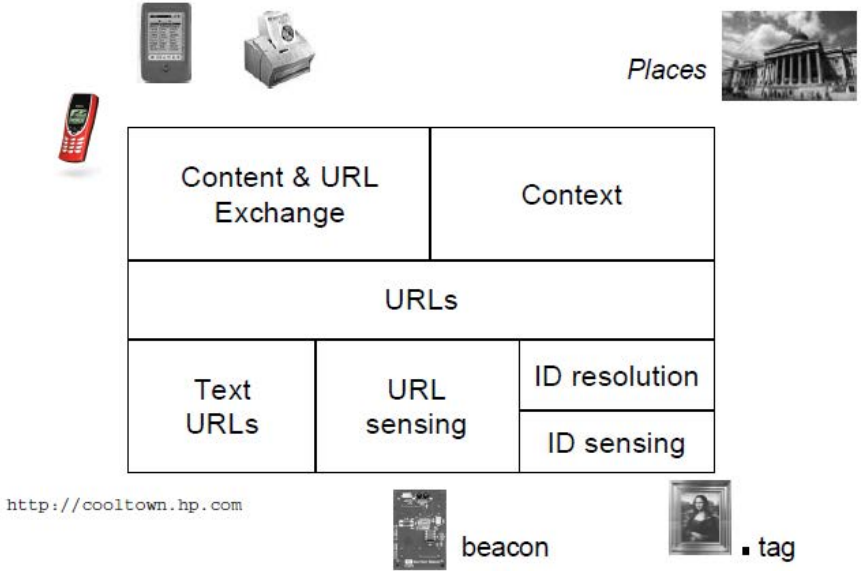
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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>Context</b></p> <p>A web-based approach allows a wide spectrum of context-dependent applications for nomadic users of handheld devices. As web-clients, the handheld devices need not be bound to particular applications or particular environments. As users interact with their environment, their devices contact servers and download pages. The particular server that they contact depends upon their physical context and the pages they download represent context for their next interactions.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.i]	obtains content information related to the known target; and	<p>CoolTown discloses [a content service coupled with the identification platform] that obtains content information related to the known target.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>



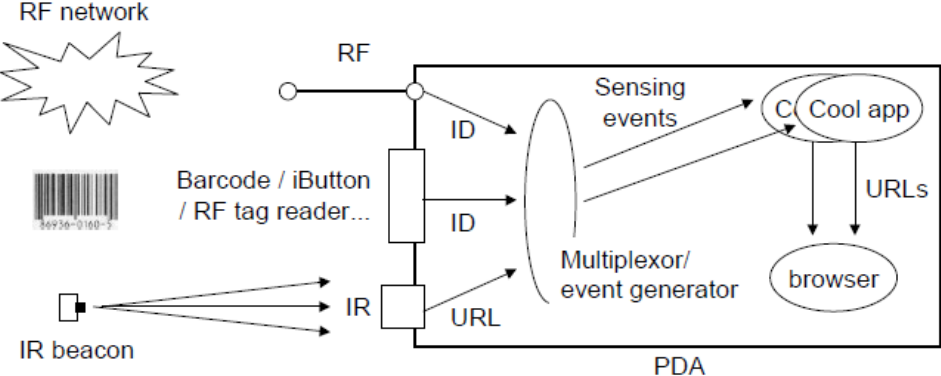
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		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p> <p>The critical element of the system is the movement of URLs acting as Internet pointers. Components in the lower parts of the diagram provide addresses used in the upper layers. Keyboards and beacons provide URLs directly; tags on objects in the physical world are “resolved” to produce URLs. This layer is discussed in Section 3. The resolution of identifiers into URLs is context dependent and some of the URLs sensed in the environment lead to web servers</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025-34) (HP000025-34) at 23</p>

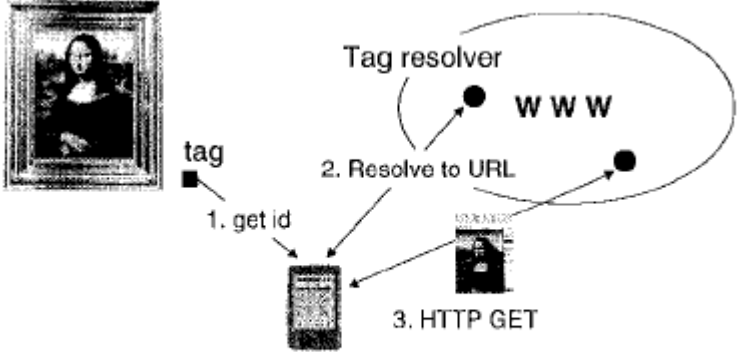
*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

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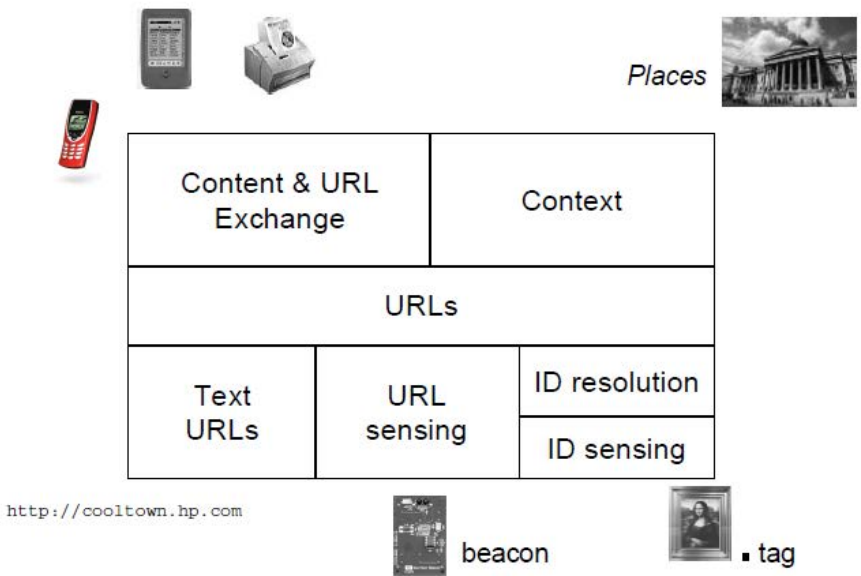
Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C.ii]	<p>sends the content information to at least one of the identification platform and the mobile device.</p>	<p>CoolTown discloses [a content service coupled with the identification platform] that sends the content information to at least one of the identification platform and the mobile device.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>



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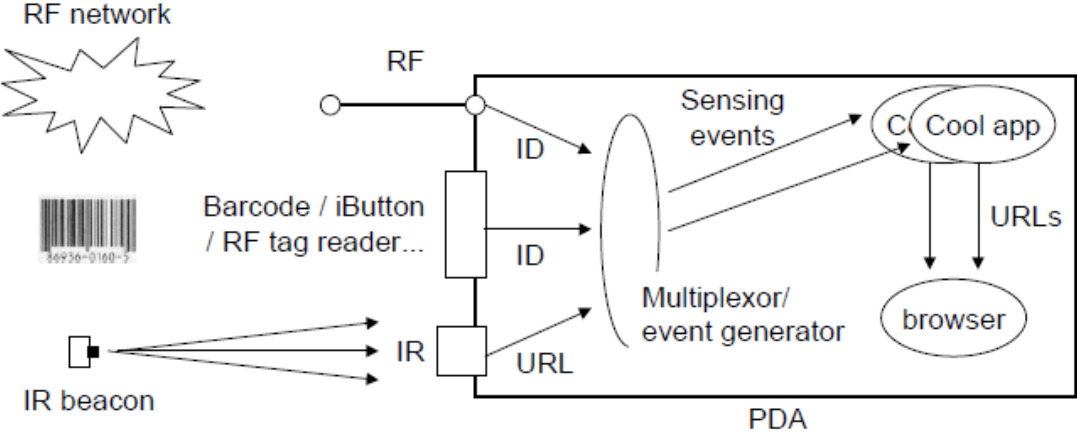
Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System ("CoolTown")

Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

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		<p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 5</p> <p><b>2.4 The Common User Experience in Cooltown.</b></p> <p>The three examples above explore various aspects of web presence but they also show a common theme. The typical user experience we seek with web presence is that of collecting links to points of web presence as they are encountered them in the physical world. One could even think of the physical world as a web page, with links at certain physical points. Of course the links are URLs presented on the user’s client device and the result of clicking on such a link will be a real web page, delivered to the user’s screen. The user can then travel through the virtual space of the web page with normal Web techniques or the user can travel through the physical space to find a different point of web presence. The user understands URLs as pointers to meta-information about objects at the same level that users of Web browsers now understand URLs as bookmarks for Web content. While this physical/virtual browsing is a typical scenario, we imagine other usage scenarios for web present things, in the same way that the Web supports many usage scenarios in addition to Web browsing.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

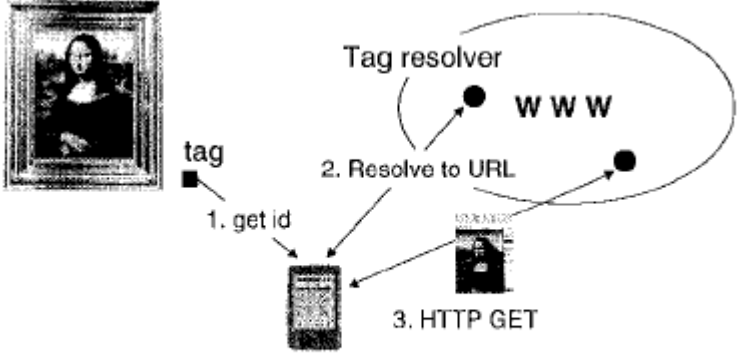
*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'036 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 21</p>

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p><b>2.4 The Common User Experience in Cooltown.</b></p> <p>The three examples above explore various aspects of web presence but they also show a common theme. The typical user experience we seek with web presence is that of collecting links to points of web presence as they are encountered them in the physical world. One could even think of the physical world as a web page, with links at certain physical points. Of course the links are URLs presented on the user’s client device and the result of clicking on such a link will be a real web page, delivered to the user’s screen. The user can then travel through the virtual space of the web page with normal Web techniques or the user can travel through the physical space to find a different point of web presence. The user understands URLs as pointers to meta-information about objects at the same level that users of Web browsers now understand URLs as bookmarks for Web content. While this physical/virtual browsing is a typical scenario, we imagine other usage scenarios for web present things, in the same way that the Web supports many usage scenarios in addition to Web browsing.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 9</p>

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

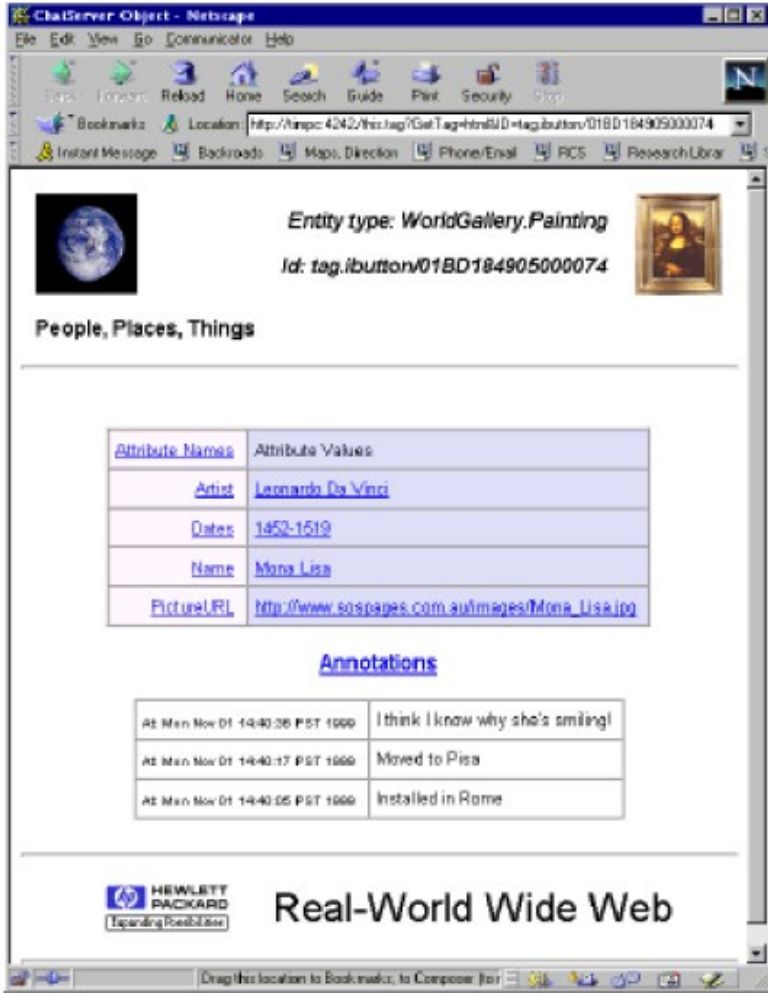
Element	'036 Claim Recitation	Exemplary Citations in Reference																
		 <p>The screenshot shows a Netscape browser window displaying a web page for the Mona Lisa. The browser's address bar shows the URL: <a href="http://nmapc:4242/vis/tag/GetTag.html?ID=tag.ibutton01BD184905000074">http://nmapc:4242/vis/tag/GetTag.html?ID=tag.ibutton01BD184905000074</a>. The page content includes a globe icon on the left and a small image of the Mona Lisa on the right. The text reads: "Entity type: WorldGallery.Painting" and "Id: tag.ibutton01BD184905000074". Below this is the heading "People, Places, Things". A table lists attributes for the painting:</p> <table border="1"> <thead> <tr> <th>Attribute Names</th> <th>Attribute Values</th> </tr> </thead> <tbody> <tr> <td>Artist</td> <td><a href="#">Leonardo Da Vinci</a></td> </tr> <tr> <td>Dates</td> <td><a href="#">1452-1519</a></td> </tr> <tr> <td>Name</td> <td><a href="#">Mona Lisa</a></td> </tr> <tr> <td>PictureURL</td> <td><a href="http://www.sospages.com.au/images/Mona_Lisa.jpg">http://www.sospages.com.au/images/Mona_Lisa.jpg</a></td> </tr> </tbody> </table> <p>Below the table is the heading "Annotations" and a list of three entries:</p> <table border="1"> <tbody> <tr> <td>At Mon Nov 01 14:40:06 PST 1999</td> <td>I think I know why she's smiling!</td> </tr> <tr> <td>At Mon Nov 01 14:40:17 PST 1999</td> <td>Moved to Pisa</td> </tr> <tr> <td>At Mon Nov 01 14:40:06 PST 1999</td> <td>Installed in Rome</td> </tr> </tbody> </table> <p>At the bottom of the page, there is a Hewlett-Packard logo with the text "Expanding Possibilities" and the slogan "Real-World Wide Web".</p>	Attribute Names	Attribute Values	Artist	<a href="#">Leonardo Da Vinci</a>	Dates	<a href="#">1452-1519</a>	Name	<a href="#">Mona Lisa</a>	PictureURL	<a href="http://www.sospages.com.au/images/Mona_Lisa.jpg">http://www.sospages.com.au/images/Mona_Lisa.jpg</a>	At Mon Nov 01 14:40:06 PST 1999	I think I know why she's smiling!	At Mon Nov 01 14:40:17 PST 1999	Moved to Pisa	At Mon Nov 01 14:40:06 PST 1999	Installed in Rome
Attribute Names	Attribute Values																	
Artist	<a href="#">Leonardo Da Vinci</a>																	
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PictureURL	<a href="http://www.sospages.com.au/images/Mona_Lisa.jpg">http://www.sospages.com.au/images/Mona_Lisa.jpg</a>																	
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At Mon Nov 01 14:40:17 PST 1999	Moved to Pisa																	
At Mon Nov 01 14:40:06 PST 1999	Installed in Rome																	

Figure 5. A Web presence for *Mona Lisa*.

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Invalidity Chart for U.S. Patent 8,478,036 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'036 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>



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U.S. Patent No. 6,947,571 to Rhoads (“Rhoads”)

### **Exhibit E-3**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Rhoads was filed on May 15, 2000, claiming the priority date of May 19, 1999. Rhoads published at least as of September 20, 2005, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Rhoads anticipates asserted claims 18, 27, 29, and 31 of the ’252 Patent. To the extent Rhoads is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Rhoads is found not to anticipate any asserted claims or claim elements of the ’252 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.

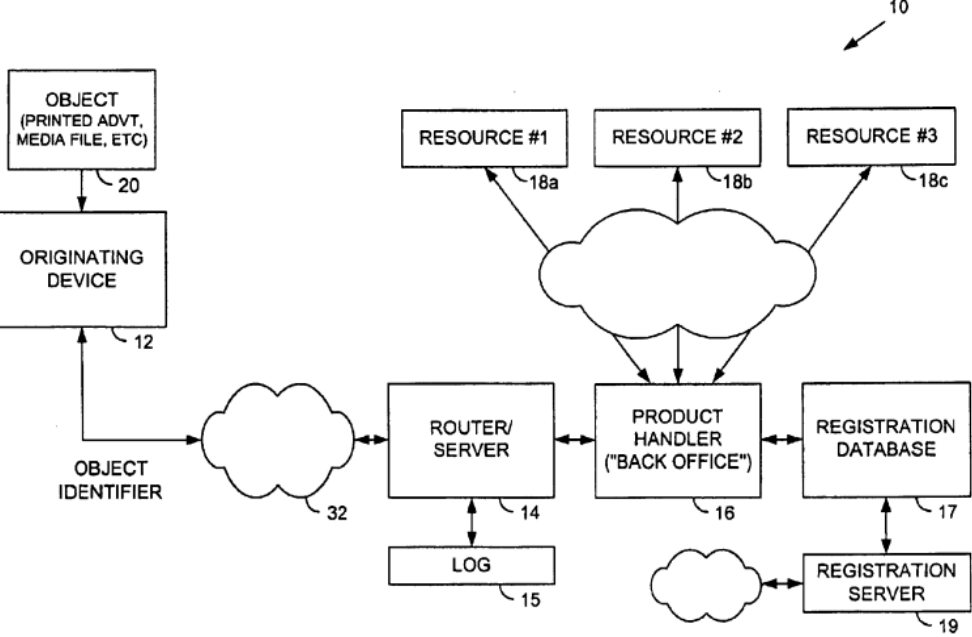


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**1. Claim 18**

Element	'252 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for retrieving information from image processing, the method comprising:	<p>Rhoads at Abstract</p> <ul style="list-style-type: none"> <li>• “A cell phone is equipped with a 2D optical sensor, enabling a variety of applications. For example, such a phone may also be provided with a digital watermark decoder, permitting decoding of steganographic data on imaged objects. Movement of a phone may be inferred by sensing movement of an imaged pattern across the optical sensor's field of view, allowing use of the phone as a gestural input device through which a user can signal instructions to a computer-based process. A variety of other arrangements by which electronic devices can interact with the physical world are also detailed, e.g., involving sensing and responding to digital watermarks, bar codes, RFIDs, etc.”</li> </ul> <p>Rhoads at 5:54-56.</p> <ul style="list-style-type: none"> <li>• “Basically, the technology detailed in this disclosure may be regarded as enhanced systems by which users can interact with computer-based devices.”</li> </ul> <p>Rhoads at 9:35-41</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.”</li> </ul> <p>Rhoads at Fig. 2 (and accompanying description)</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 49:15-18</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 2, a system 10 according to the exemplary embodiment includes an originating device 12, a router/server 14, a product handler 16, a registration database 17, and one or more remote resources 18.”</li> </ul> <p>Rhoads at 50:21-26</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).”</li> </ul>

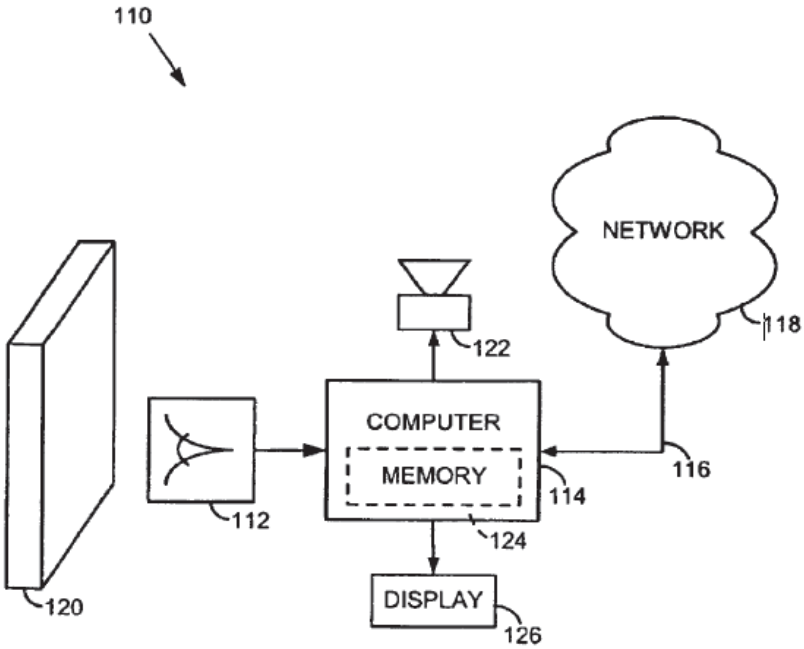
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 U.S. Patent No. 6,947,571 to Rhoads (“Rhoads”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
[1A]	providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image to an image processing platform;	<p>Rhoads discloses providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image to an image processing platform.</p> <p>Rhoads at Fig. 2 (and accompanying description)</p> <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 3:41–51</p> <ul style="list-style-type: none"> <li>“According to another aspect, the invention includes a promotional method comprising: (a) presenting an object within the field of view of an optical sensor device, the object being selected from the list consisting of a retail product, packaging for a retail product, or printed advertising; (b) acquiring optical data corresponding to the object; (c) decoding plural-bit digital data from the optical data; (d) submitting at least some of said decoded data to a</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>remote computer; and (e) determining at the remote computer whether a prize should be awarded in response to submission of said decoded data.”</p> <p>Rhoads at 7:24-42</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</li> </ul> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28.”</p> <p>Rhoads at Fig. 11</p>

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 Invalidity Chart for U.S. Patent 7,899,252 based on  
 U.S. Patent No. 6,947,571 to Rhoads (“Rhoads”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 11</b></p> <p>Rhoads at 7:13-29</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 11, a basic embodiment 110 of the present technology includes an optical sensor 112, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed</li> </ul>

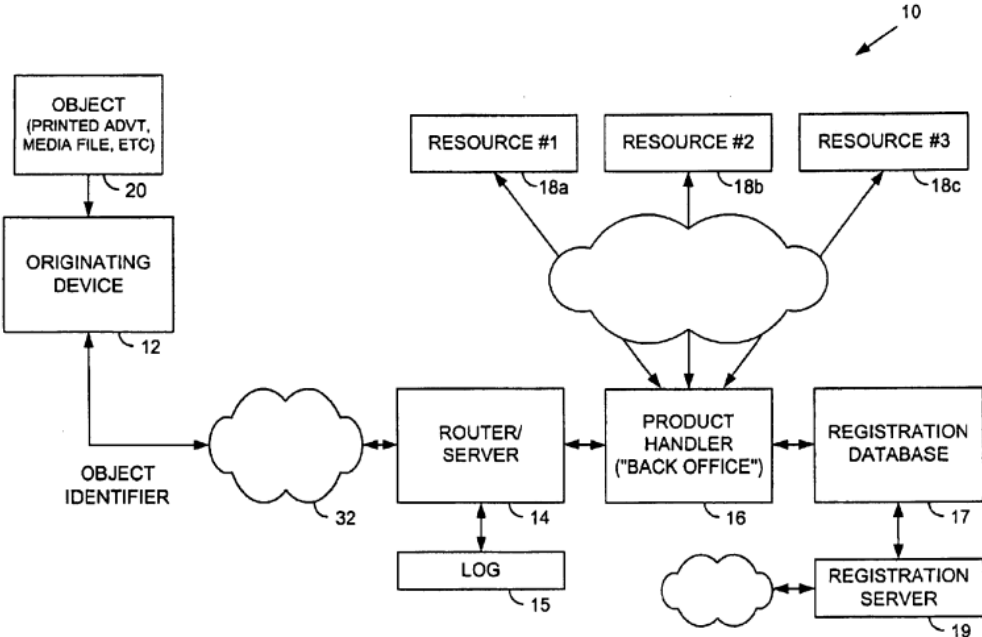
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		<p>by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110— data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</p> <p>Rhoads 8:66 – 9:12</p> <ul style="list-style-type: none"> <li>• “In still other embodiments, the camera (or other sensor) can be equipped with one or more auxiliary fixed-focus lenses that can be selectively used, depending on the particular application. Some such embodiments have a first fixed focused lens that always overlies the sensor, with which one or more auxiliary lenses can be optically cascaded (e.g., by hinge or slide arrangements). Such arrangements are desirable, e.g., when a camera is not a dedicated Bedoop sensor but also performs other imaging tasks. When the camera is to be used for Bedoop, the auxiliary lens is positioned (e.g., flipped into) place, changing the focal length of the first lens (which may be unsuitably long for Bedoop purposes, such as infinity) to an appropriate Bedoop imaging range (such as one foot).”</li> </ul> <p>Rhoads at 17:46–54</p> <ul style="list-style-type: none"> <li>• “The building can be provided with an image sensor (such as a video camera or the like), an associated Bedoop. detection system, and the proximity detector. When a user wearing the badge approaches, the proximity detector signals the camera to capture image data. The Bedoop detection system identifies the badge photograph (e.g., by clues as are described in the prior applications, or without such aids), captures optical data, and decodes same to extract the steganographically-embedded data hidden therein.”</li> </ul>

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		<p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"> <li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	configuring the image processing platform to receive the data relating to the image and to conduct image processing, including:	<p>Rhoads discloses configuring the image processing platform to receive the data relating to the image and to conduct image processing.</p> <p>Rhoads at Fig. 2 (including accompanying description)</p>

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		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 3:52–60</p> <ul style="list-style-type: none"> <li>“According to another aspect, the invention includes a method of interacting with a magazine using a computer, the computer including an internet web browser, the method including: (a) providing a peripheral device having a sensor; (b) positioning the peripheral device adjacent a first advertisement in the magazine to direct the web browser to a first internet address; and (c) positioning the peripheral device adjacent a second advertisement in the magazine to direct the web browser to a second internet address.”</li> </ul> <p>Rhoads at 49:15–35</p>



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		<ul style="list-style-type: none"> <li>• “Referring to FIG. 2, a system 10 according to the exemplary embodiment includes an originating device 12, a router/server 14, a product handler 16, a registration database 17, and one or more remote resources 18.</li> </ul> <p>The originating device 12 can take many different forms, e.g., a cell phone, a personal digital assistant (e.g., a Palm Pilot), a personal computer, a barcode scanning system, etc. For expository convenience, the embodiment is described with reference to a personal computer for device 12.</p> <p>Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</p> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object....”</p> <p>Rhoads at 10:22–30 “Some embodiments filter the image data at some point in the process to aid in ultimate Bedoop data extraction. One use of such filtering is to mitigate image data artifacts due to the particular optical sensor. For example, CCD arrays have regularly-spaced sensors that sample the optical image at uniformly spaced discrete points. This discrete sampling effects a transformation of the image data, leading to certain image artifacts. An appropriately configured filter can reduce some of these artifacts.”</p> <p>Rhoads at 19:61 – 20:15</p> <ul style="list-style-type: none"> <li>• “The coffee cup is an example of a non-planar object. Another is soft drink</li> </ul>

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		<p>cans. Special issues can arise when encoding and decoding markings on such objects. For example, when sensing such an object with a camera or the like, part of the image will be out of focus due to differing distances from the camera to different parts of the can surface.</p> <p>While parts of an image sensed from a non-planar object, such as a can, may be out of focus, they still convey useful image data. The out of focus areas are just blurred—as if filtered by a low pass filter. But to make use of this information, a further complication must first be addressed: warping.</p> <p>When viewed from a camera, the planar artwork with which the can is wrapped becomes warped. Portions of the can nearest the camera appear at a nominal full scale, while areas successively further around the can curvature (as viewed from the camera) appear progressively more and more spatially compressed. Regardless of the watermarking technology being employed, the physical warp of the can's surface is likewise manifested as a warping of the encoded watermark data.”</p> <p>Rhoads at 38:1 – 19</p> <ul style="list-style-type: none"> <li>• “Post-It® Notes                      Pads of Post-It® notes, or other pads of paper, can be marked by the manufacturer (either by texturing, watermarked tinting, ink-jet spattering, etc.) to convey steganographic data (e.g., Bedoop data). When such a note is presented to a Bedoop system, the system may launch an application that stores a snapshot of the note. More particularly, the application may mask the note-portion of the image data from the other image data, virtually re-map it to a rectangular format of standardized pixel dimensions, JPEG-compress the resulting image, and store it in a particular computer subdirectory with a name indicating the date of image acquisition, together with the color and/or size of the note. (These latter two data may be</li> </ul>

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		<p>indicated by data included in the Bedoop payload.) If the color of the note is indicated by digital data (e.g., in the file name), then the image itself may be stored in grey-scale. When later recalled for display, the white image background can be flooded with color in accordance with the digital color data.”</p> <p>Rhoads at 42:1–12</p> <ul style="list-style-type: none"> <li>• “The optical data collected by the sensor can be processed within the peripheral's processor to extract the steganographically encoded binary Bedoop data therefrom. Or this processing burden can be undertaken by the associated computer system, with the peripheral simply processing and formatting the raw sensor data into sequential frames of image data to be output to that system.</li> </ul> <p>While scanning peripherals of the type described above are typically wired to an associated host system, wireless links (e.g., radio, infrared, ultrasonic, etc.) can of course be used, freeing the user from the constraint imposed by the cable.”</p> <p>Rhoads at 45:19–55</p> <ul style="list-style-type: none"> <li>• “Bedoop technology can be integrated into portable telecommunication terminals, such as cell phones (manufactured, e.g., by Motorola, Nokia, Qualcomm, and others). Such a phone can be equipped with a 1D or 2D image sensor, the output of which is applied to Bedoop decoding circuitry within the phone. This decoding circuitry can be the phone's main CPU, or can be a processing circuit dedicated to Bedoop functionality. (In this as in other embodiments, the decoding can be effected by dedicated hardware, by decoding software executing on a general purpose CPU, etc.)</li> </ul> <p>Cell phones are already equipped with numerous features that make them</p>

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		<p>well suited for Bedoop operation. One is that cell phones typically include an LCD or similar screen for display of textual or graphic information, and additionally include buttons or other controls for selecting among menu options presented on the screen (e.g., by moving a cursor). Moreover, cell phones naturally include both audio input and output devices (i.e., microphone and speaker). Still further, the protocol by which cell phones transmit data includes data identifying the phone, so that such data need not be separately encoded. And finally, cell phones obviously provide ready links to remote computer systems. Collectively, these capabilities rival those of the most fully-equipped desktop computer system. Thus, essentially all of the applications detailed elsewhere in this specification can be implemented using cell phone Bedoop systems</p> <p>As with the other Bedoop systems, when Bedoop data is sensed, the phone can respond to the data locally, or it can forward Same over the cellular network to a remote System (or computer network) for handling.”</p> <p>Rhoads at 46:10–12.</p> <ul style="list-style-type: none"> <li>• “Bedoop decoding function within the phone, in other embodiments the image data can be transmitted from the phone and decoded at a remote location.”</li> </ul> <p>Rhoads at 46:47 – 53</p> <ul style="list-style-type: none"> <li>• “The provision of image sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The screens on such phones can likewise be used for display of incoming image or video data.”</li> </ul>

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		<p>Rhoads at Fig. 3</p> <p><b>FIG. 3</b></p> <p>Rhoads at 45:19–55</p>

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		<ul style="list-style-type: none"> <li>• “Bedoop technology can be integrated into portable telecommunication terminals, such as cell phones (manufactured, e.g., by Motorola, Nokia, Qualcomm, and others). Such a phone can be equipped with a 1D or 2D image sensor, the output of which is applied to Bedoop decoding circuitry within the phone. This decoding circuitry can be the phone's main CPU, or can be a processing circuit dedicated to Bedoop functionality. (In this as in other embodiments, the decoding can be effected by dedicated hardware, by decoding software executing on a general purpose CPU, etc.)</li> </ul> <p>Cell phones are already equipped with numerous features that make them well suited for Bedoop operation. One is that cell phones typically include an LCD or similar screen for display of textual or graphic information, and additionally include buttons or other controls for selecting among menu options presented on the screen (e.g., by moving a cursor). Moreover, cell phones naturally include both audio input and output devices (i.e., microphone and speaker). Still further, the protocol by which cell phones transmit data includes data identifying the phone, so that such data need not be separately encoded. And finally, cell phones obviously provide ready links to remote computer systems. Collectively, these capabilities rival those of the most fully-equipped desktop computer system. Thus, essentially all of the applications detailed elsewhere in this specification can be implemented using cell phone Bedoop systems</p> <p>As with the other Bedoop systems, when Bedoop data is sensed, the phone can respond to the data locally, or it can forward Same over the cellular network to a remote System (or computer network) for handling.”</p> <p>Rhoads at 46:10–12.</p> <ul style="list-style-type: none"> <li>• “Bedoop decoding function within the phone, in other embodiments the image data can be transmitted from the phone and decoded at a remote</li> </ul>

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		<p>location.”</p> <p>Rhoads at 46:47 – 53                      “The provision of image sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The screens on such phones can likewise be used for display of incoming image or video data.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30. Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</li> </ul> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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		<p>FIG. 12</p> <p>Rhoads at 12:23 – 33</p> <ul style="list-style-type: none"> <li>• “Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default</li> </ul>



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		<p>Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar</p>

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		known problems, according to known methods which would yield predictable results.
[1B.i]	operating on the data relating to the image to determine if the image contains one or more recognizable symbols; and	<p>Rhoads discloses operating on the data relating to the image to determine if the image contains one or more recognizable symbols.</p> <p>Rhoads at Abstract</p> <ul style="list-style-type: none"> <li>• “A cell phone is equipped with a 2D optical sensor, enabling a variety of applications. For example, such a phone may also be provided with a digital watermark decoder, permitting decoding of steganographic data on imaged objects. Movement of a phone may be inferred by sensing movement of an imaged pattern across the optical sensor’s field of view, allowing use of the phone as a gestural input device through which a user can signal instructions to a computer-based process. A variety of other arrangements by which electronic devices can interact with the physical world are also detailed, e.g., involving sensing and responding to digital watermarks, bar codes, RFIDs, etc.”</li> </ul> <p>Rhoads at 4:19–26</p> <ul style="list-style-type: none"> <li>• “According to another aspect, the invention comprises a wireless telephony handset including a microphone, a modulator, and an RF amplifier, the device serving to receive audio and transmit an RF signal conveying audio modulation, the handset further including an optical sensor producing optical data, a lens for imaging an object onto the sensor, and a decoder for decoding plural bit identifier data conveyed by a barcode or a digital watermark on the object.”</li> </ul> <p>Rhoads at 7:2–11</p> <ul style="list-style-type: none"> <li>• “Although the following specification focuses on applications employing digital watermarking, certain of such applications can alternatively employ other data encoding techniques, including 1D and 2D barcodes, magnetic ink</li> </ul>

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		<p>character recognition (MICR), optical character recognition (OCR), optical mark recognition (OMR), radio frequency identification (RF/ID), UV/IR identification technologies, data glyphs, organic transistors, magnetic stripe, etc., depending on the particular application requirements.”</p> <p>Rhoads at 9:35–41</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.”</li> </ul> <p>Rhoads at 9:35–10:10</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge</p>

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		<p>boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.”</p> <p>Rhoads at 44:66 – 45:11</p> <ul style="list-style-type: none"> <li>• “Just as the scanner 210 can perform watermark decoding, it can similarly perform barcode decoding. Conventional pattern-recognition algorithms can be applied by CPU 212 to either the raw or final scan data to identify barcode patterns. Once the pattern is identified, decoding is straightforward by applying known barcode alphabets. As in the watermark case, barcode decoding can be performed autonomously, or in response to user/auxiliary device command. Similarly, the decoded barcode data can be provided to the auxiliary device whenever detected, or in response to an auxiliary device query. The 2D data can likewise be used to augment the information provided to the CPU so as to aid in the barcode detection/decoding process.”</li> </ul>

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		<p>Rhoads at 49:3-14:</p> <ul style="list-style-type: none"> <li>• “Detection is the complementary operation to embedding, i.e., discerning a digital identifier from an object.</li> </ul> <p>Response refers to the action taken based on the discerned identifier. The middle two steps—embedding and detection—can employ any of myriad well-known technologies, including 1D and 2D barcodes, magnetic ink character recognition (MICR), optical character recognition (OCR), optical mark recognition (OMR), radio frequency identification (RF/ID), data glyphs, organic transistors, magnetic stripe, metadata, file header information, UV/IR identifiers, and other machine-readable indicia and techniques for associating plural-bit digital data with an electronic or physical object. The detailed embodiment employs watermarking technology, although this is illustrative only.”</p> <p>Rhoads at 49:48-65:</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30. Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</li> </ul>

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		<p>Rhoads at 91:3–6</p> <ul style="list-style-type: none"> <li>“As indicated above, while steganographic encoding of the digital data is used in the preferred embodiments, visible forms of digital encoding—such as bar codes—can naturally be employed where aesthetic considerations permit.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.ii]	decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type;	<p>Rhoads discloses decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type.</p> <p>Rhoads at 4:18 – 26</p> <ul style="list-style-type: none"> <li>“According to another aspect, the invention comprises a wireless telephony handset including a microphone, a modulator, and an RF amplifier, the device serving to receive audio and transmit an RF signal conveying audio modulation, the handset further including an optical sensor producing optical data, a lens for imaging an object onto the sensor, and a decoder for decoding plural bit identifier data conveyed by a barcode or a digital watermark on the object.”</li> </ul> <p>Rhoads at 7:2–11</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “Although the following specification focuses on applications employing digital watermarking, certain of such applications can alternatively employ other data encoding techniques, including 1D and 2D barcodes, magnetic ink character recognition (MICR), optical character recognition (OCR), optical mark recognition (OMR), radio frequency identification (RF/ID), UV/IR identification technologies, data glyphs, organic transistors, magnetic stripe, etc., depending on the particular application requirements.”</li> </ul> <p>Rhoads at 9:35–10:21</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data.</p> <p>Color is a further object identification clue that may be useful in some</p>

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		<p>contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>The next step in the decoding process, determining orientation of the Bedoop data, can likewise be discerned by reference to visual clues. For example, some objects include subliminal graticule data, or other calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either placed for that sole purpose (e.g. reference lines or fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also be employed to deduce the orientation of the object by reference to its edges.”</p>



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		<p>Rhoads at 11:19–22</p> <ul style="list-style-type: none"> <li>• “Details of particular encoding and decoding techniques can be found in U.S. Pat. No. 5,862,260 and application Ser. No. 09/503,881, the disclosures of which are incorporated by reference.”</li> <li>• The 260 patent discloses:                         <ul style="list-style-type: none"> <li>○ “Step one of FIG. 25 is the standard "scanning" of a personal cash card 950 within the optical window 960. This can be performed using linear optical sensors which scan the window, or via a two dimensional optical detector array such as a CCD. The resulting scan is digitized into a grey scale image and stored in an image frame memory buffer such as a "framegrabber," as is now common in the designs of optical imaging systems. Once the card is scanned, a first image processing step would probably be locating the four fiducial center points, 954, and using these four points to guide all further image processing operations (i.e. the four fiducials "register" the corresponding patterns and barcodes on the personal cash card). Next, the barcode ID number would be extracted using common barcode reading image processing methods. Generally, the user's account number would be determined in this step.” ’260 patent at 58:45–60</li> <li>○ “It will be appreciated that the information embedded in the photograph need not be visually hidden or steganographically embedded. For example, the photograph incorporated into the identification card may be a composite of an image of the individual and one-, or two-dimensional bar codes. The bar code information would be subject to conventional optical scanning techniques (including internal cross checks) so that the information derived from the code may be compared, for example, to the information printed on the identification document.” ’260 patent at 61:62–62:4.</li> <li>○ “Generally speaking, three classes of data can be steganographically</li> </ul> </li> </ul>

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		<p>embedded in an object: a number (e.g. a serial or identification number, encoded in binary), an alphanumeric message (e.g. a human readable name or telephone number, encoded in ASCII or a reduced bit code), or computer instructions (e.g. JAVA or HTML instructions). The embedded URLs and the like detailed above begin to explore this third class, but a more detailed exposition of the possibilities may be helpful.” ’260 patent at 64:59–67.</p> <p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"> <li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.”</li> </ul> <p>Rhoads at 26:13 – 45</p> <ul style="list-style-type: none"> <li>• “Gestural Decoding Module</li> </ul> <p>There are various ways in which the Bedoop system's decoding of gestural input can be effected. In some Bedoop systems, this functionality is provided as part of the Bedoop applications. Generally, however, the applications must be provided with the raw frame data in order to discern</p>

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		<p>the gestural movements. Since this functionality is typically utilized by many Bedoop applications, it is generally preferable to provide a single set of gestural interpretation software functions (commonly at the operating system level) to analyze the frame data, and make available gestural output data in standardized form to all Bedoop applications.</p> <p>In one such system, a gestural decoding module tracks the encoded object within the series of image data frames, and outputs various parameters characterizing the object's position and manipulation over time. Two of these parameters indicate the X-Y position of the object within current frame of image data. The module can identify a reference point (or several) on the object, and output two corresponding position data (X and Y). The first represents the horizontal offset of the reference point from the center of the image frame, represented as a percentage of frame width. A two's complement representation, or other representation capable of expressing both positive and negative values, can be used so that this parameter has a positive value if the reference point is right of center-frame, and has a negative value if the reference point is left of center frame. The second parameter, Y, similarly characterizes the position of the reference point above or below center-frame (with above-being represented by a positive value). Each of these two parameters can be expressed as a seven-bit byte. A new pair of X, Y parameters is output from the gestural decoding module each time a new frame of image data is processed.”</p> <p>Rhoads at 44:66 – 45:11</p> <ul style="list-style-type: none"> <li>• “Just as the scanner 210 can perform watermark decoding, it can similarly perform barcode decoding. Conventional pattern-recognition algorithms can be applied by CPU 212 to either the raw or final scan data to identify barcode patterns. Once the pattern is identified, decoding is straightforward by applying known barcode alphabets. As in the watermark case, barcode decoding can be performed autonomously, or in response to user/auxiliary</li> </ul>

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		<p>device command. Similarly, the decoded barcode data can be provided to the auxiliary device whenever detected, or in response to an auxiliary device query. The 2D data can likewise be used to augment the information provided to the CPU so as to aid in the barcode detection/decoding process.”</p> <p>Rhoads at 49:3-14:</p> <ul style="list-style-type: none"> <li>• “Detection is the complementary operation to embedding, i.e., discerning a digital identifier from an object.</li> </ul> <p>Response refers to the action taken based on the discerned identifier. The middle two steps—embedding and detection—can employ any of myriad well-known technologies, including 1D and 2D barcodes, magnetic ink character recognition (MICR), optical character recognition (OCR), optical mark recognition (OMR), radio frequency identification (RF/ID), data glyphs, organic transistors, magnetic stripe, metadata, file header information, UV/IR identifiers, and other machine-readable indicia and techniques for associating plural-bit digital data with an electronic or physical object. The detailed embodiment employs watermarking technology, although this is illustrative only.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30. Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected</li> </ul>

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		<p>watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”                      49:48-65.</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information; and	<p>Rhoads discloses providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information.</p> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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		<p>FIG. 12</p> <p>Rhoads at 12:23 – 33</p> <ul style="list-style-type: none"> <li>• “Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default</li> </ul>

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		<p>Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>Rhoads at 22:28–33</p> <ul style="list-style-type: none"> <li>• “Magazine (and newspaper) pages can be steganographically encoded with Bedoop data to provide another “paper as portal” experience. As with the earlier-described office document case, the encoded data yields an address to a computer location (e.g., a web page) having the same, or related, content.”</li> </ul> <p>Rhoads at 45:19–55</p> <ul style="list-style-type: none"> <li>• “Bedoop technology can be integrated into portable telecommunication terminals, such as cell phones (manufactured, e.g., by Motorola, Nokia,</li> </ul>

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		<p>Qualcomm, and others). Such a phone can be equipped with a 1D or 2D image sensor, the output of which is applied to Bedoop decoding circuitry within the phone. This decoding circuitry can be the phone's main CPU, or can be a processing circuit dedicated to Bedoop functionality. (In this as in other embodiments, the decoding can be effected by dedicated hardware, by decoding software executing on a general purpose CPU, etc.)</p> <p>Cell phones are already equipped with numerous features that make them well suited for Bedoop operation. One is that cell phones typically include an LCD or similar screen for display of textual or graphic information, and additionally include buttons or other controls for selecting among menu options presented on the screen (e.g., by moving a cursor). Moreover, cell phones naturally include both audio input and output devices (i.e., microphone and speaker). Still further, the protocol by which cell phones transmit data includes data identifying the phone, so that such data need not be separately encoded. And finally, cell phones obviously provide ready links to remote computer systems. Collectively, these capabilities rival those of the most fully-equipped desktop computer system. Thus, essentially all of the applications detailed elsewhere in this specification can be implemented using cell phone Bedoop systems</p> <p>As with the other Bedoop systems, when Bedoop data is sensed, the phone can respond to the data locally, or it can forward Same over the cellular network to a remote System (or computer network) for handling.”</p> <p>Rhoads at 46:10–12.</p> <ul style="list-style-type: none"> <li>• “Bedoop decoding function within the phone, in other embodiments the image data can be transmitted from the phone and decoded at a remote location.”</li> </ul> <p>Rhoads at 48:32–53</p>



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		<ul style="list-style-type: none"> <li>“As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content. It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li> </ul> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>“The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30. Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected</li> </ul>

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		<p>watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</p> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).                      In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).                      In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18. </li> </ul>

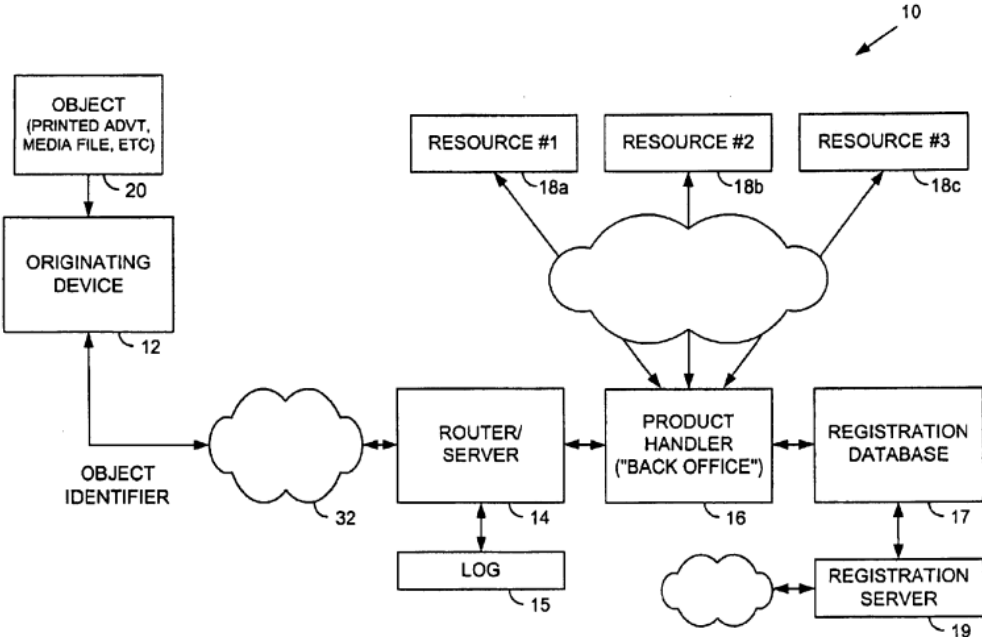
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		<p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other</p>

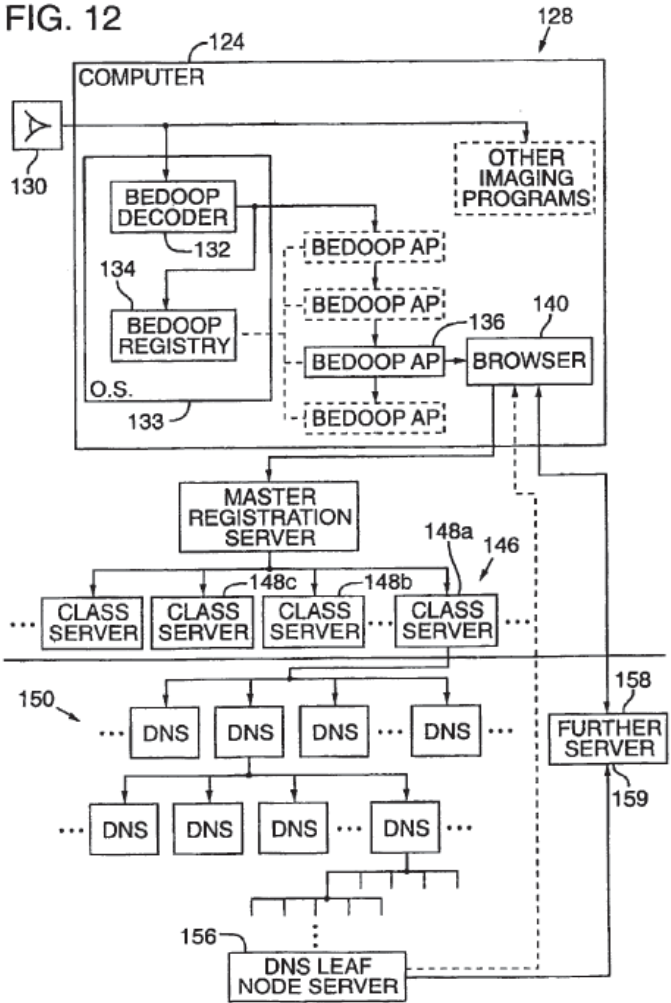
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		<p>prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>allowing the mobile device to receive the pertinent information over a network.</p>	<p>Rhoads discloses allowing the mobile device to receive the pertinent information over a network.</p> <p>Rhoads at Fig. 2</p>

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		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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		<p>FIG. 12</p>  <p>Rhoads at 12:23 – 33</p> <ul style="list-style-type: none"> <li>• “Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default</li> </ul>

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		<p>Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>Rhoads at 49:19-47</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</li> </ul> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based</p>

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		<p>optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28. Device driver software 26 serves as a software interface, communicating at a relatively high level with the application programs 28 (e.g., through API instructions whose content and format are standardized to facilitate application programming), and at a relatively low level with the interface electronics 24.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30.</li> </ul> <p>Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</p> <p>Rhoads at 50:21–51:3</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be</li> </ul>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).</p> <p>In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>browser pointed to a URL is another example of such triggering.)</p> <p>The illustrated product handler 16 comprises essentially the same hardware elements as the router 14, e.g., CPU, memory, etc. Although FIG. 2 shows just one product handler, several product handlers can be included in the system—either co-located or geographically distributed. Different handlers can be dedicated to different functions (e.g., serving URLs, serving music, etc.) or to different watermark sources (e.g., one responds to watermarks found in audio, another responds to watermarks found in print advertising, etc.).”</p> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 12</b></p> <p>The diagram illustrates a computer system (124) and its network architecture. The computer (124) includes a BEDOOP DECODER (132) and a BEDOOP REGISTRY (134) within an O.S. (133). A BROWSER (140) is connected to the decoder and registry via a series of BEDOOP APs (136). The browser is also connected to a MASTER REGISTRATION SERVER (146), which is linked to several CLASS SERVERS (148a, 148b, 148c). These class servers are connected to a hierarchy of DNS servers (150), including DNS LEAF NODE SERVERS (156). A FURTHER SERVER (158) is also connected to the system via a network (159).</p>

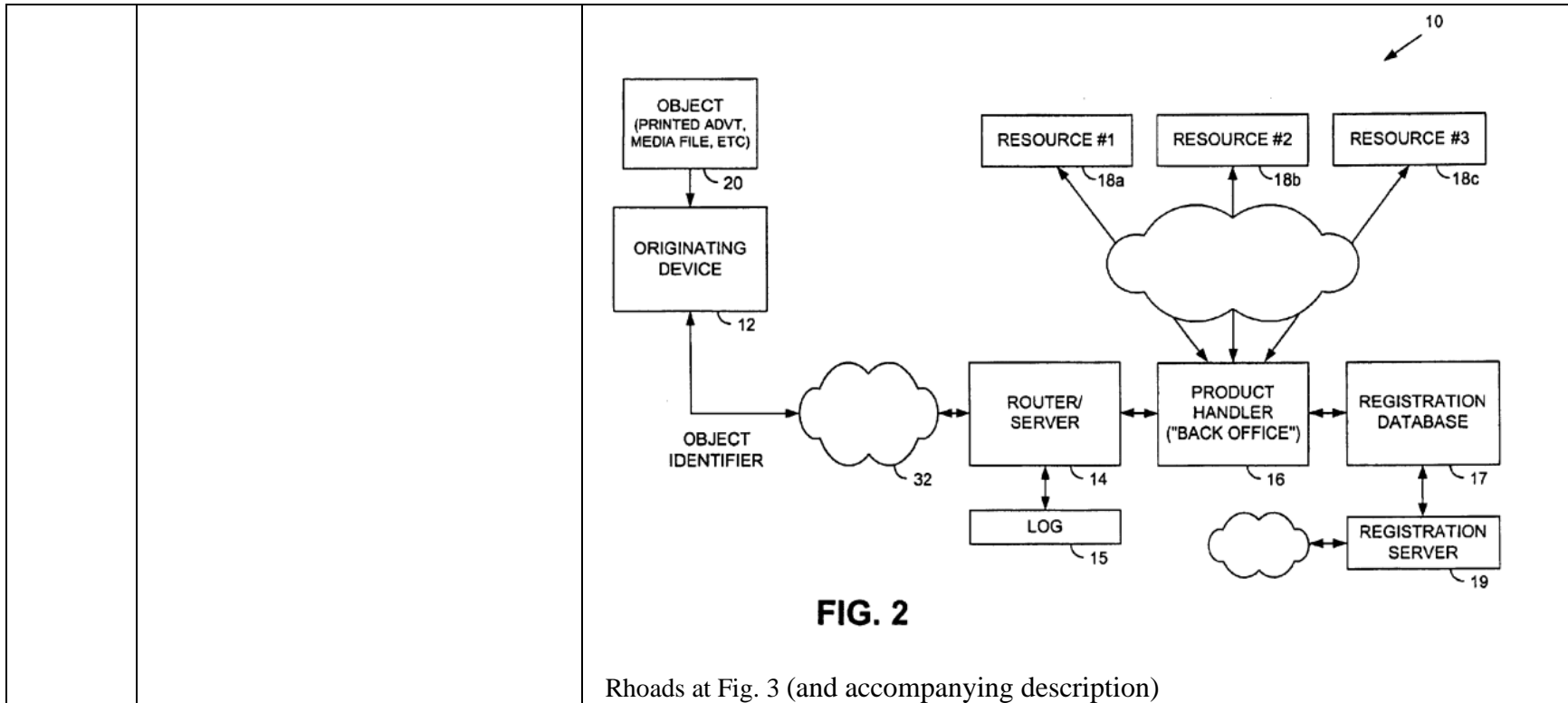
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

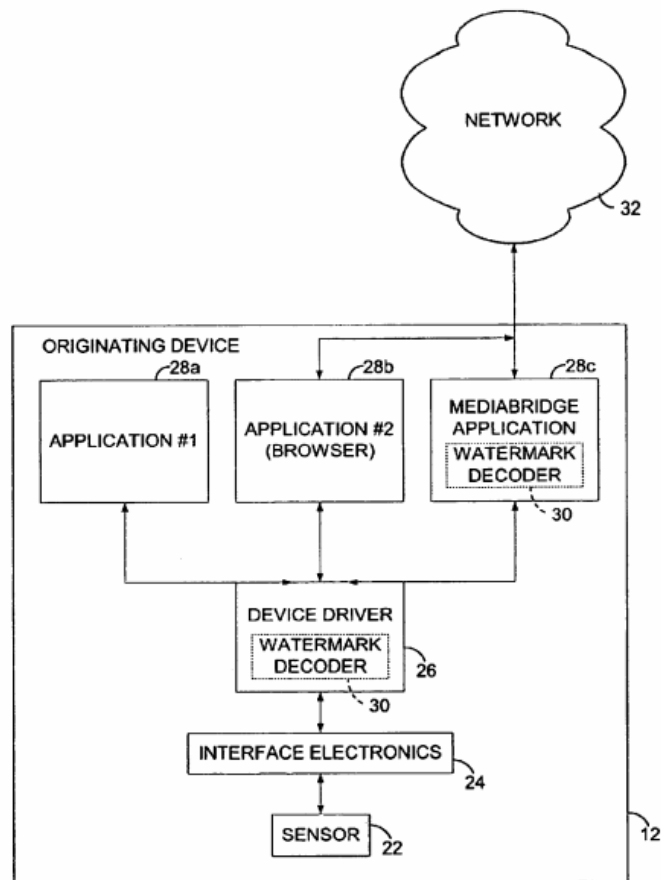
**2. Claim 26**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
26	<p>The method of claim 18, wherein the data relating to the image comprises the image.</p>	<p>Rhoads discloses the data relating to the image comprises the image.                       Rhoads at Fig. 2 (and accompanying description)</p>

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**FIG. 3**

Rhoads at 12:23 – 33

- “Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default Bedoop application can be invoked. This default application can,

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		<p>e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"><li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)” To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.”</li></ul>
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		<p>Rhoads at 49:19-47</p> <ul style="list-style-type: none"><li>• “Device <b>12</b> interacts with an object <b>20</b>. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</li></ul> <p>When used with nonelectronic objects, device <b>12</b> (FIG. 2) typically includes some form of sensor or transducer <b>22</b> to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor <b>22</b> may be coupled to associated interface electronics <b>24</b>, which in turn may be coupled to device driver software <b>26</b>, which in turn may be coupled to one or more application programs <b>28</b>. Device driver software <b>26</b> serves as a software interface, communicating at a relatively high level with the application programs <b>28</b> (e.g., through API instructions whose content and format are standardized to facilitate application programming), and at a relatively low level with the interface electronics <b>24</b>.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"><li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30.</li></ul> <p>Watermark detector 30 can be implemented in various different locations</p>
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		<p>in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 27**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
27	The method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.	Rhoads discloses image processing further comprises compressing the image to form the data relating to the image.  Rhoads at 38:1-19 <ul style="list-style-type: none"> <li>• “Post-It® Notes</li> </ul>

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		<p>Pads of Post-It® notes, or other pads of paper, can be marked by the manufacturer (either by texturing, watermarked tinting, ink-jet spattering, etc.) to convey steganographic data (e.g., Bedoop data). When such a note is presented to a Bedoop system, the system may launch an application that stores a snapshot of the note. More particularly, the application may mask the note-portion of the image data from the other image data, virtually re-map it to a rectangular format of standardized pixel dimensions, JPEG-compress the resulting image, and store it in a particular computer subdirectory with a name indicating the date of image acquisition, together with the color and/or size of the note. (These latter two data may be indicated by data included in the Bedoop payload.) If the color of the note is indicated by digital data (e.g, in the file name), then the image itself may be stored in grey-scale.”</p> <p>Rhoads at 46:47 – 53</p> <ul style="list-style-type: none"><li>• “The provision of image sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The screens on such phones can likewise be used for display of incoming image or video data.”</li></ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to</p>
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		address similar known problems, according to known methods which would yield predictable results.
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**4. Claim 29**

Claim	’252 Claim Recitation	Exemplary Citations in Reference
29	The method of claim 18, wherein image processing further includes converting at least a portion of the data relating to the image into a grayscale image.	<p>Rhoads discloses image processing further includes converting at least a portion of the data relating to the image into a grayscale image.</p> <p>Rhoads at 38:1-17</p> <ul style="list-style-type: none"> <li>• “Post-It® Notes                      Pads of Post-It® notes, or other pads of paper, can be marked by the manufacturer (either by texturing, watermarked tinting, ink-jet spattering, etc.) to convey steganographic data (e.g., Bedoop data). When such a note is presented to a Bedoop system, the system may launch an application that stores a snapshot of the note. More particularly, the application may mask the note-portion of the image data from the other image data, virtually re-map it to a rectangular format of standardized pixel dimensions, JPEG-compress the resulting image, and store it in a particular computer subdirectory with a name indicating the date of image acquisition, together with the color and/or size of the note. (These latter two data may be indicated by data included in the Bedoop payload.) If the color of the note is indicated by digital data (e.g. in the file name), then the image itself may be stored in grey-scale.”</li> </ul> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the</li> </ul>

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		<p>handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).</p> <p>In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</p> <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation,</p>
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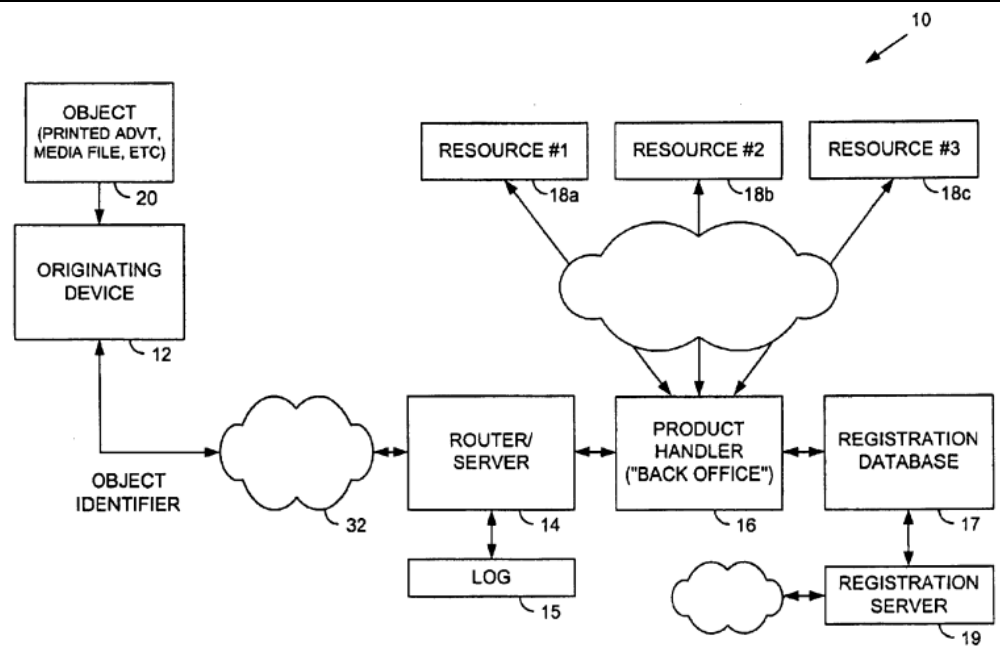
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		<p>the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 31**

<b>Claim</b>	<b>'252 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
31	<p>The method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p>	<p>Rhoads discloses the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p> <p>Rhoads at Fig. 2 (and accompanying description)</p>

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**FIG. 2**

Rhoads at 7:13-29

- “Referring to FIG. 11, a basic embodiment 110 of the present technology includes **an optical sensor 112**, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by

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		<p>communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</p> <p>Rhoads 7:30 – 46</p> <ul style="list-style-type: none"><li>• “Consider the milk carton example. The artwork on a milk carton can be adapted to convey Bedoop data. In the preferred embodiment, the Bedoop data is steganographically encoded (e.g., digitally watermarked) on the carton. Numerous digital watermarking techniques are known—all of which convey data in a hidden form (i.e., on human inspection, it is not apparent that digitally encoded data is present). Exemplary techniques operate by slightly changing the luminance, or contours of selected points on artwork or text printed on the carton, or by splattering tiny droplets of ink on the carton in a seemingly random pattern. Each of these techniques has the effect of changing the local luminance at areas across the carton—luminance changes that can be detected by the computer 114 and decoded to extract the encoded digital data. In the case of a milk carton, the data may serve to identify the object as, e.g., a half gallon carton of Alpenrose brand skim milk.”</li></ul> <p>Rhoads at 9:35–10:21</p> <ul style="list-style-type: none"><li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li></ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will</p>
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		<p>typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>The next step in the decoding process, determining orientation of the Bedoop data, can likewise be discerned by reference to visual clues. For example, some objects include subliminal graticule data, or other calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either</p>
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		<p>placed for that sole purpose (e.g. reference lines or fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also be employed to deduce the orientation of the object by reference to its edges.”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"><li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li></ul> <p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"><li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire</li></ul>
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		<p>a higher resolution image of the digitally-encoded object suitable for decoding.”</p> <p>Rhoads at 23:33–54</p> <ul style="list-style-type: none"><li>• “When a recipient of a business card holds it in front of a Bedoop sensor, the operating system on the local system launches a local Bedoop application. That local Bedoop application, in turn, establishes an external internet connection to a remote business card server. The address of that server may already be known to the local Bedoop application (e.g., having been stored from previous use), or the local Bedoop system can traverse the above-described public network of DNS servers to reach the business card server.</li></ul> <p>A database on the business card name server maintains a large collection of business card data, one database record per UID. When that server receives Bedoop data from a local Bedoop system, it parses out the UID and accesses the corresponding database record. This record typically includes more information than is commonly printed on conventional business cards. Sample fields from the record may include, for example, name, title, office phone, office fax, home phone, home fax, cellular phone, email address, company name, corporate web page address, personal web page address, secretary's name, spouse's name, and birthday. This record is transmitted back to the originating Bedoop system.”</p> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"><li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content. It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li></ul>
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		<p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"><li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider). In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</li></ul> <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate</p>
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		<p>device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"><li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li></ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a</p>
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		<p>URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 84:11 – 17</p> <ul style="list-style-type: none"><li>• “B55. A method comprising:  presenting an object to an optical sensor, the optical sensor producing image data, the object being steganographically encoded with plural bits of digital data;  decoding said digital data from the image data; and  in response to said digital data, displaying an image of a like object.”</li></ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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#### **Exhibit E-4**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, Mault was filed on September 7, 2001, claiming the priority date of September 7, 2000. Mault published at least as of April 25, 2002, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Mault anticipates asserted claims 18, 27, 29 and 31 of the ’252 Patent. To the extent Mault is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Mault is found not to anticipate any asserted claims or claim elements of the ’252 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

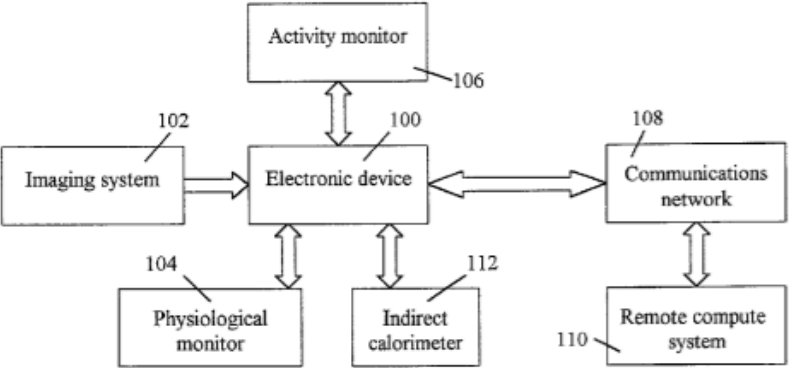
The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 18**

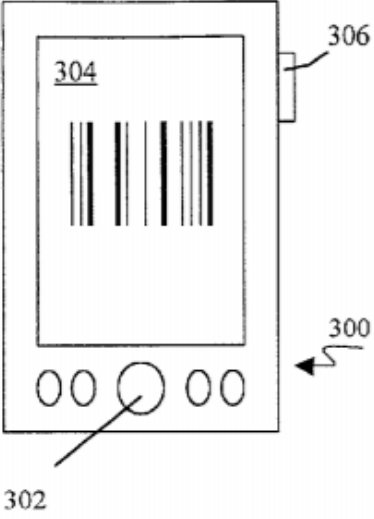
Element	'252 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method for retrieving information from image processing, the method comprising:	<p>Mault discloses a method for retrieving information from image processing.</p> <p>Mault at Abstract</p> <ul style="list-style-type: none"> <li>• “A method for assisting a person create a record of food items consumed by the person comprises the capturing of food images corresponding to food items consumed, for example by creating an image using an optical image sensor; recording the food images in the memory of an electronic device; viewing the food images on the display of the electronic device, so as to identify food items consumed; selecting food item identifiers corresponding to the food images, and recording food item identifiers in a memory, So as to create a record of food items consumed.”</li> </ul> <p>Mault at [0038]</p> <ul style="list-style-type: none"> <li>• “A person can be provided with a portable electronic device, having an image creation capability. For example, the portable electronic device may be a personal digital assistant (PDA) having an optical image sensor. The optical image sensor can be an accessory to the PDA, or can be within the housing of the PDA.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these</p>

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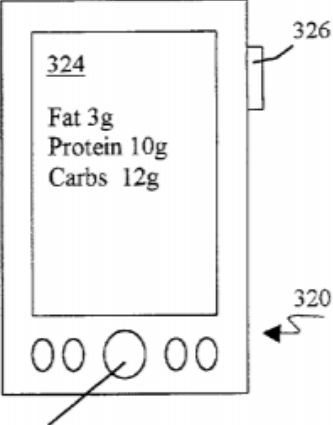
Element	'252 Claim Recitation	Exemplary Citations in Reference
		references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1A]	providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image to an image processing platform;	Mault discloses providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image to an image processing platform.  Mault at Fig. 5.   <p style="text-align: center;">Figure 5</p>
		Mault at Figs. 12 and 13.



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 12</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>322</p> <p>Figure 13</p> <p>Mault at [0008]</p> <ul style="list-style-type: none"> <li>• “The image can be stored, for example, on the memory of an imaging device such as a camera, a memory of a device in communication with the imaging device, a memory module (such as a memory stick), a memory of a portable computing device, or on a memory associated with a remote computer system, such as one accessible over a communications network. In this context, the term image refers to an electronic file, or equivalent, containing information corresponding to an image. An example would be a conventional JPEG file.”</li> </ul> <p>Mault at [0009]</p> <ul style="list-style-type: none"> <li>• “After recording the image, at a convenient later time the person can retrieve a stored image and view the image on a display. The display can be part of the imaging device, or other device such as a personal digital assistant, personal computer, Internet appliance, WebTV, e-book, tablet computer, pager, cell</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>phone, interactive TV, spectacle mounted display, visor, and the like. An electronic device having a display used to view an image may be in communication with a separate device used to create the image, for example using wireless or cable-based links.”</p> <p>Mault at [0011]</p> <ul style="list-style-type: none"> <li>• “The imaging device, used to create an image of foods consumed, can be a digital camera, device having the functionality of a camera, such as a personal digital assistant (PDA), cell phone, electronic book, pager, calculator, or other consumer electronics device.”</li> </ul> <p>Mault at [0013]</p> <ul style="list-style-type: none"> <li>• “An imaging device can comprise elements such as an optical imaging sensor such as a charge coupled device (CCD), a memory, a memory slot adapted to receive a memory module such as a non-volatile memory module, an electrical power source, a transceiver, a clock, a display, an electrical interface, an audible signal generator, an indicator light, a data port (such as a socket for a cable), an IR transmitter or transceiver, or other wireless transceiver.”</li> </ul> <p>Mault at [0027]</p> <ul style="list-style-type: none"> <li>• “ FIG. 5 illustrates a system allowing diet log creation;”</li> </ul> <p>Mault at [0038–39]</p> <ul style="list-style-type: none"> <li>• “A person can be provided with a portable electronic device, having an image creation capability. For example, the portable electronic device may be a personal digital assistant (PDA) having an optical image sensor. The optical image sensor can be an accessory to the PDA, or can be within the housing of the PDA. The portable electronic device may also be a digital camera, wireless telephone, pager, organizer, calculator (numeric calculator, diet calculator,</li> </ul>

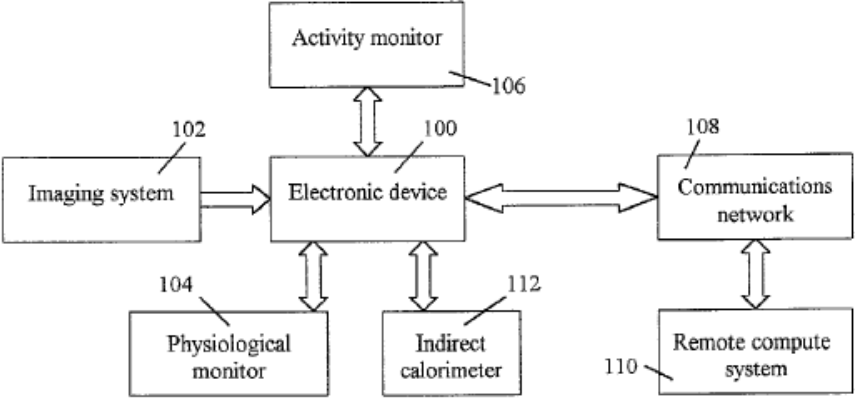
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>graphing calculator), spectacle mounted device, wrist mounted device, or other electronic device having image production capabilities.</p> <p>FIG. 1A shows a schematic of an electronic device which may be used in embodiments of the present invention, having a processor <b>10</b>, an image capturing system <b>12</b>, a data entry mechanism <b>14</b>, a memory <b>16</b>, a clock <b>18</b>, and display <b>18</b>.”</p> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet.”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging system 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110. The electronic device can be a PDA or other device carried by the person. The imaging device can be included with the electronic device in a unitary device. The physiological sensor may detect eating, for example a blood glucose sensor can detect the rise in blood glucose after a meal, allowing the electronic device to alert the person to make a diet log entry. The activity sensor provides a signal correlated with a physical activity level of the person.</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>Mault at [0054]</p> <ul style="list-style-type: none"> <li>“FIG. 9 shows a schematic of a system in which an imaging system <b>220</b>, such as a camera, transmits images over a communications network <b>222</b> to a remote computer system <b>224</b>.”</li> </ul> <p>Mault at [0079]</p> <ul style="list-style-type: none"> <li>“Embodiments of the present invention allow an electronic diet log to be created by any person with access to the recorded images. After recording an image using the PDA, the image may be transferred to another location using a communications network. For example, the image may be transmitted via a wireless Internet connection to another computer system.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	configuring the image processing platform to receive the data relating to the image and to conduct image processing, including:	<p>Mault discloses configuring the image processing platform to receive the data relating to the image and to conduct image processing.</p> <p>Mault at Fig. 5</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;">Figure 5</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li> </ul> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network such as the internet, receiving food identification data from the remote computer system (which may be generated by a software running on the remote computer System, a computer expert system, an image analysis</li> </ul>

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		<p>system, a human operative in communication with the remote computer system, or some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</p> <p>Mault at [0027]</p> <ul style="list-style-type: none"> <li>• “ FIG. 5 illustrates a system allowing diet log creation;”</li> </ul> <p>Mault at [0048]</p> <ul style="list-style-type: none"> <li>• FIG. 5 is a schematic of a system comprising an electronic device 100, an imaging system 102, a physiological sensor 104, an activity sensor 106, and a communications link through communications network 108 to a remote computer system (such as a server system) 110. The electronic device can be a PDA or other device carried by the person. The imaging device can be included with the electronic device in a unitary device. The physiological sensor may detect eating, for example a blood glucose sensor can detect the rise in blood glucose after a meal, allowing the electronic device to alert the person to make a diet log entry. The activity sensor provides a signal correlated with a physical activity level of the person.</li> </ul> <p>Mault at [0049]</p> <ul style="list-style-type: none"> <li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “FIG. 6 is a flow chart of a method for diet logging. Box <b>120</b> corresponds to recording an image of food. Box <b>122</b> corresponds to transmission of the image to a remote location, such as a remote computer system. Other data can be</li> </ul>

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		<p>transmitted with the image, for example a sales receipt, data provided by the food vendor, location the image was taken (which may be correlated with a restaurant identity), a menu image, and the weight of the food (which may be provided by a mat).”</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.i]	operating on the data relating to the image to determine if the image contains one or more recognizable symbols; and	<p>Mault discloses operating on the data relating to the image to determine if the image contains one or more recognizable symbols.</p> <p><i>See</i> limitation [1B] above.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list</li> </ul>



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		<p>of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</p> <p>Mault at [0018].</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network such as the internet, receiving food identification data from the remote computer system (which may be generated by a software running on the remote computer system, a computer expert system, an image analysis system, a human operative in communication with the remote computer system, or some combination of techniques); and recording the food identification data so as to create a record of foods consumed.”</li> </ul> <p>Mault at [0046]</p> <ul style="list-style-type: none"> <li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet. Other options include receiving transmissions such as wireless data transmissions from food vendors or food vending devices, viewing the recorded diet log, editing the diet log, or analyzing previously recorded images.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “Box 124 corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert system, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images. Box <b>126</b> corresponds to determining food identity and/or nutritional content of the food within the image.”</p> <p>Mault at [0075–77]</p> <ul style="list-style-type: none"> <li>• “Image processing techniques can be used to identify food items from images. For packaged foods, optical character recognition may be used to record and identify nutritional information and/or identify the item consumed. Computer analysis of images may be carried out on the PDA or using another computer system in communication with the PDA. For example, an image of food packaging may be used to identify the food contained. An image of the nutritional content information panel provided by the manufacturer on the package may also be recorded. Optical character recognition may be used to obtain information from the image for storage in a diet log. An image of a box of corn flakes may be recognized by a computer as such, and used to generate a corn flake serving record in a diet log.</li> </ul> <p>For non-packaged foods, e.g. restaurant meals, image analysis may also be used in identifying the food items. Imaging at a number of wavelengths, followed by false color image generation, can be used to help identify image components. Spectroscopic imaging can be used in computer-assisted food recognition.</p> <p>Image processing, image recognition, and pattern recognition algorithms are useful in analyzing stored images so as to create a diet log. Algorithms may be applied to color images, or images recorded at a number of different wavelengths (e.g. in the IR, optical, and UV) which may assist identification. Stored images can be identified by comparison with previously stored images that the person has identified, using a software learning mechanism such as a</p>

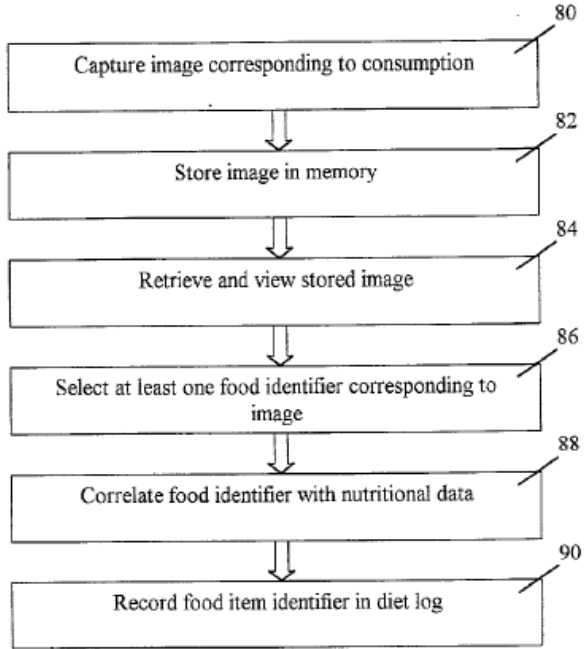
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>neural network.”</p> <p>Mault at [0080]</p> <ul style="list-style-type: none"> <li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code Scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode (e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer System (remote in this context meaning a computer System not carried by the person, for example a commercial Server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the database.”</li> </ul> <p>Mault at [0081]</p> <ul style="list-style-type: none"> <li>• “FIG. 12 shows an image of a barcode presented on the display <b>304</b> of PDA <b>300</b> (the PDA having data entry buttons <b>302</b>, and an image sensor <b>306</b>). Image analysis software can be used to analyze the image of the barcode, so as to determine UPC, product name, nutritional data, and the like.”</li> </ul> <p>Mault at [0082]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image Sensor <b>326</b>. Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”</li> </ul> <p>Mault at [0090]</p> <ul style="list-style-type: none"> <li>• “Colors, shapes, printed codes, and fluorescent markers of tablets can be used to assist identification, either by a person or an [sic] software image analysis program.”</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B.ii]	<p>decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type;</p>	<p>Mault discloses decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type .</p> <p><i>See</i> limitation [1B.i] above.</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	<p>providing access to a distal server configured to use a database to</p>	<p>Mault discloses providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on</p>

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	identify pertinent information associated with the recognizable symbols based on the symbol information; and	the symbol information. Mault at Fig. 4  <p style="text-align: center;">Figure 4</p> Mault at [0017] <ul style="list-style-type: none"> <li>• “The identity of food items consumed can be correlated with nutritional data, for example using a nutritional database, and the nutritional data can stored in an electronic memory so as to create a nutritional record, for example as part of a diet log.”</li> </ul> Mault at [0047]

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “Box <b>88</b> corresponds to selecting a food item identifier, such as a food name, corresponding to the displayed image. The selection can be made from a menu displayed to the person. Box <b>88</b> corresponds to correlating a food item identifier with nutritional data. Box <b>90</b> corresponds to recording the food item identifier and corresponding nutritional data in memory, so as to create a diet log.”</li> </ul> <p>Mault at [0059]</p> <ul style="list-style-type: none"> <li>• “For example, a person can sit down to a meal and record an image of the meal using the electronic device. The image is transmitted to a remote location where it is analyzed and converted into a caloric value. The caloric value can be transmitted back to the person, allowing the person to decide whether to eat the meal, choose another meal, or eat some portion of the meal consistent with reaching a calorie balance goal.”</li> </ul> <p>Mault at [0082–83]</p> <ul style="list-style-type: none"> <li>• “FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image sensor <b>326</b>. Optical character recognition software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.</li> </ul> <p>Food item identities and nutritional information can also be received from food vendors, e.g. grocery stores, on-line retailers, restaurants, vending machines, diet food retailers, etc. The PDA may prompt the person to identify the source of the food being imaged, and this information can be used to help in identification.”</p> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the</p>

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		<p>knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>allowing the mobile device to receive the pertinent information over a network.</p>	<p>Mault discloses allowing the mobile device to receive the pertinent information over a network.</p> <p>Mault at [0052]</p> <ul style="list-style-type: none"> <li>• “A diet log channel, generated by remote server (or other remote computer systems, or other content provider) <b>176</b>, and received by the set top box over communications network <b>178</b>, can be selected for display on the interactive television <b>160</b>. A display of food item identifiers, such as food names in a menu format, can be displayed on the display <b>162</b> of the interactive TV <b>160</b>. An image stored in the local memory <b>172</b> can be added to the diet log channel signal, using techniques known in the art, so that the person views the diet log channel with an embedded image of the food consumed. The person then selects items corresponding to the food consumed from the displayed menu. Selection data is generated with user input <b>146</b> (for example a keyboard) and transmitted to the set top box and to the remote server. The display is changed appropriately on receipt of the selection data by the content provider and the selection is added to the diet log of the person, which is stored in a database associated with or otherwise accessible by the remote server <b>176</b>.”</li> </ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"> <li>• “FIG. 6 is a flow chart of a method for diet logging. Box <b>120</b> corresponds to</li> </ul>

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		<p>recording an image of food. Box <b>122</b> corresponds to transmission of the image to a remote location, such as a remote computer system. Other data can be transmitted with the image, for example a sales receipt, data provided by the food vendor, location the image was taken (which may be correlated with a restaurant identity), a menu image, and the weight of the food (which may be provided by a mat). Box <b>124</b> corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert system, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images. Box <b>126</b> corresponds to determining food identity and/or nutritional content of the food within the image. Box <b>128</b> corresponds to storing the food identity and nutritional content into a database, so as to create a diet log. Box <b>130</b> corresponds to the person reviewing the diet log for accuracy at a convenient later time.”</p> <p>Mault at [0059]</p> <ul style="list-style-type: none"> <li>• “For example, a person can sit down to a meal and record an image of the meal using the electronic device. The image is transmitted to a remote location where it is analyzed and converted into a caloric value. The caloric value can be transmitted back to the person, allowing the person to decide whether to eat the meal, choose another meal, or eat some portion of the meal consistent with reaching a calorie balance goal.”</li> </ul> <p>Mault at [0074]</p> <ul style="list-style-type: none"> <li>• “FIG. 11 shows a PDA <b>280</b> with display <b>284</b>, buttons <b>282</b>, and imaging device <b>286</b> directed at a can of pickles <b>288</b>. The display <b>284</b> can be used to indicate the image to be captured. A button such as <b>282</b> may be pressed to</li> </ul>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>record the image. The display <b>184</b> can be used to view captured images of foods stored in the memory of the PDA, for assisting the person in creating a diet log.”</p> <p>Mault at [0075]</p> <ul style="list-style-type: none"> <li>• “Optical character recognition may be used to obtain information from the image for storage in a diet log. An image of a box of corn flakes may be recognized by a computer as such, and used to generate a corn flake serving record in a diet log. Computer analysis may be used as a first attempt in producing a diet log, and if unsuccessful, the image can be passed to a human for analysis.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 26**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
26	The method of claim 18, wherein the data relating to the image comprises the image.	<p>Mault discloses the data relating to the image comprises the image.</p> <p>Mault at Fig. 5</p>

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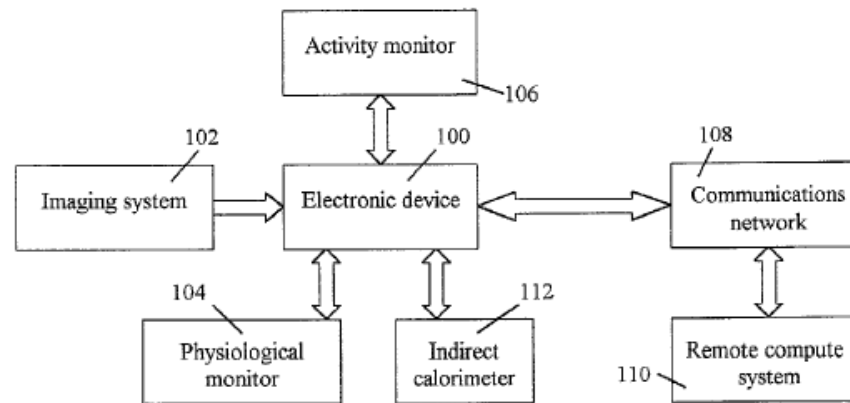


Figure 5

Mault at [0008]

- “The image can be stored, for example, on the memory of an imaging device such as a camera, a memory of a device in communication with the imaging device, a memory module (such as a memory stick), a memory of a portable computing device, or on a memory associated with a remote computer system, such as one accessible over a communications network. In this context, the term image refers to an electronic file, or equivalent, containing information corresponding to an image. An example would be a conventional JPEG file.”

Mault at [0009]

- “After recording the image, at a convenient later time the person can retrieve a stored image and view the image on a display. The display can be part of the imaging device, or other device such as a personal digital assistant, personal computer, Internet appliance, WebTV, e-book, tablet computer, pager, cell phone, interactive TV, spectacle mounted display, visor, and the like. An electronic device having a display used to view an image may be in communication with a separate device used to create the image, for example

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		<p>using wireless or cable-based links.”</p> <p>Mault at [0011]</p> <ul style="list-style-type: none"><li>• “The imaging device, used to create an image of foods consumed, can be a digital camera, device having the functionality of a camera, such as a personal digital assistant (PDA), cell phone, electronic book, pager, calculator, or other consumer electronics device. The imaging device can also be an ornamental component, clothing item, or other functional or decorative item having image creation capabilities, Such as spectacles, buttons, a pen, cutlery item, key ring, keys, belt, cigarette-like object, ring, body ornament, or jewelry.”</li></ul> <p>Mault at [0017]</p> <ul style="list-style-type: none"><li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li></ul> <p>Mault at [0018]</p> <ul style="list-style-type: none"><li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications network Such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on the remote computer System, a computer expert System, an image analysis system, a human operative in communication with the</li></ul>
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		<p>remote computer system, or Some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</p> <p>Mault at [0038–39]</p> <ul style="list-style-type: none"><li>• “A person can be provided with a portable electronic device, having an image creation capability. For example, the portable electronic device may be a personal digital assistant (PDA) having an optical image sensor. The optical image sensor can be an accessory to the PDA, or can be within the housing of the PDA. The portable electronic device may also be a digital camera, wireless telephone, pager, organizer, calculator (numeric calculator, diet calculator, graphing calculator), spectacle mounted device, wrist mounted device, or other electronic device having image production capabilities.</li></ul> <p>FIG. 1A shows a schematic of an electronic device which may be used in embodiments of the present invention, having a processor <b>10</b>, an image capturing system <b>12</b>, a data entry mechanism <b>14</b>, a memory <b>16</b>, a clock <b>18</b>, and display <b>18</b>.”</p> <p>Mault at [0046]</p> <ul style="list-style-type: none"><li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode Scanner, or the optical image Sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet.”</li></ul> <p>Mault at [0049]</p> <ul style="list-style-type: none"><li>• “Images recorded with the imaging device are transmitted over the communications network to the remote computer. The remote computer</li></ul>
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		<p>system can be a server system, and may comprise a computer expert system for image analysis. Image analysis can be performed by one or more persons, a computer expert system, or other mechanism.”</p> <p>Mault at [0051]</p> <ul style="list-style-type: none"><li>• “Box 124 corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert System, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images.”</li></ul> <p>Mault at [0054]</p> <ul style="list-style-type: none"><li>• “FIG. 9 shows a schematic of a system in which an imaging system <b>220</b>, such as a camera, transmits images over a communications network <b>222</b> to a remote computer system <b>224</b>.”</li></ul> <p>Mault at [0073]</p> <ul style="list-style-type: none"><li>• “Fig. 11 shows a PDA 280 with display 284, buttons 282, and imaging device 286 directed at a can of pickles 288. The display 284 can be used to indicate the image to be captured. A button such as 282 may be pressed to record the image. The display 184 can be used to view captured images of foods stored in the memory of the PDA, for assisting the person in creating a diet log.”</li></ul> <p>Mault at [0080]</p> <ul style="list-style-type: none"><li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode</li></ul>
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		<p>(e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer System (remote in this context meaning a computer system not carried by the person, for example a commercial server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the database.”</p> <p>Mault at [0081]</p> <ul style="list-style-type: none"><li>• “FIG. 12 shows an image of a barcode presented on the display 304 of PDA 300 (the PDA having data entry buttons 302, and an image sensor 306). Image analysis software can be used to analyze the image of the barcode, So as to determine UPC, product name, nutritional data, and the like. Alternatively, a barcode Scanner can be used to read the barcode, or an accessory device which in communication with the PDA may be used as a barcode scanner.”</li></ul> <p>Mault at Fig. 12</p>
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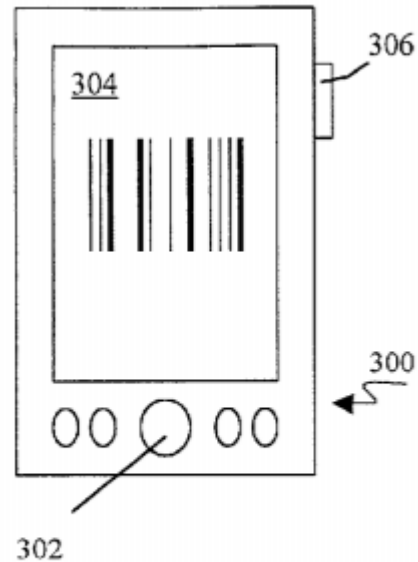


Figure 12

Mault at [0082]

- “FIG. 13 shows an image of nutritional information on the display 324 of a PDA320, having data entry buttons 322 and optical image Sensor 326. Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”

Mault at Fig. 13

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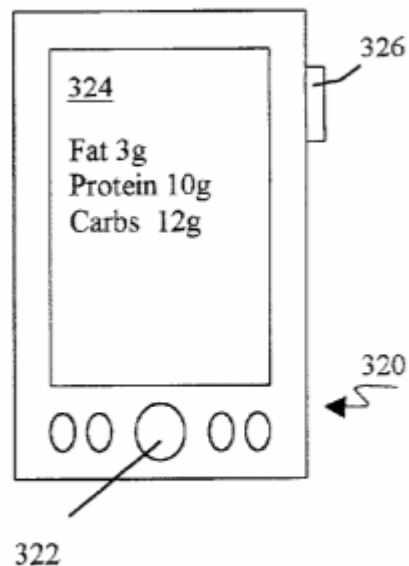


Figure 13

To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

**3. Claim 27**



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Claim	'252 Claim Recitation	Exemplary Citations in Reference
27	The method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.	<p>Mault discloses image processing further comprises compressing the image to form the data relating to the image.</p> <p>Mault at [0008]</p> <ul style="list-style-type: none"> <li>• “The image can be stored, for example, on the memory of an imaging device such as a camera, a memory of a device in communication with the imaging device, a memory module (such as a memory stick), a memory of a portable computing device, or on a memory associated with a remote computer system, such as one accessible over a communications network. In this context, the term image refers to an electronic file, or equivalent, containing information corresponding to an image. An example would be a conventional JPEG file.”</li> </ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**4. Claim 29**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
29	The method of claim 18, wherein image processing further includes converting at least a portion of the	To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with

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	<p>data relating to the image into a grayscale image.</p>	<p>other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 31**

<b>Claim</b>	<b>'252 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
31	<p>The method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p>	<p>Mault discloses the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p> <p>Mault at [0017]</p> <ul style="list-style-type: none"> <li>• “A method of creating a diet log comprises: recording an image of a label, the label corresponding to a food item consumed; analyzing the image of the label (for example using optical character recognition, image analysis, image recognition, or neural network techniques) so as to determine the identity of the food item consumed; and storing the determined identity of the food item consumed in an electronic memory, so as to create a diet log. The label can be a printed label, a barcode, an alphanumeric code, a nutritional data label, a list of ingredients, a product code, graphical designs (Such as trademarks), product names, and the like.”</li> </ul> <p>Mault at [0018]</p> <ul style="list-style-type: none"> <li>• “A method by which a person can create a record of foods consumed comprises: recording a food image of a food consumed; transmitting the food image to a remote computer system, for example over a communications</li> </ul>

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		<p>network such as the internet, receiving food identification data from the remote computer System (which may be generated by a software running on the remote computer System, a computer expert system, an image analysis system, a human operative in communication with the remote computer system, or some combination of techniques); and recording the food identification data So as to create a record of foods consumed.”</p> <p>Mault at [0046]</p> <ul style="list-style-type: none"><li>• “Other options which may be presented to the user include the entering of a food by name, for example into diet log software, or scanning the barcode of a food item. The electronic device may comprise or communicate with a barcode scanner, or the optical image sensor can be used to record an image of the barcode. The barcode can then be interpreted in terms of a UPC (universal product code) and/or product name using a database accessible to the PDA. A UPC database may be accessible over a communications network such as the Internet. Other options include receiving transmissions such as wireless data transmissions from food vendors or food vending devices, viewing the recorded diet log, editing the diet log, or analyzing previously recorded images.”</li></ul> <p>Mault at [0051]</p> <ul style="list-style-type: none"><li>• “Box 124 corresponds to analysis of the image of the remote location. Image recognition software may be used. A trained person, at a remote location, can select food names corresponding to the images, for example in conjunction with image recognition, providing names where image recognition has not been successful in identifying the food. A computer expert System, optical character recognition of a name on the package, barcode recognition, portion size estimate, and other food data can also be extracted from the image or images.”</li></ul> <p>Mault at [0075–76]</p>
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		<ul style="list-style-type: none"><li>• “Image processing techniques can be used to identify food items from images. For packaged foods, optical character recognition may be used to record and identify nutritional information and/or identify the item consumed. Computer analysis of images may be carried out on the PDA or using another computer system in communication with the PDA. For example, an image of food packaging may be used to identify the food contained. An image of the nutritional content information panel provided by the manufacturer on the package may also be recorded. Optical character recognition may be used to obtain information from the image for storage in a diet log. An image of a box of corn flakes may be recognized by a computer as such, and used to generate a corn flake serving record in a diet log.</li></ul> <p>For non-packaged foods, e.g. restaurant meals, image analysis may also be used in identifying the food items. Imaging at a number of wavelengths, followed by false color image generation, can be used to help identify image components. Spectroscopic imaging can be used in computer-assisted food recognition.”</p> <p>Mault at [0077]</p> <ul style="list-style-type: none"><li>• “Image processing, image recognition, and pattern recognition algorithms are useful in analyzing stored images so as to create a diet log. Algorithms may be applied to color images, or images recorded at a number of different wavelengths (e.g. in the IR, optical, and UV) which may assist identification. Stored images can be identified by comparison with previously stored images that the person has identified, using a software learning mechanism such as a neural network.”</li></ul> <p>Mault at [0080]</p> <ul style="list-style-type: none"><li>• “Barcodes can also be used in food item identification. The PDA may also incorporate a bar-code Scanner, or alternatively, barcodes may be identified from a recorded image of the bar-code using image analysis. The barcode</li></ul>
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		<p>(e.g. universal product code) can be used to retrieve nutritional data relating to the item from a database. The database may reside on a remote computer System (remote in this context meaning a computer System not carried by the person, for example a commercial Server System, home computer, etc.). The person may scan the barcode of a box of cereal and the UPC code used to retrieve nutrition information specific to that brand of cereal from the database.”</p> <p>Mault at [0081]</p> <ul style="list-style-type: none"><li>• “FIG. 12 shows an image of a barcode presented on the display <b>304</b> of PDA <b>300</b> (the PDA having data entry buttons <b>302</b>, and an image sensor <b>306</b>). Image analysis software can be used to analyze the image of the barcode, so as to determine UPC, product name, nutritional data, and the like.”</li></ul> <p>Mault at [0082]</p> <ul style="list-style-type: none"><li>• “FIG. 13 shows an image of nutritional information on the display <b>324</b> of a PDA <b>320</b>, having data entry buttons <b>322</b> and optical image Sensor <b>326</b>. Optical character recognition Software running on a processor of the PDA can be used to extract nutritional information from the image, and place it into memory for possible later transfer to a database.”</li></ul> <p>Mault at [0090]</p> <ul style="list-style-type: none"><li>• “Colors, shapes, printed codes, and fluorescent markers of tablets can be used to assist identification, either by a person or an [sic] software image analysis program.”</li></ul> <p>To the extent it is found that Mault does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Mault does not anticipate this claim, Mault renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final</p>
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		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Mault with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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### **Exhibit E-6**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

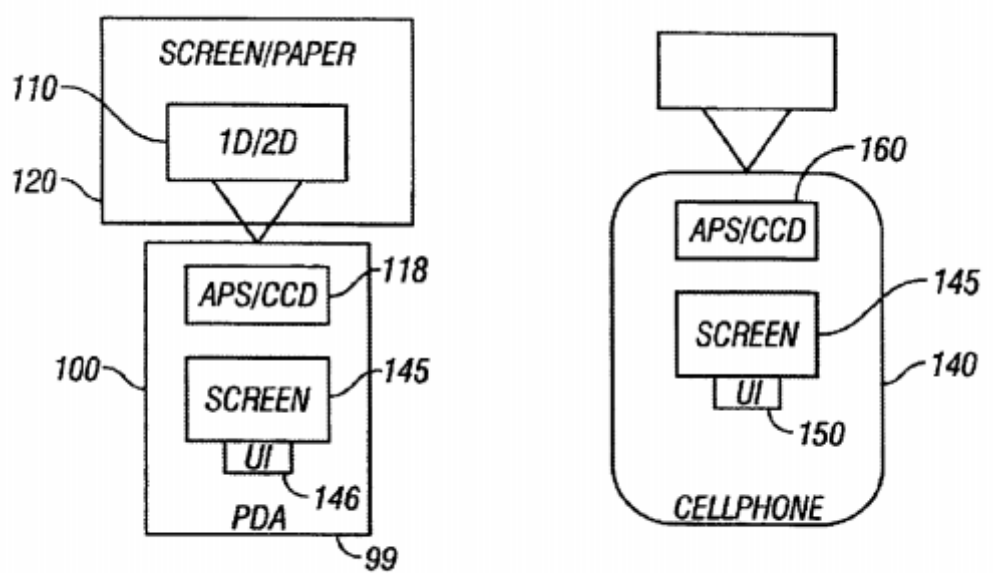
On information and belief, the application that matured into Harris was filed on July 18, 2000. Harris published at least as of December 23, 2003, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Harris anticipates asserted claims 18, 27, 29, and 31 of the ’252 Patent. To the extent Harris is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Harris is found not to anticipate any asserted claims or claim elements of the ’252 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 18**

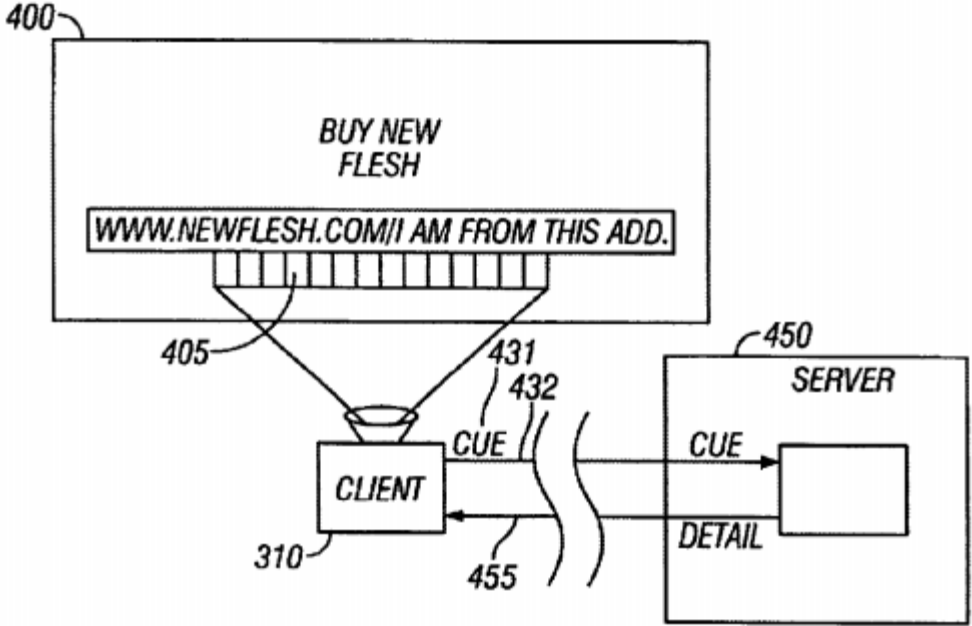
Element	'252 Claim Recitation	Exemplary Citations in Reference
[18Pre]	A method for retrieving information from image processing, the method comprising:	
[18A]	providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image an image processing platform;	<p>Harris at FIG. 1A and FIG. 1B</p>  <p><b>FIG. 1A</b></p> <p><b>FIG. 1B</b></p> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One</li> </ul>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using <b>a personal digital assistant 100</b> as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99.</p> <p>FIG. 1B shows the client being <b>a cellular telephone</b> which also may include a screen 145 and user interface 150. The cellular telephone can be associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>“The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement. In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar</li> </ul>

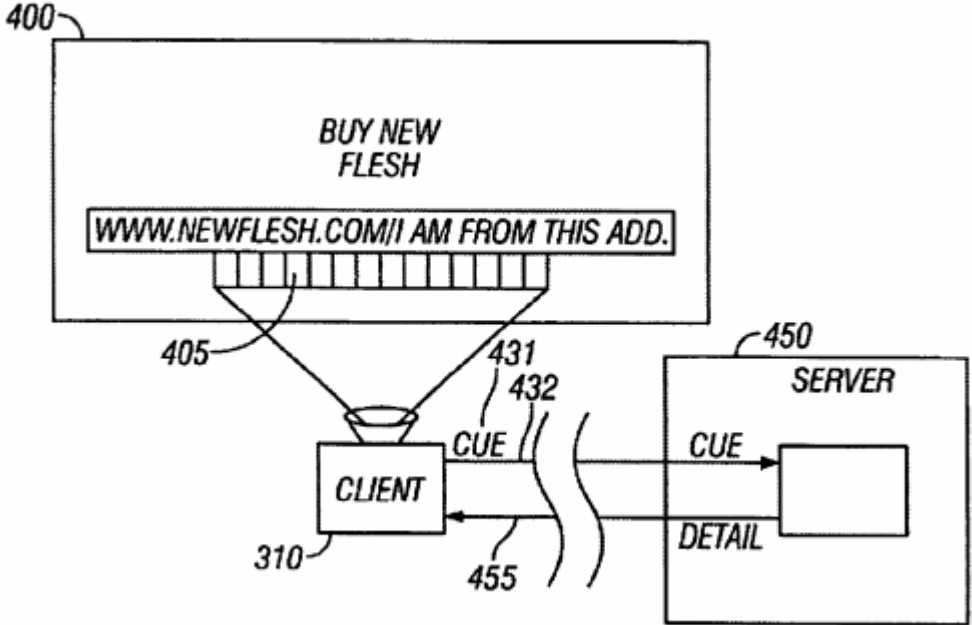
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 U.S. Patent No. 6,666,377 to Harris (“Harris”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18B]	<p>configuring the image processing platform to receive the data relating to the image and to conduct image processing, including:</p>	<p>See element 18A.</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
[18B.i]	operating on the data relating to the image to determine if the image contains one or more recognizable symbols; and	<p>Harris discloses operating on the data relating to the image to determine if the image contains one or more recognizable symbols.</p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.</li> </ul> <p>In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

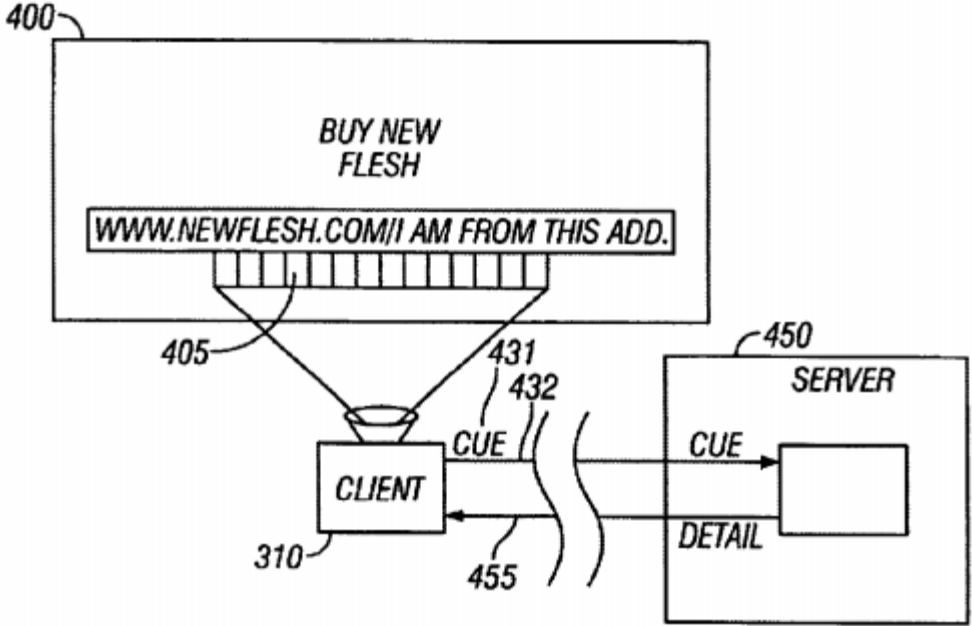
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Element	'252 Claim Recitation	Exemplary Citations in Reference
[18B.ii]	decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type;	<p>Harris discloses decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type.</p> <p>Harris at FIG. 4</p>  <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.</p> <p>In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18C]	<p>providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information; and</p>	<p>Harris discloses providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information.</p> <p>Harris at FIG. 4</p>

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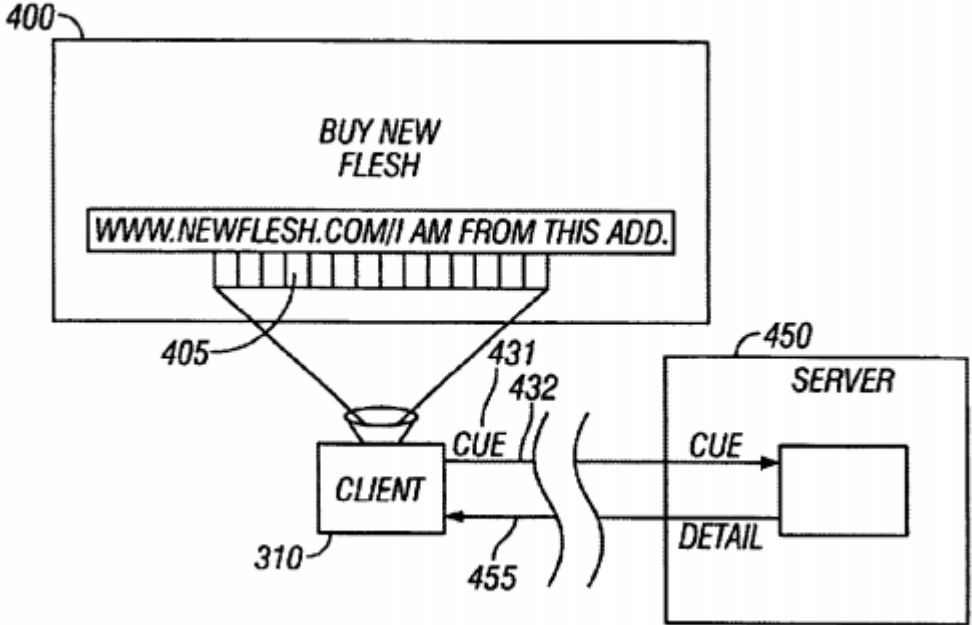
Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>“The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement. In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>• “In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to <b>the server 450</b>, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>Harris at 4:55-58</p> <ul style="list-style-type: none"> <li>• “During hot sync, the database returns the full text of the detailed information, e.g., “visit the website at <a href="http://www.pdascan.com/~more">http://www.pdascan.com/~more</a> to get a free gift.” Any desired length or size of information can be returned.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
[18D]	allowing the mobile device to receive the pertinent information over a network.	<p>Harris discloses allowing the mobile device to receive the pertinent information over a network.</p> <p>Harris at FIG. 4</p>  <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.</p> <p>In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>• “In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>Harris at 4:55-58</p> <ul style="list-style-type: none"> <li>• “During hot sync, the database returns the full text of the detailed information, e.g., “visit the website at <a href="http://www.pdascan.com/~more">http://www.pdascan.com/~more</a> to get a free gift.” Any desired length or size of information can be returned.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the</p>

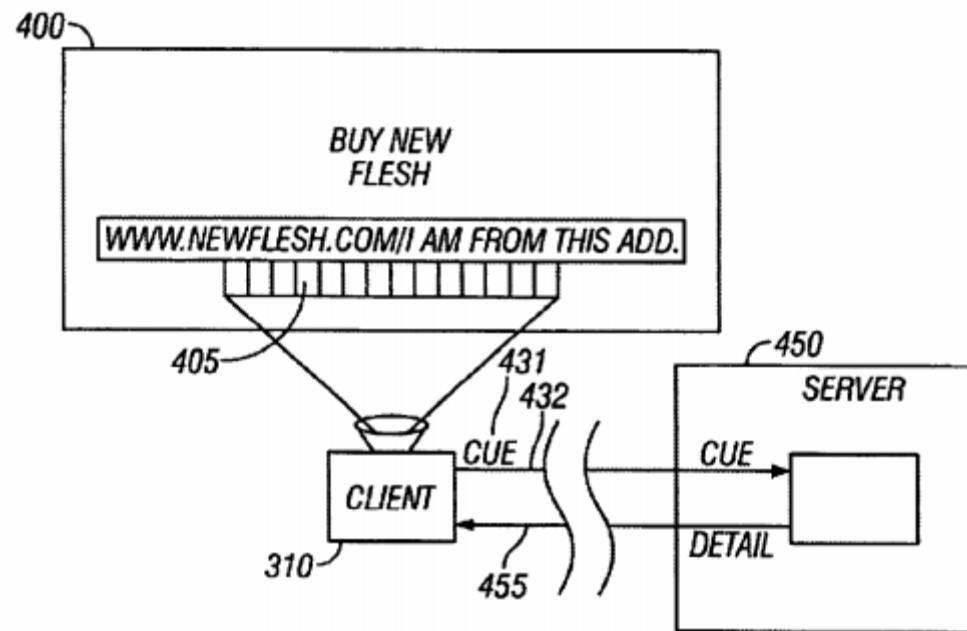
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

**2. Claim 26 (Non-asserted)**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
26	The method of claim 18, wherein the data relating to the image comprises the image.	Harris discloses the method of claim 18, wherein the data relating to the image comprises the image.  Harris at FIG. 4

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**FIG. 4**

Harris at 4:15-30

- “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement. In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a

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 Invalidity Chart for U.S. Patent 7,899,252 based on  
 U.S. Patent No. 6,666,377 to Harris (“Harris”)

		<p>zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 27**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
27	<p>The method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p>	<p>Harris discloses the method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.</li> </ul> <p>In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client</p>

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		<p>reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 29**

<b>Claim</b>	<b>'252 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
29	The method of claim 18, wherein image processing further includes converting at least a portion of the data relating to the image into a grayscale image.	To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to

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		address similar known problems, according to known methods which would yield predictable results.
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**5. Claim 31**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
31	The method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.	<p>Harris discloses the method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p> <p>Harris at FIG. 4</p> <p style="text-align: center;"><b>FIG. 4</b></p>

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		<p>Harris at 4:41-48</p> <ul style="list-style-type: none"><li>• “In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to the server 450, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li></ul> <p>Harris at 4:55-58</p> <ul style="list-style-type: none"><li>• “During hot sync, the database returns the full text of the detailed information, e.g., “visit the website at <a href="http://www.pdascan.com/~more">http://www.pdascan.com/~more</a> to get a free gift.” Any desired length or size of information can be returned.”</li></ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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6.



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### **Exhibit E-11**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Ehrhart was filed on July 13, 2001, claiming the priority date of July 13, 2001. Ehrhart published at least as of April 20, 2004, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Ehrhart anticipates asserted claims 18, 27, 29, 31, of the ’252 Patent. To the extent Ehrhart is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Ehrhart is found not to anticipate any asserted claims or claim elements of the ’252 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 18**

Element	'252 Claim Recitation	Exemplary Citations in Reference
[18Pre]	A method for retrieving information from image processing, the method comprising:	<p>Ehrhart discloses a method for retrieving information from image processing, the method comprising:</p> <p>“In another aspect, the present invention includes a method for acquiring an image of an object with an optical reader.” Ehrhart at 2:62-64.</p>
[18A]	providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image an image processing platform;	<p>Ehrhart discloses a mobile device having a camera, the mobile device configured to capture an image, and configured to transmit data relating to the image an image processing platform.</p> <p><i>Id.</i> at [18Pre].</p> <p>“The optical reader of the present invention automatically, or through manual Selection, determines whether a captured image is a color photographic image or, a color image that includes a graphical Symbol. Subsequently, the optical reader of the present invention processes the acquired imaging data in accordance with that determination. The optical reader of the present invention is operative to acquire and associate a plurality of acquired images.</p> <p>One aspect of the present invention is an optical reader.</p> <p>The optical reader includes a color imaging assembly for acquiring an image of an object, the color imaging assembly generating imaging data corresponding to the image. An image analysis circuit is coupled to the color imaging assembly.</p> <p>The image analysis circuit being configured to determine if the color imaging data includes at least one graphical Symbol. The image is classified as a</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>graphical Symbol, or the image is classified as a color photograph if the color imaging data does not include at least one graphical Symbol. A processing circuit is coupled to the image analysis circuit. The processing circuit is operative to process the imaging data based on the determination.</p> <p>In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for converting the image of the object into color digital data corresponding to the image.” Ehrhart at 1:57-2:16.</p> <p>“In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for capturing the image as color imaging data. A classification circuit is coupled to the color imaging assembly, the classification circuit being configured to process at least a portion of the color imaging data to thereby Select one of a plurality of classifications, whereby the image is classified as a color photographic image, or as an image that includes at least one graphical Symbol. An automatic mode Selector is coupled to the classification circuit, the automatic mode Selector being configured to Select an optical reader mode in accordance with the Selected classification. A processor is coupled to the classification circuit, the processor being programmed to process the color imaging data in accordance with the optical reader mode Selected by the automatic mode Selector.” Ehrhart at 2:26-42.</p> <p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14,</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>alphanumeric key pad 16, and display 60. In one embodiment, function keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG. 1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100. Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18B]	configuring the image processing platform to receive the data relating to the image and to conduct image	Ehrhart discloses configuring the image processing platform to receive the data relating to the image and to conduct image processing.

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Element	'252 Claim Recitation	Exemplary Citations in Reference
	processing, including:	<p><i>Id.</i> at [18Pre-A].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>“In the embodiment depicted in FIG. 2, ASIC 44 is implemented using a programmable logic array (PLA) device. In a similar embodiment, ASIC 44 is implemented using a field programmable gate array (FPGA) device. ASIC 44 is tasked with controlling the image acquisition process, and the storage of image data. As part of the image acquisition process, ASIC 44 performs various timing and control functions including control of light source 24, control of color imager 34, and control of external interface 56. It will be apparent to those of ordinary skill in the pertinent art that modifications and variations can be made to processor 40 of the present invention depending on the cost, availability, and performance of off-the-shelf microprocessors, and the type of color imager used. In one embodiment, microprocessor 42 and ASIC 44 are replaced by a single microprocessor 40. In one embodiment, microprocessor 40 is implemented using a single RISC processor. In yet another embodiment, microprocessor 40 is implemented using a RISC and DSP hybrid processor.” Ehrhart at 7:32-50.</p>

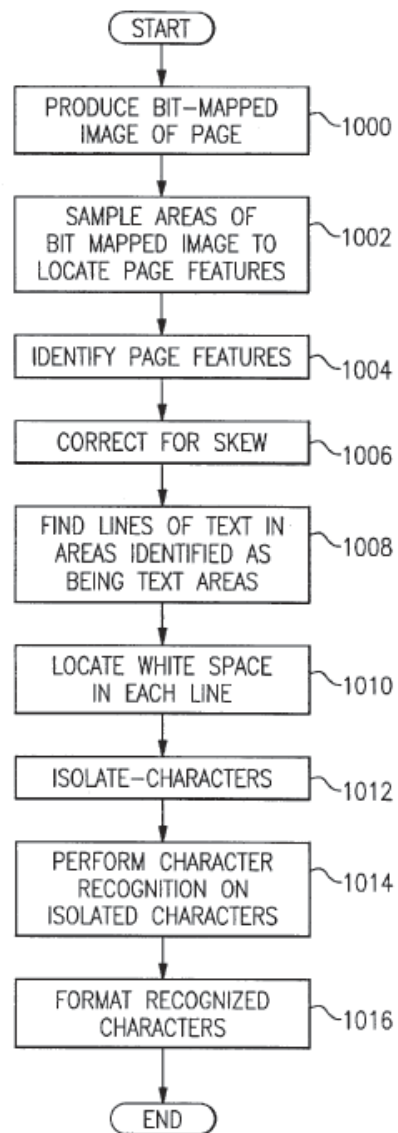
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results</p>
[18B.i]	<p>operating on the data relating to the image to determine if the image contains one or more recognizable symbols; and</p>	<p>Ehrhart discloses operating on the data relating to the image to determine if the image contains one or more recognizable symbols.</p> <p><i>Id.</i> at [18Pre-B].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>“In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are</p>

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		analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In Step 1014, a character recognition algorithm is used in an attempt to recognize each individual character.” Ehrhart at 12:55-66.

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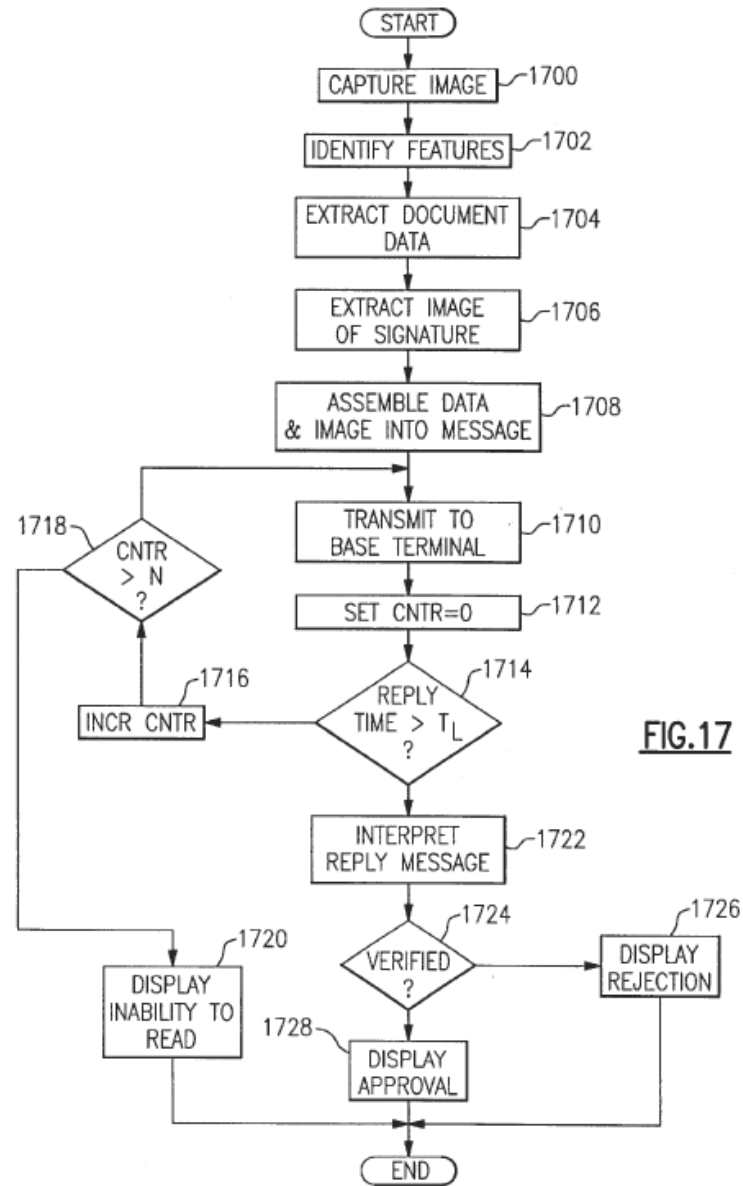
**FIG. 10**



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		Ehrhart at Fig. 10.

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**FIG. 17**

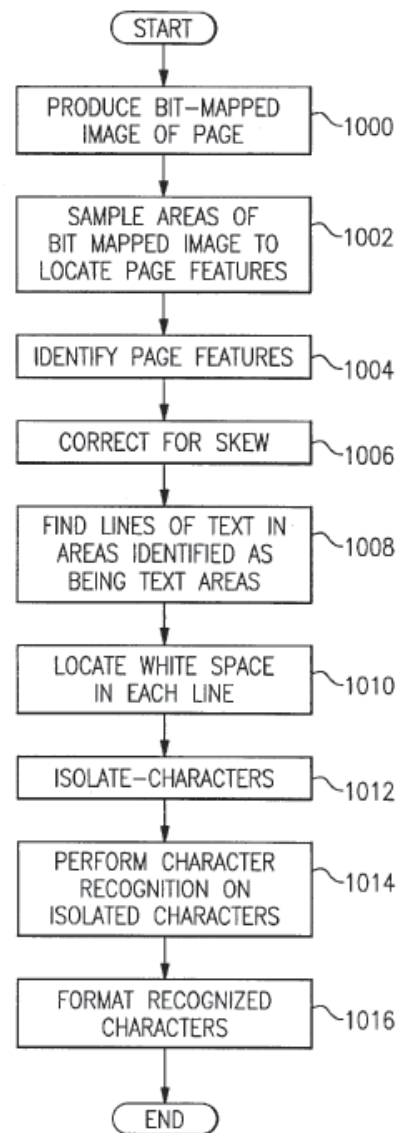
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18B.ii]	<p>decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type;</p>	<p>Ehrhart discloses decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type.</p> <p><i>Id.</i> at [18Pre-B].</p> <p>“As embodied herein and depicted in FIG. 13, an example of image association in accordance with the present invention is disclosed. One or ordinary skill in the art will recognize that associated images 1300 can be disposed on paper, displayed electronically on display 60, or displayed electronically using other electronic means, such as a computer monitor. In this example, the first image captured is color photograph 1302 which shows a damaged parcel. The second image captured is bar code 1304 affixed to the side of the damaged parcel. Processor 40 decodes bar code 1304 and associates decoded bar code data 1306 with color photograph 1302. In this example, the user elected to associate a third image, signature 1308. Thus, personnel viewing record 1300 may reasonably conclude that a damaged parcel was delivered</p>

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		<p>to Company XYZ, and that the person signing for the parcel delivery was someone named John W. Smith.” Ehrhart at 13:27-43.</p> <p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p> <p>“In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In Step 1014, a character recognition algorithm is used in an attempt to recognize each individual character.” Ehrhart at 12:55-66.</p> <p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p>

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**FIG. 10**

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		Ehrhart at Fig. 10.

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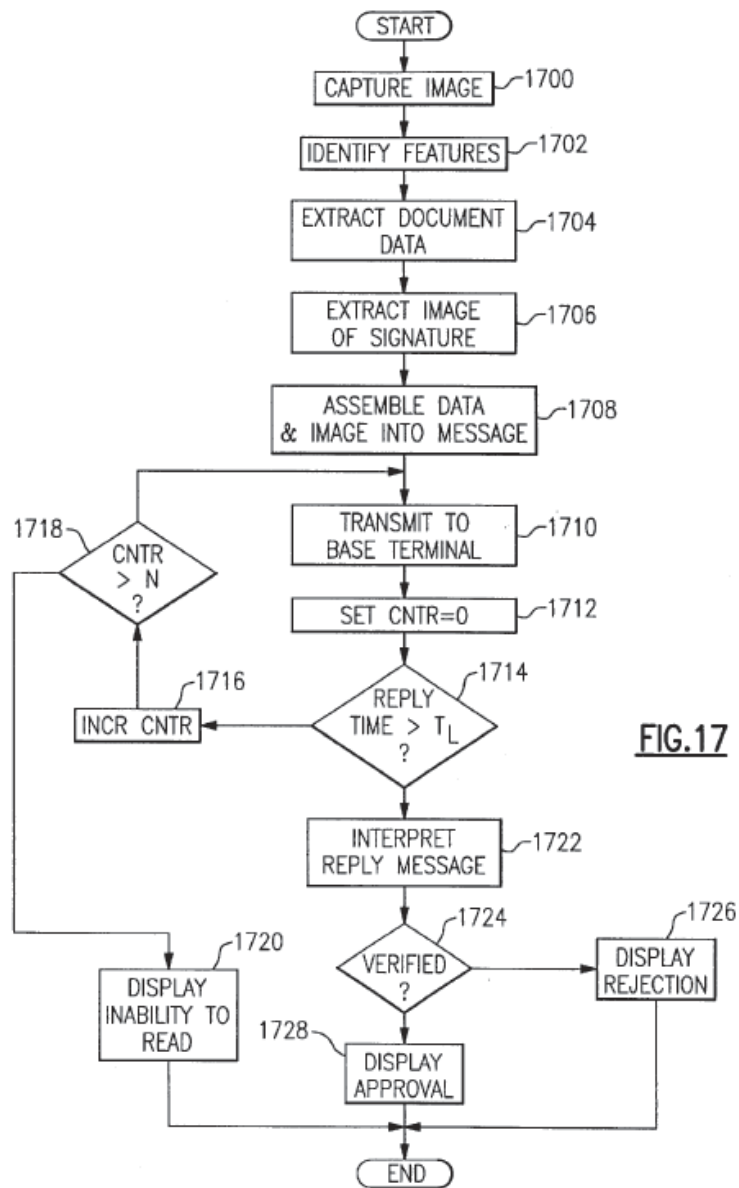


FIG. 17

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18C]	<p>providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information; and</p>	<p>Ehrhart discloses providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information.</p> <p><i>Id.</i> at [18Pre-B].</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18D]	<p>allowing the mobile device to receive the pertinent information over a network.</p>	<p>Ehrhart discloses allowing the mobile device to receive the pertinent information over a network.</p> <p><i>Id.</i> at [18Pre-C].</p> <p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14, alphanumeric key pad 16, and display 60. In one embodiment, function keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG.</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100. Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 26**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
26	The method of claim 18, wherein the data relating to the image comprises the image.	Ehrhart discloses the method of claim 18, wherein the data relating to the image comprises the image.

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		<p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p> <p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.” Ehrhart at 10:5-20.</p> <p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p>
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		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 27**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
27	<p>The method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p>	<p>Ehrhart discloses the method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p> <p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a</p>

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		<p>signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.” Ehrhart at 10:5-20.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 29**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
29	<p>The method of claim 18, wherein image processing further includes converting at least a portion of the data relating to the image into a grayscale image.</p>	<p>Ehrhart discloses converting at least a portion of the data relating to the image into a grayscale image.</p> <p><i>Id.</i> at 18.</p> <p>“In another embodiment, processor 40 creates a gray-Scale image to determine whether the image includes a graphical Symbol.” Ehrhart at 9:54-56.</p> <p>“As embodied herein and depicted in FIG. 10, a flow chart showing a method for reading text in accordance with yet another embodiment of the present invention is disclosed. This routine can be accessed in a number of ways as described above. In step 1000, a bit-map image of the page is produced. In step 1002, the bit mapped</p>

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		<p>image is sampled. In one embodiment, this is performed by analyzing every Nth scan line of the bit mapped image. The value of integer N is dependent on the resolution of the scanned image. In one embodiment the image is sampled every {fraction (1/40)}th of an inch. This provides sufficient resolution to locate and classify the various regions on the page. By sampling every {fraction (1/40)}th of an inch instead of every scan line, the processing and memory requirements of reader 10 are substantially reduced. In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In step 1014, a character recognition algorithm is used in an attempt to recognize each individual character. Finally, in step 1016, processor 40 formats the recovered text before storing the text in memory.” Ehrhart at 12:41-67.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 31**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
31	<p>The method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p>	<p>Ehrhart discloses the method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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### Exhibit E-23

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. A statement of reasons and good cause for each supplement in this chart is identified in the cover pleading.

QBIC was known or used by others in the United States and publicly used or on sale in the United States by November 5, 2000. *See generally* W. Niblack et al., *The QBIC Project: Querying Images By Content Using Color, Texture, and Shape*, SPIE Vol. 1908 (1993), pp. 173–187 (IBM0002390–404); M. Flickner et al., *Query by Image and Video Content: The QBIC System (“QBIC”)*, IEEE Sept. 1995, pp. 23–32 (IBM0000893–902); W. Niblack et al., *Updates to the QBIC System*, SPIE Vol. 3312 (1997), pp. 150–161 (IBM 0002419–430); and *Query By Image Content QBIC Demonstration Program*, IBM Research, Sept. 1998 (IBM000747). QBIC is available as prior art at least under 35 U.S.C. § 102(a), (b), and (g), having been known or used by others in the United States and publicly used or on sale in the United States by at least 1995 and certainly by November 5, 2000, including, for example, at <http://libra.uc.davis.edu> through the Art History Department at U.C. Davis; at [www.thinker.org/imagebase/indox-2.htm](http://www.thinker.org/imagebase/indox-2.htm) through the Fine Arts Museum of San Francisco; through demos at <http://www.qbic.almaden.ibm.com>; and through IBM’s commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. *See generally* Deposition of IBM Corporate Representative Myron Flickner, *Nantworks, LLC and Nant Holdings IP, LLC v. Bank of America Corporation and Bank of America, N.A.*, 2:20-cv-07872-GW-PVC (C.D.C.A. 2020) (“Flickner 8/29/23 Depo”) at e.g., 32–33, 39–40, 44, 62–63, 66–67, 72–74, 103–107, 110–112, 127, 163–174, 183–189, 191–195, 215, 219–220, 241, 307–309, 311–317, Exs. 3–13; *see also* Deposition of IBM Corporate Representative Myron Flickner, *Network-1 Technologies, Inc., v. Google LLC and Youtube LLC*, 1:14-cv-09558-PGG (S.D.N.Y. 2019) (“Flickner Depo”), including, e.g., at 13, 14, 15–18, 29–30, 34, 36, 37, 43–46, 48, 58, 60, 61–62, 67–69, 72, 74–76, 84–86, 88–89, 98–100, 102, 106, 113, 125, 135, 152–154, 160–161, 170–172, 180–181, 194, 198–201, 203–205, 215–216, 220–221, and Exs. 1–16.

As shown in the chart below, QBIC anticipates asserted claims 18, 27, 29, and 31 of the ’252 Patent. The disclosures/exemplary citations for each element incorporate the disclosures/exemplary citations of the proceeding limitations. To the extent QBIC is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent QBIC is found not to anticipate any asserted claims or claim elements of the ’252 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified in the cited references and/or or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass

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the accused products, the claims must also be construed to have that same scope when considering whether they are invalid. The following chart incorporates by reference the analysis from Exhibit E-21 for each limitation.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 18**

Element	'252 Claim Recitation	Exemplary Citations in Reference
[18Pre]	A method for retrieving information from image processing, the method comprising:	<p>QBIC discloses a method for retrieving information from image processing, the method comprising:</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images' content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>QBIC Demo (IBM000747)</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p><b>QBIC Demo (IBM000747)</b></p> 

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 13</p> <p><sup>11</sup> And what does QBIC stand for?</p> <p><sup>12</sup> A. Query by image content.</p> <p>Flickner Depo at 40</p> <p><sup>3</sup> Q. Okay. Could you take as -- as you did in</p> <p><sup>4</sup> the query by image search system, could you just</p> <p><sup>5</sup> search a video using this system?</p> <p><sup>6</sup> A. You could search for a key frame and that</p> <p><sup>7</sup> could point you to a video.</p> <p><sup>8</sup> Q. As an input into the system, could you</p> <p><sup>9</sup> search -- could you input a whole video and then</p> <p><sup>10</sup> the system would extract the key frames and then --</p> <p><sup>11</sup> A. Yes.</p> <p><sup>12</sup> Q. -- search that using that?</p> <p><sup>13</sup> A. If I recall correctly, yes.</p> <p><sup>14</sup> Q. Okay. And the way -- the method by which</p> <p><sup>15</sup> it did so, as you mentioned, was -- would it</p> <p><sup>16</sup> extract key frames from the video, extract features</p> <p><sup>17</sup> from those key frames, and then search those</p> <p><sup>18</sup> features; is that right?</p> <p><sup>19</sup> A. Correct.</p> <p>Flickner Depo at 76</p> <p><sup>3</sup> Q. Did the image extender incorporate QBIC</p> <p><sup>4</sup> technology?</p> <p><sup>5</sup> A. I believe it did.</p> <p><sup>6</sup> Q. Did the image extender allow a user of</p> <p><sup>7</sup> the Db2 universal database to search images by</p> <p><sup>8</sup> their content?</p> <p><sup>9</sup> A. I believe it did.</p> <p>Flickner Depo at 89-90</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>11 Q. Was that used to the QBIC system publicly                      12 available anywhere?                      13 A. You mean was the Fine Arts demo                      14 available?                      15 Q. Yes.                      16 A. I think it was on our site, but I can't                      17 remember for...                      18 Q. How did their system work to identify art                      19 prints?                      20 A. Art what?                      21 Q. How would one identify an art print using                      22 their system?                      2 THE DEPONENT: Well, you had a picture --                      3 you could take a picture of a painting and then you                      4 could use that as a query content. And you could,                      5 for example, determine its -- its heritage or its                      6 lineage.                      7 Q. (By Mr. Dang) So you could identify                      8 image about -- or you could identify information                      9 about the painting using the system?                      10 A. Right.</p> <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>



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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <p style="text-align: right;">Page 62</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p>
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right? 1 A. Right. Flickner 8/29/23 Depo at 42</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>4 Q. So let's just start at a high level. Tell 5 me generally what is QBIC? 6 A. QBIC was a technology -- stands for query 7 by image content. It was a way of extracting 8 features of various types, putting those features in 9 a database and then searching the database to get 10 images that looked visually similar or semantically 11 similar. 12 Q. And when you say "semantically similar," 13 what do you mean? 14 A. You could query based on semantics. You 15 could ask for what does a microphone look like and 16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206</p>

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Invalidity Chart for U.S. Patent 7,899,252 based on the Query by Image and Video Content (“QBIC”) System

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.</p> <p>The QBIC system was implemented in IBM commercial products, including in</p>

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		<p>IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. <i>See, e.g.</i>, Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.</p>
[18A]	<p>providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image an image processing platform;</p>	<p>QBIC discloses a mobile device having a camera, where the mobile device is configured to capture an image and configured to transmit data relating to the image an image processing platform.</p> <p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2 / Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93</p>

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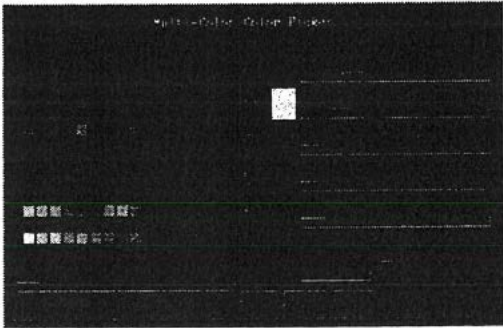
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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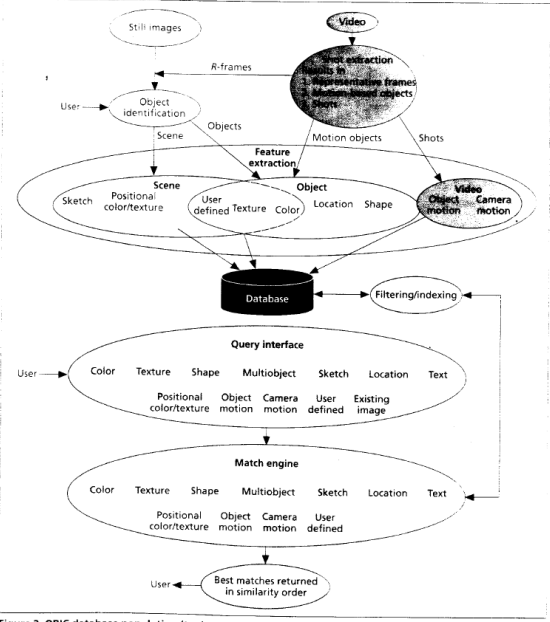
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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.”  <i>Id.</i> at p. 3.</p>



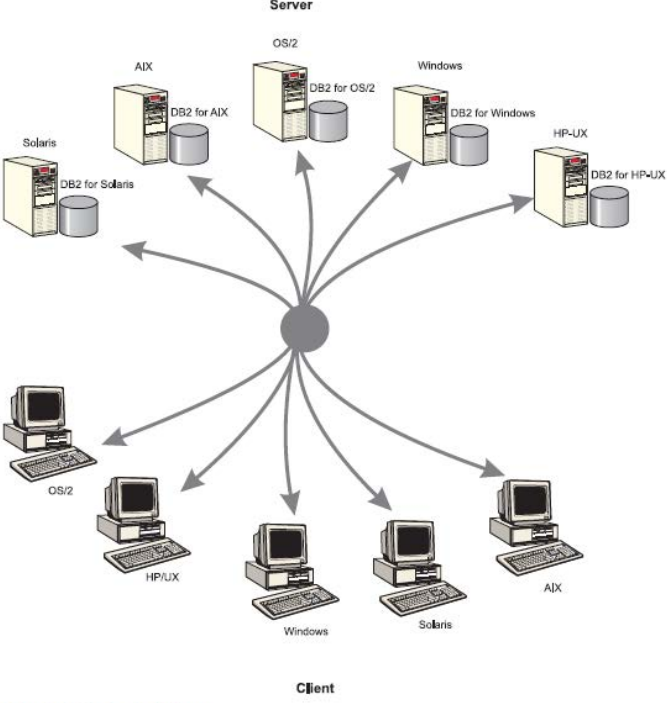
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		 <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):              “DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data. In addition, the extenders give your applications new ways to search for information.” <i>Id.</i> at p. 3.</p>

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		 <p>The diagram, labeled 'Figure 6. DB2 extender platforms', illustrates a central 'Server' at the top connected to various 'Client' systems at the bottom. The server is connected to several database instances: Solaris (DB2 for Solaris), AIX (DB2 for AIX), OS/2 (DB2 for OS/2), Windows (DB2 for Windows), and HP-UX (DB2 for HP-UX). Below the server, there are several client computers, each labeled with an operating system: OS/2, HP/UX, Windows, Solaris, and AIX. Arrows point from the central server to each of these database instances and client systems.</p> <p><i>Figure 6. DB2 extender platforms</i></p> <p><i>Id.</i> at p. 12 (Fig. 6).</p> <p>“The DB2 Extenders run in the DB2 client/server environment. This environment consists of a database server and one or more remote database clients. The DB2 extender services run on the server. Before you can access them, you have to start them.” <i>Id.</i> at p. 47.</p> <p>OS/2 2.1 Ultimea Tools (IBM 0001550–1805):          “Perfect Image/2 can capture or import images and enhance the images for later use in Builder/2. To capture images, the Video Capture Adapter/A must be installed in your micro channel PC. The Video Capture Adapter/A works in conjunction with the video feature in Perfect Image/2 to capture images from live</p>

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		<p>motion video, paused motion video, or a still video player. Input sources can include television, broadcast signals, video camera, VCR, videodisc player, or any other video source that produces the proper video signal.” <i>Id.</i> at p. 63.</p> <p>“Preparing for video capture: A video input device (for example, a VCR, video camera, or laserdisc) must be connected to the VCA before you can capture video images. Refer to your Video Capture Adapter/A reference manual for the correct procedure to connect a video source to the adapter card.” <i>Id.</i> at p. 64.</p> <p>IBM Ultimedia Video I/O Adapter (IBM 0002217–221):                      “Video Capture: The adapter provides video capture on a frame-by-frame (field-by-field) basis of “live” video from a single source. Selection of S-video or CVBS input formats is enabled. The captured video is converted from NTSC (PAL) to YUV. The YUV digital video can be converted to 24-bit RGB, 8-bit dithered RGB, or remain unchanged. . . . Video Monitoring: Monitoring of incoming video data is supported with a graphics adapter and/or a video monitor supported by IBM. The image sizes shown in table #1 are supported for viewing with a supported graphics adapter.” <i>Id.</i> at p. 2.</p>

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		<p>Flickner Depo at 38-41</p> <table border="1"> <tr> <td> <p>1 project at this time?                      2 A. I don't know that.                      3 Q. Okay. Would reviewing -- let's see.                      4 Let's turn to page -- let's turn to page -- this                      5 one is Bates-stamped, so the page ending in                      6 Network1_007316.                      7 Would reviewing this page refresh your                      8 recollection as to whether --                      9 A. Yes.                      10 Q. Okay. Perfect. Feel free.                      11 MR. DeCLERCK: Just give him a chance to                      12 finish his question before you respond.                      13 MR. DANG: Thank you.                      14 THE DEPONENT: Is there a question                      15 standing?                      16 Q. (By Mr. Dang) Sure. Yeah.                      17 So was there any video search                      18 functionality included as part of the QBIC system                      19 at this time?                      20 A. Evidently, yes.                      21 Q. Okay. And how did that video search                      22 functionality work?</p> <p style="text-align: right;">Page 38</p> </td> <td> <p>1 A. You just populate image database using                      2 those images.                      3 Q. Okay. Could you take as -- as you did in                      4 the query by image search system, could you just                      5 search a video using this system?                      6 A. You could search for a key frame and that                      7 could point you to a video.                      8 Q. As an input into the system, could you                      9 search -- could you input a whole video and then --                      10 the system would extract the key frames and then --                      11 A. Yes.                      12 Q. -- search that using that?                      13 A. If I recall correctly, yes.                      14 Q. Okay. And the way -- the method by which                      15 it did so, as you mentioned, was -- would it                      16 extract key frames from the video, extract features                      17 from those key frames, and then search those                      18 features; is that right?                      19 A. Correct.                      20 Q. Okay. Other than the use of shots and                      21 key frames, is there any difference between the                      22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p> </td> </tr> <tr> <td> <p>1 A. You detect shots in -- transitions in                      2 video and then treat -- treat those as still images                      3 in the QBIC system.                      4 Q. So to break that down, you -- what do you                      5 mean by detecting shots?                      6 A. You try to find some key frame in a video                      7 sequence or multiple key frames in a video                      8 sequence, to give you a summarization of the video.                      9 Q. And how would you detect those key                      10 frames?                      11 A. There were algorithms to do it. I didn't                      12 personally work on any of those algorithms.                      13 Q. Are you otherwise aware of any of those                      14 algorithms?                      15 A. Well, they used histogram methodologies.                      16 I remember that.                      17 Q. Okay. So you would take -- you would use                      18 a histogram methodology to extract key frames from                      19 the video; is that what -- is that right?                      20 A. That's one way to do it.                      21 Q. Okay. And then what would you do with                      22 those key frames?</p> <p style="text-align: right;">Page 39</p> </td> <td> <p>1 query by image search system?                      2 A. There may have been.                      3 Q. Can you think of any now?                      4 A. No.                      5 Q. When you searched for -- or when you                      6 searched a video using this system, what would                      7 the -- or what would the system return?                      8 A. I don't remember if we returned the                      9 stills or a small -- small video clip.                      10 Q. Say it returned the stills, could you use                      11 those stills to point you to a video?                      12 A. Yeah.                      13 Q. And how would you do that?                      14 A. Well, the -- each -- each key frame                      15 typically represents a frame in the video. So                      16 there's a -- the key frame is -- is one frame of                      17 the video so you just seek to that point.                      18 Q. So if I'm understanding this right, you                      19 could take a query video, the system would extract                      20 frames, which would then extract features from it,                      21 and then the system would return either shot clips                      22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p> </td> </tr> </table>	<p>1 project at this time?                      2 A. I don't know that.                      3 Q. Okay. Would reviewing -- let's see.                      4 Let's turn to page -- let's turn to page -- this                      5 one is Bates-stamped, so the page ending in                      6 Network1_007316.                      7 Would reviewing this page refresh your                      8 recollection as to whether --                      9 A. Yes.                      10 Q. Okay. Perfect. Feel free.                      11 MR. 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Are you otherwise aware of any of those                      14 algorithms?                      15 A. Well, they used histogram methodologies.                      16 I remember that.                      17 Q. Okay. So you would take -- you would use                      18 a histogram methodology to extract key frames from                      19 the video; is that what -- is that right?                      20 A. That's one way to do it.                      21 Q. Okay. And then what would you do with                      22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?                      2 A. There may have been.                      3 Q. Can you think of any now?                      4 A. No.                      5 Q. When you searched for -- or when you                      6 searched a video using this system, what would                      7 the -- or what would the system return?                      8 A. I don't remember if we returned the                      9 stills or a small -- small video clip.                      10 Q. Say it returned the stills, could you use                      11 those stills to point you to a video?                      12 A. Yeah.                      13 Q. And how would you do that?                      14 A. Well, the -- each -- each key frame                      15 typically represents a frame in the video. So                      16 there's a -- the key frame is -- is one frame of                      17 the video so you just seek to that point.                      18 Q. So if I'm understanding this right, you                      19 could take a query video, the system would extract                      20 frames, which would then extract features from it,                      21 and then the system would return either shot clips                      22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>
<p>1 project at this time?                      2 A. I don't know that.                      3 Q. Okay. Would reviewing -- let's see.                      4 Let's turn to page -- let's turn to page -- this                      5 one is Bates-stamped, so the page ending in                      6 Network1_007316.                      7 Would reviewing this page refresh your                      8 recollection as to whether --                      9 A. Yes.                      10 Q. Okay. Perfect. Feel free.                      11 MR. DeCLERCK: Just give him a chance to                      12 finish his question before you respond.                      13 MR. DANG: Thank you.                      14 THE DEPONENT: Is there a question                      15 standing?                      16 Q. (By Mr. Dang) Sure. Yeah.                      17 So was there any video search                      18 functionality included as part of the QBIC system                      19 at this time?                      20 A. Evidently, yes.                      21 Q. Okay. And how did that video search                      22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using                      2 those images.                      3 Q. Okay. Could you take as -- as you did in                      4 the query by image search system, could you just                      5 search a video using this system?                      6 A. You could search for a key frame and that                      7 could point you to a video.                      8 Q. As an input into the system, could you                      9 search -- could you input a whole video and then --                      10 the system would extract the key frames and then --                      11 A. Yes.                      12 Q. -- search that using that?                      13 A. If I recall correctly, yes.                      14 Q. Okay. And the way -- the method by which                      15 it did so, as you mentioned, was -- would it                      16 extract key frames from the video, extract features                      17 from those key frames, and then search those                      18 features; is that right?                      19 A. Correct.                      20 Q. Okay. Other than the use of shots and                      21 key frames, is there any difference between the                      22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>					
<p>1 A. You detect shots in -- transitions in                      2 video and then treat -- treat those as still images                      3 in the QBIC system.                      4 Q. So to break that down, you -- what do you                      5 mean by detecting shots?                      6 A. You try to find some key frame in a video                      7 sequence or multiple key frames in a video                      8 sequence, to give you a summarization of the video.                      9 Q. And how would you detect those key                      10 frames?                      11 A. There were algorithms to do it. I didn't                      12 personally work on any of those algorithms.                      13 Q. Are you otherwise aware of any of those                      14 algorithms?                      15 A. Well, they used histogram methodologies.                      16 I remember that.                      17 Q. Okay. So you would take -- you would use                      18 a histogram methodology to extract key frames from                      19 the video; is that what -- is that right?                      20 A. That's one way to do it.                      21 Q. Okay. And then what would you do with                      22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?                      2 A. There may have been.                      3 Q. Can you think of any now?                      4 A. No.                      5 Q. When you searched for -- or when you                      6 searched a video using this system, what would                      7 the -- or what would the system return?                      8 A. I don't remember if we returned the                      9 stills or a small -- small video clip.                      10 Q. Say it returned the stills, could you use                      11 those stills to point you to a video?                      12 A. Yeah.                      13 Q. And how would you do that?                      14 A. Well, the -- each -- each key frame                      15 typically represents a frame in the video. So                      16 there's a -- the key frame is -- is one frame of                      17 the video so you just seek to that point.                      18 Q. So if I'm understanding this right, you                      19 could take a query video, the system would extract                      20 frames, which would then extract features from it,                      21 and then the system would return either shot clips                      22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>					

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		<p>Flickner Depo at 139-140</p> <p>22 A. Yeah. We had some -- as I recall, we had</p> <p>1 some proto- -- versions of the system that you</p> <p>2 could bring in external image either through an URL</p> <p>3 or through an upload.</p> <p>Flickner Depo at 125</p> <p>6 Q. A user couldn't simply submit an image</p> <p>7 file in place of -- of a QBIC query in SQL</p> <p>8 language, is that right, in this version of QBIC?</p> <p>9 A. There probably was a way of specifying an</p> <p>10 external image. I think you probably imported --</p> <p>11 you had to do a SQL statement and -- to add the</p> <p>12 image, compute its features, and then query, I</p> <p>13 guess, the features that...</p> <p>Flickner 8/29/23 Depo at 53</p> <p>4 Q. So if you look at -- under 2.1 Database</p> <p>5 Population, it says, "The first step in population</p> <p>6 is to simply load the images into the system."</p> <p>7 Is that right?</p> <p>8 A. Yep.</p> <p>9 Q. And the next sentence says then you can</p> <p>0 also add the image to the database, preparing a</p> <p>1 reduced thumbnail and adding any available text</p> <p>2 information to the database.</p> <p>3 A. Yep.</p> <p>4 Q. Is that correct?</p> <p>5 A. Yep.</p> <p><i>Id.</i> at 60–61</p>

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		<p>13 Q. Okay. Did you do that type of                      14 segmentation to differentiate foreground objects                      15 from the background in this database population                      16 step?                      17 A. We did research prototypes of it. I don't                      18 know what all went out.                      19 Q. You don't know whether those made it into                      20 a commercial product?                      21 A. I would say they probably didn't.                      22 Q. Okay. Were they in the -- were they used                      23 in the -- in demo applications that you referred to?                      24 A. They might have been.                      25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                      2 with those objects? Were they stored, for example,                      3 as a separate image or were they somehow linked to                      4 or associated with the image from which they were                      5 extracted?                      6 A. Typically they were linked.                      7 Q. They were linked to the source image?                      8 A. Yeah.</p> <p><i>Id.</i> at 32–33</p>

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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah.</p> <p><i>Id.</i> at 74–75</p>

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			<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202</p>

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		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300</p> <p>6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312</p>

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		<p style="text-align: right;">Page 312</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p> <p><i>See also</i> Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to</p>

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		<p>combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the '252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. '252 Patent, 3:7-16. Indeed, the '252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee’s own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
[18B]	<p>configuring the image processing platform to receive the data relating to the image and to conduct image processing, including:</p>	<p>QBIC discloses configuring the image processing platform to receive the data relating to the image and to conduct image processing.</p>

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		<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390.</p> <p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <math>MTM</math> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <math>MTM</math> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2 / Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <i>m</i> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <i>w</i> the width of the image in pixels and <i>h</i> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93</p>

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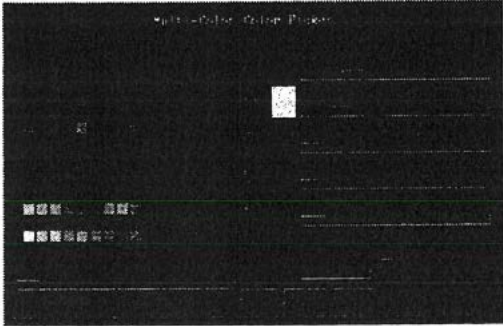
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>



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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.</p> <p>For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2. Videos</p>

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Invalidity Chart for U.S. Patent 7,899,252 based on the Query by Image and Video Content (“QBIC”) System

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		<p>are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“DATABASE POPULATION</b></p> <p>In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like ‘baby on beach,’ can be associated with an outlined object or with the scene as a whole.</p> <p><b>Object-outlining tools</b></p> <p>Ideally, object identification would be automatic, but this is generally difficult. The alternative—manual identification—is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised segmentation methods along with a foreground/background model to identify objects in a restricted class of images. The images, typical of museums and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.</p> <p>We also provide semiautomatic tools for identifying objects. One is an enhanced flood-fill technique. Flood-fill methods, found in most photo-editing programs,</p>

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		<p>start from a single object pixel and repeatedly add adjacent pixels whose values are within some given threshold of the original pixel. Selecting the threshold, which must change from image to image and object to object, is tedious. We automatically calculate a dynamic threshold by having the user click on background as well as object points. For reasonably uniform objects that are distinct from the background, this operation allows fast object identification without manually adjusting a threshold. The example in Figure 3 shows an object, a fox, identified by using only a few clicks.</p> <p>We designed another outlining tool to help users track object edges. This tool takes a user-drawn curve and automatically aligns it with nearby image edges. Based on the ‘snakes’ concept developed in recent computer vision research, the tool finds the curve that maximizes the image gradient magnitude along the curve. The spline snake formulation we use allows for smooth solutions to the resulting nonlinear minimization problem. The computation is done at interactive speeds so that, as the user draws a curve, it is ‘rubber-banded’ to lie along object boundaries.</p> <p>...</p> <p><b>Video data</b></p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that</p>

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		<p>search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“ A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content. You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b>                      The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b>                      Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b>                      The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b>                      Measures the coarseness, contrast, and directionality of an image. Coarseness</p>

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		<p>indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>Flickner Depo at 21</p>

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		<p>1 Q. And you mentioned that you would extract                  2 features from the images?                  3 A. We did.                  4 Q. How would you do that?                  5 A. We ran algorithms on the pixels of the                  6 image and from that we created a feature.                  7 Q. What sort of features would you extract                  8 from the images?                  9 A. A QBIC system did color, shape and                  10 texture.                  11 Q. Okay. So let's take color.                  12 How would you, say, extract a color                  13 feature from an image?                  14 A. We typically would compute -- compute a                  15 color histogram.                  16 Q. And what's a color histogram?                  17 A. It's a measure of -- it's an estimate of                  18 the probability density of a color being in an                  19 image.                  20 Q. So you would take an image and extract                  21 that color histogram from it?                  22 A. Yup.</p> <p>Flickner Depo at 212-213</p>

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		<p>7 Q. So comparing your -- the understanding of              8 CueVideo that you've described so far and this              9 manual, would you -- would you defer to the              10 description of the product in this manual as              11 opposed to your own recollection?              12 Please -- please feel free to review the              13 document.              14 A. Okay.              15 MR. DANG: Objection. Lacks foundation.              16 Q. (By Ms. Hayden) Let's go through the --              17 let's go through a couple specific questions about              18 the document, and then I can re-ask -- re-ask my              19 question.              20 If you can turn to page -- the page --              21 page 9 or the page that's Bates-stamped 100044.              22 There's -- there's a point that's numbered point 2.</p> <p style="text-align: right;">Page 212</p> <hr/> <p>1 Point 1 is the "Preprocessing." And then point 2              2 is the generation of shot boundary index and              3 speech -- speech index.              4 For the -- I know that there was some              5 description of a video system in one of the              6 articles we discussed, the -- the one that you              7 had -- had been the first author on.              8 Is it your -- from this description, is              9 the shot boundary index similar to what was              10 described in that article?              11 MR. DANG: Objection. Lacks foundation.              12 THE DEPONENT: Yes.</p> <p>Flickner Depo at 72-73</p>

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		<p>21 Q. Did MediaMiner support any indexing                  22 structures for the image database?</p> <p style="text-align: right;">Page 72</p> <hr/> <p>1 MS. HAYDEN: Objection. Foundation.                  2 THE DEPONENT: I don't remember.                  3 Q. (By Mr. Dang) Turn to page 735 at the                  4 bottom, the Bates number ending in 735.                  5 You see on the third bullet on this page                  6 it says "Indexing of images as an automatic                  7 preprocessing step."                  8 What does that mean?                  9 A. When you create the database, you build                  10 the indexes.                  11 Q. What indexes could you incorporate?                  12 A. Any -- any index your scheme has                  13 supported.                  14 Q. Could you incorporate a clustered index?                  15 A. You could.                  16 Q. Could you incorporate specifically that                  17 clustering index that was mentioned in the 1998                  18 paper?                  19 MS. HAYDEN: Objection. Calls for                  20 speculation.                  21 THE DEPONENT: You could.                  22</p> <p>Flickner Depo at 54-55</p>



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		<p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <p style="text-align: right;">Page 54</p> <hr/> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.                      17 Q. Was there any metadata returned with the                      18 trademarks?                      19 A. I'm sure there was.</p>

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		<p>Flickner Depo at 89-90</p> <p>11 Q. Was that used to the QBIC system publicly                      12 available anywhere?</p> <p>13 A. You mean was the Fine Arts demo                      14 available?</p> <p>15 Q. Yes.</p> <p>16 A. I think it was on our site, but I can't                      17 remember for...</p> <p>18 Q. How did their system work to identify art                      19 prints?</p> <p>20 A. Art what?</p> <p>21 Q. How would one identify an art print using                      22 their system?</p> <p>2 THE DEPONENT: Well, you had a picture --                      3 you could take a picture of a painting and then you                      4 could use that as a query content. And you could,                      5 for example, determine its -- its heritage or its                      6 lineage.</p> <p>7 Q. (By Mr. Dang) So you could identify                      8 image about -- or you could identify information                      9 about the painting using the system?</p> <p>10 A. Right.</p>

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		<p>Flickner Depo at 88</p> <p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.</p> <p>Flickner Depo at 50</p> <p>7 Q. And so if I clicked on this T, and it              8 used the texture features, what would -- what would              9 the system do?              10 A. It would return the list of stamps based              11 on similarity and texture.              12 Q. And how would it decide which stamps were              13 the most similar to that query image?              14 A. It would use those texture features to              15 compute it, and then it -- I think it was using L              16 to distance.</p> <p>Flickner Depo at 78-79</p>

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		<p>6 Q. How would the Db2 universal search a                      7 query image using QBIC technology?                      8 A. You would create a -- create a manager                      9 QB- -- or create a QBIC catalog.                      10 Q. What's a QBIC catalog?                      11 A. It's an instance of a table that has a                      12 bunch of images in it.                      13 Q. And forgive me, what's an instance of a                      14 table?                      15 A. You create a table -- create a database,                      16 and then in the database you create a table and you                      17 have maybe like a file name, and then the actual                      18 image bits into it.                      19 Q. And how would you search for images using                      20 that table?                      21 A. You could search -- you could use                      22 whatever you wanted to for the -- the SQL query</p> <p style="text-align: right;">Page 78</p> <hr/> <p>1 to -- to filter, and then that would give you a                      2 list of results. And then you'd rank all of those                      3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 201-202</p>

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		<p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p>

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		<p>1 with -- where you already -- you had already sought</p> <p>2 to the -- the point of the -- of the match.</p> <p>3 Q. Would it return the same video as the</p> <p>4 query video?</p> <p>5 A. It would -- it would return snippets, as</p> <p>6 I recall.</p> <p>7 Q. And snippets of which videos?</p> <p>8 A. Of the video that's -- the -- that the</p> <p>9 database has been created with.</p> <p>10 Q. Were those video snippets indexed in any</p> <p>11 way?</p> <p>12 A. I'm sure they were.</p> <p>Flickner Depo at 22-25</p>

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		<p>1 Q. Okay. And what would you do with the 2 image after you hit and extracted the color 3 histogram from it? 4 A. Nothing. 5 Q. Would those features be stored in any 6 database or -- 7 A. Yes. 8 Q. Okay. And let's do -- what about 9 texture, could you extract texture features from an 10 image? 11 A. We did. 12 Q. And how would you do that? 13 A. I don't remember exact features we were 14 using. There were -- we published some papers on 15 them. 16 Q. Okay. Was there any reasoning behind 17 picking the features that you chose? 18 A. Yes. 19 Q. And what was that reasoning? 20 A. We wanted to make it so that the results 21 were perceptually good. 22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red 2 color in it or some sort red color histogram; is 3 that right? 4 A. Well, you -- you take specific -- you 5 search for a red color. You'd compute the 6 histogram and then basically match the histogram, 7 which would give you images that had more colors in 8 the reds. This is not -- it's not a unique thing. 9 Q. Were you always searching for a 10 particular feature, or could you just search some 11 sort of example image? 12 A. We could search an example image. 13 Q. And how would that process work? 14 A. Just extract the features from it. 15 Q. So let's break that down. 16 So you would submit an example image to 17 the -- to the system, right? 18 A. Uh-huh. 19 Q. And then how do the -- how -- how does 20 the system select which features to extract? 21 A. It would compute them all, typically, or 22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that 2 this is a better match, that the ordering was 3 reasonable and... 4 Q. So by that, do you mean that people would 5 view the results returned as the closest or close 6 matches to your -- to your image? 7 A. It was -- it would satisfy their query. 8 Q. Okay. So -- so you would have this set 9 of features in your database. 10 How would you search for those features? 11 A. Typically, we -- initially, we did linear 12 scan where you just actually evaluate the -- the 13 distance metric against all the features. 14 Q. So in linear scan, you would compare some 15 sort of search term against all the features in the 16 database? 17 A. Well, it depends on which features you're 18 using. You didn't have to use all the features. 19 You could use just color features or just texture 20 features or just... 21 Q. So to make sure I'm understanding this 22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with 2 those features that it had extracted from that 3 example? 4 A. Then it became the reference point to the 5 search. 6 Q. And by research point to the search, what 7 do you mean? 8 A. So you have a vector in -- in the 9 individual space. 10 (Reporter clarification.) 11 A. That -- that query represents a point in 12 that space, and you're looking for other things 13 near that space or ordered by that space. 14 Q. And by other things near that space, is 15 that the other features that are in the -- in the 16 database? 17 A. Yes. 18 Q. Okay. So at bottom then, you would -- 19 you would take the image, the system would extract 20 features from it, and then those features would be 21 searched against the reference database -- the 22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>

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		<p>Flickner Depo at 159</p> <p>10 Q. Would either version of the stamps demo                      11 allow a user to submit an unknown image as the                      12 query and ask the system to find images similar to                      13 that query image?                      14 A. I suspect it did.                      15 Q. Why do you suspect that?                      16 A. Because that's one of the nice things you                      17 can do with QBIC.</p> <p>Flickner Depo at 209-210</p> <p>13 Q. Okay. Let me ask -- let me ask that                      14 question using -- using an example.                      15 Say I had a file that -- that was a                      16 snippet of a Star Wars movie.                      17 Could the CueVideo system take that                      18 snippet of the -- of a Star Wars movie and indicate                      19 to the user what Star Wars movie that snippet is                      20 from?                      21 A. Most likely, yes.                      22 Q. And how do you know that?                      1 A. Based on my knowledge in content-based                      2 imagery -- content-based retrieval, in general,                      3 that would be one of the first things you would try                      4 to implement in a video search system.</p> <p>Flickner Depo at 36</p>



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		<p>10 Q. So underlying this paper, you mentioned</p> <p>11 you did more work on the shape side of things; is</p> <p>12 that right?</p> <p>13 A. I did.</p> <p>14 Q. And what would that work have entailed?</p> <p>15 A. We wanted to query by shape.</p> <p>16 Q. Okay. And how would that have worked?</p> <p>17 A. We created features related to the shape</p> <p>18 of a -- the object of -- as it populated the</p> <p>19 database, and then we would query against those</p> <p>20 features.</p> <p>Flickner Depo at 38-41</p>

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		<p>1 project at this time?</p> <p>2 A. I don't know that.</p> <p>3 Q. Okay. Would reviewing -- let's see.</p> <p>4 Let's turn to page -- let's turn to page -- this</p> <p>5 one is Bates-stamped, so the page ending in</p> <p>6 Network1_007316.</p> <p>7 Would reviewing this page refresh your</p> <p>8 recollection as to whether --</p> <p>9 A. Yes.</p> <p>10 Q. Okay. Perfect. Feel free.</p> <p>11 MR. DeCLERCK: Just give him a chance to</p> <p>12 finish his question before you respond.</p> <p>13 MR. DANG: Thank you.</p> <p>14 THE DEPONENT: Is there a question</p> <p>15 standing?</p> <p>16 Q. (By Mr. Dang) Sure. Yeah.</p> <p>17 So was there any video search</p> <p>18 functionality included as part of the QBIC system</p> <p>19 at this time?</p> <p>20 A. Evidently, yes.</p> <p>21 Q. Okay. And how did that video search</p> <p>22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using</p> <p>2 those images.</p> <p>3 Q. Okay. Could you take as -- as you did in</p> <p>4 the query by image search system, could you just</p> <p>5 search a video using this system?</p> <p>6 A. You could search for a key frame and that</p> <p>7 could point you to a video.</p> <p>8 Q. As an input into the system, could you</p> <p>9 search -- could you input a whole video and then</p> <p>10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which</p> <p>15 it did so, as you mentioned, was -- would it</p> <p>16 extract key frames from the video, extract features</p> <p>17 from those key frames, and then search those</p> <p>18 features; is that right?</p> <p>19 A. Correct.</p> <p>20 Q. Okay. Other than the use of shots and</p> <p>21 key frames, is there any difference between the</p> <p>22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>
		<p>1 A. You detect shots in -- transitions in</p> <p>2 video and then treat -- treat those as still images</p> <p>3 in the QBIC system.</p> <p>4 Q. So to break that down, you -- what do you</p> <p>5 mean by detecting shots?</p> <p>6 A. You try to find some key frame in a video</p> <p>7 sequence or multiple key frames in a video</p> <p>8 sequence, to give you a summarization of the video.</p> <p>9 Q. And how would you detect those key</p> <p>10 frames?</p> <p>11 A. There were algorithms to do it. I didn't</p> <p>12 personally work on any of those algorithms.</p> <p>13 Q. Are you otherwise aware of any of those</p> <p>14 algorithms?</p> <p>15 A. Well, they used histogram methodologies.</p> <p>16 I remember that.</p> <p>17 Q. Okay. So you would take -- you would use</p> <p>18 a histogram methodology to extract key frames from</p> <p>19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with</p> <p>22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?</p> <p>2 A. There may have been.</p> <p>3 Q. Can you think of any now?</p> <p>4 A. No.</p> <p>5 Q. When you searched for -- or when you</p> <p>6 searched a video using this system, what would</p> <p>7 the -- or what would the system return?</p> <p>8 A. I don't remember if we returned the</p> <p>9 stills or a small -- small video clip.</p> <p>10 Q. Say it returned the stills, could you use</p> <p>11 those stills to point you to a video?</p> <p>12 A. Yeah.</p> <p>13 Q. And how would you do that?</p> <p>14 A. Well, the -- each -- each key frame</p> <p>15 typically represents a frame in the video. So</p> <p>16 there's a -- the key frame is -- is one frame of</p> <p>17 the video so you just seek to that point.</p> <p>18 Q. So if I'm understanding this right, you</p> <p>19 could take a query video, the system would extract</p> <p>20 frames, which would then extract features from it,</p> <p>21 and then the system would return either shot clips</p> <p>22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><i>See also</i> Flickner Depo at 40-42, 87.</p> <p><i>See also</i> Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p> <p>Flickner 8/29/23 Depo at 79–80</p>

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		<p>16 Q. Well, for example, if, for example, you --</p> <p>17 the image was sourced from a camera and there was a</p> <p>18 noise from the image sensor on the image, were there</p> <p>19 any methodologies used by IBM in the QBIC system to</p> <p>20 reduce that noise or grain in the image?</p> <p>21 A. I don't recall.</p> <p>22 Q. What about -- and, again, I'm talking</p> <p>23 about preprocessing steps, before you're actually</p> <p>24 extracting features.</p> <p>25 Were there any methodologies to enhance</p> <hr/> <p style="text-align: right;">Page 79</p> <p>1 the contrast of the image?</p> <p>2 A. I don't remember.</p> <p>3 Q. What about resizing the image?</p> <p>4 A. We did -- we probably supported that on</p> <p>5 import.</p> <p>6 Q. Say again?</p> <p>7 A. We supported that on -- most likely we</p> <p>8 supported that on import, on read.</p> <p>9 So the read, you request a particular</p> <p>10 size.</p> <p>11 Q. You're going to have to repeat it. I</p> <p>12 didn't understand you.</p> <p>13 MR. STRAUSSMAN: And speak up.</p> <p>14 THE WITNESS: So resizing would be done</p> <p>15 typically when you import the image into the system.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. Okay. So if you're importing the image</p> <p>18 into the database, is that what you're talking</p> <p>19 about?</p> <p>20 A. Correct.</p> <p>21 Q. Okay. And at that point you would resize</p> <p>22 the image to reduce the size?</p>

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		<p>1 How would you resize the image on</p> <p>2 importation?</p> <p>3 A. You would request a particular size of</p> <p>4 image and then use that to populate the database.</p> <p>5 Q. So if the source images that you were</p> <p>6 acquiring were say too big for purposes of QBIC, on</p> <p>7 importation you could resize those to get them to</p> <p>8 the size that are -- meet the -- meet the</p> <p>9 requirements of the QBIC system?</p> <p>10 A. Yes.</p> <p>11 Q. Was that done as a matter of course in the</p> <p>12 QBIC system?</p> <p>13 MR. HANSEN: Objection; vague and ambiguous.</p> <p>14 THE WITNESS: As I recall, yes.</p> <p>15 BY MR. EDWARDS:</p> <p>16 Q. Was it an automatic process?</p> <p>17 A. As I recall, yes.</p> <p>18 Q. So if a user were to import source images</p> <p>19 into the database, when the user did that, the QBIC</p> <p>20 system would automatically resize it to fit the</p> <p>21 requirement of the QBIC system?</p> <p>22 A. Make sure it's in the range that the QBIC</p> <p>23 system could handle.</p> <p>24 Q. That's a "yes"?</p> <p>25 A. That's a "yes."</p> <p><i>Id.</i> at 80–81</p>

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		<p>6 Q. How about converting the images to binary?</p> <p>7 A. Threshold. There probably was a threshold</p> <p>8 control.</p> <p>9 Q. And what do you mean by "threshold</p> <p>10 control"?</p> <p>11 A. Just change the value of the threshold.</p> <p>12 You make a binary decision, is a pixel bigger than</p> <p>13 a -- is a pixel bigger than a particular number or</p> <p>14 is it smaller and you put a 01 based on that.</p> <p>15 Q. And that would have been done prior to</p> <p>16 feature extraction?</p> <p>17 A. For some features it would be done that</p> <p>18 way.</p> <p>19 Q. So, for example, for shape, was it</p> <p>20 required to convert the image to binary before you</p> <p>21 did your shape analysis?</p> <p>22 A. No.</p> <p>23 Q. Were there any other features that, as</p> <p>24 part of the -- as part of the extraction process,</p> <p>25 the image had to be converted to binary before?</p>

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		<p>2        Were there any features that required the</p> <p>3 image to be converted to binary before the features</p> <p>4 were extracted?</p> <p>5        A. Some features required a binary image,</p> <p>6 yeah.</p> <p>7        Q. Which ones?</p> <p>8        A. Some of the texture features.</p> <p>9        Q. And when you say "some of the texture</p> <p>10 features," do you -- do you recall which ones?</p> <p>11        A. No.</p> <p>12        Q. Let's put a pin in that because we're</p> <p>13 going to get to it.</p> <p>14        What about gray scale? Were any images</p> <p>15 converted to gray scale before features were</p> <p>16 extracted?</p> <p>17        A. Yes.</p> <p>18        Q. Which -- for which features?</p> <p>19        A. For shape, for texture.</p> <p>20        Q. Any others?</p> <p>21        A. Color wouldn't make any difference.</p> <p>22        That's all I can think of.</p> <p>23        Q. At least for shape and texture?</p> <p>24        A. Yeah.</p> <p><i>Id.</i> at 94–97</p> <p>18        Q. So that's why I ask is it the first step</p> <p>19 in calculating shape to convert the image to binary?</p> <p>20        A. Yes.</p> <p><i>Id.</i> at 101–102</p>

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		<p>3           Okay. So first sketch used something</p> <p>4 called an edge map of each image?</p> <p>5           A. Yeah.</p> <p>6           Q. What is an edge map?</p> <p>7           A. It's an estimate of the edges, the major</p> <p>8 edges of the image.</p> <p>9           Q. Okay. Sort of the outline; is that fair?</p> <p>10          A. The outline is slightly different, but</p> <p>11 outlines would be closed, whereas sketch would --</p> <p>12 you didn't have to always do closed objects, you</p> <p>13 could do -- you could draw a circle or you could</p> <p>14 also draw a U.</p> <p>15          The circle would find sun-like objects and</p> <p>16 the U would find things that had a dominant curve --</p> <p>17 turn to it.</p> <p>18          Q. So you could draw -- so, for example, you</p> <p>19 could draw a flower --</p> <p>20          A. Right.</p> <p>21          Q. -- have the circle part for the flower and</p> <p>22 then for the stem it would just be a line?</p> <p>23          And that's where you're saying --</p> <p>24          A. Right.</p> <p>25          Q. -- it doesn't necessarily -- it's broader</p>



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		<p>1 than outline?</p> <p>2 A. Right.</p> <p>3 Q. Understood. Okay.</p> <p>4 And so the steps are you would convert the</p> <p>5 image to binary to calculate the sketch feature;</p> <p>6 right?</p> <p>7 A. No, you're inputting . . . I'm not sure</p> <p>8 how we did database population. Give me a minute.</p> <p>9 Yeah, it was done on a binary image.</p> <p>10 Q. Okay. So you convert the image to binary</p> <p>11 image; right?</p> <p>12 A. Right, using a Canny edge operator.</p> <p>13 Q. Okay. And then that gives you a binary</p> <p>14 edge map?</p> <p>15 A. Right.</p> <p>16 Q. All right. And then you reduce the size</p> <p>17 of that binary edge map?</p> <p>18 A. Right.</p> <p><i>Id.</i> at 140–141</p>

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		<p>23 Q. So if I needed to resize the image we                  24 would need to do that -- the system would do that                  25 before features are extracted from the image query?</p> <hr/> <p style="text-align: right;">Page 141</p> <p>1 A. Yes.                  2 Q. And for certain things, like you said, for                  3 like texture and shape, for example, you had to                  4 convert the image to binary, as an example, that                  5 would need to be done for the image query -- the                  6 image query image as well; correct?                  7 A. Correct.</p> <p><i>Id.</i> at 164–165</p>

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		<p>14 Q. All right. Let's flip forward to 2429.                      15 And is 2429 a screenshot of a trademark                      16 demo that was also available in the Almaden --                      17 excuse me -- almaden.ibm website?                      18 A. Yes.                      19 Q. Okay. And that demo looks like the                      20 trademark query is based on shape; is that right?                      21 A. It uses shape as one similarity feature.                      22 Q. Right. So the trademarks are converted to                      23 a binary image, like we talked before -- talked                      24 about before, and then they're -- the matching                      25 process is done based on those binary images?</p> <hr/> <p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.                      2 Q. Okay. And here we're showing the query                      3 image is a -- is a heart -- a heart pattern with                      4 Love's next to it. It's in the top part of the                      5 screenshot.                      6 A. Yep.</p> <p><i>Id.</i> at 82</p> <p>12 Q. Let's put a pin in that because we're                      13 going to get to it.                      14 What about gray scale? Were any images                      15 converted to gray scale before features were                      16 extracted?                      17 A. Yes.                      18 Q. Which -- for which features?                      19 A. For shape, for texture.</p>

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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the ’252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. ’252 Patent, 3:7-16. Indeed, the ’252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee’s own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
[18B.i]	operating on the data relating to the image to determine if the image contains one or more recognizable symbols; and	QBIC discloses operating on the data relating to the image to determine if the image contains one or more recognizable symbols.

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2 / Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93</p>

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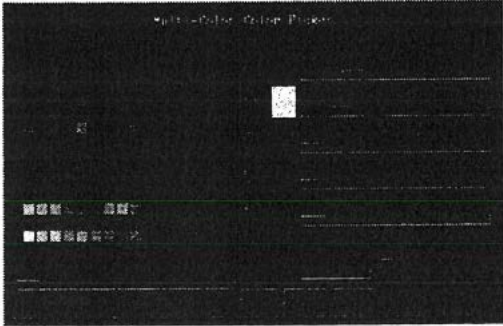
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>



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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>


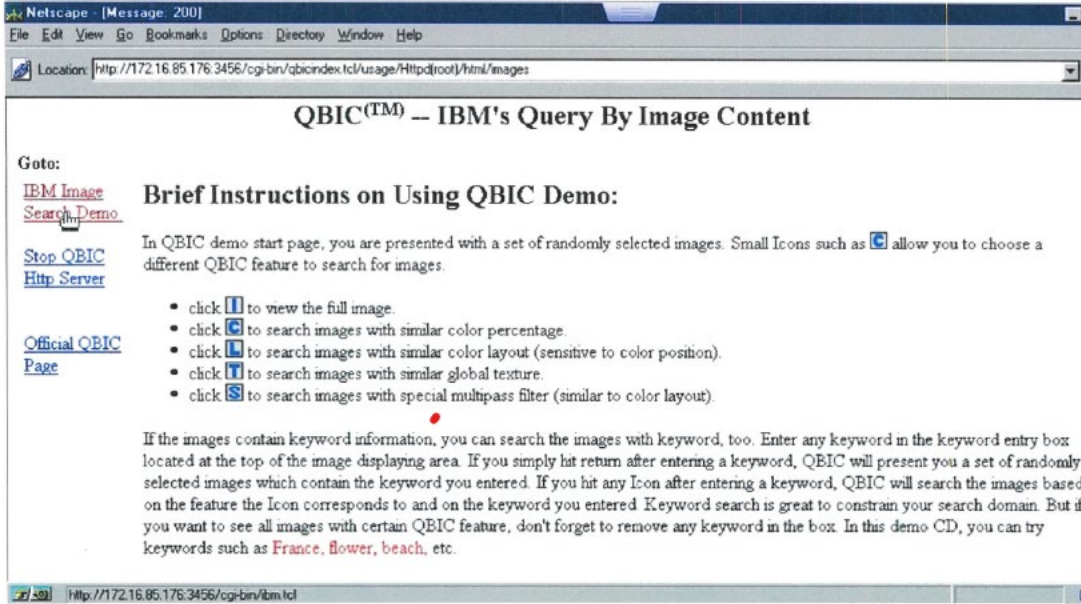
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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data. In addition, the extenders give your applications new ways to search for information.” <i>Id.</i> at p. 3.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>QBIC Demo (IBM000747)</p>


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		 <p>Flickner 8/31/23 Depo at Ex. 6 at 1</p> 

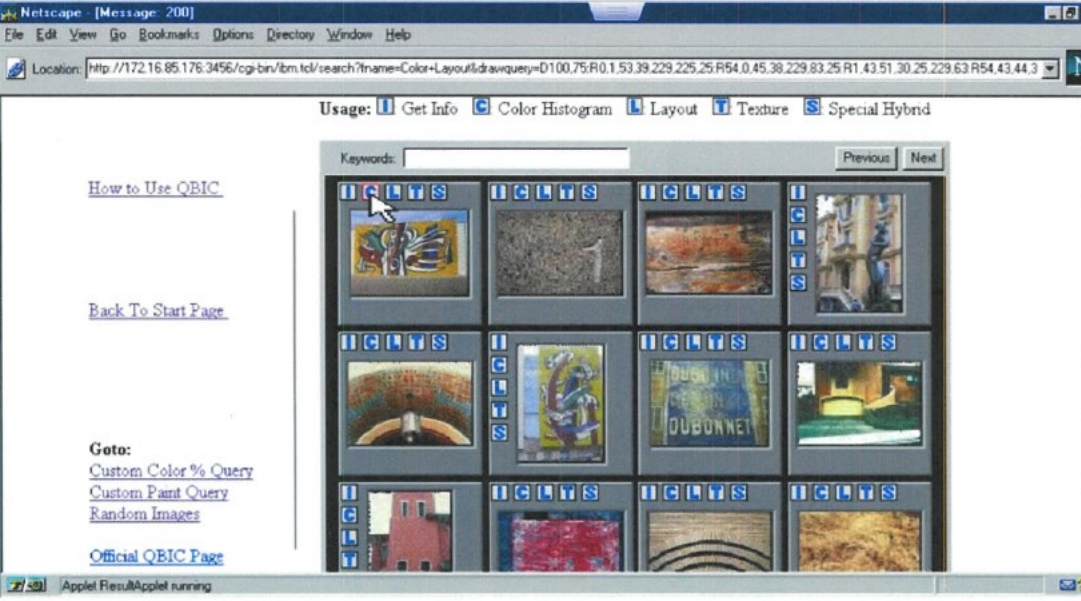
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		<p><i>Id.</i> at 2.</p>  <p>Flickner 8/31/23 Depo Ex. 7 at 1</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>




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		 <p>Flickner 8/31/23 Depo at Ex. 8</p>


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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>

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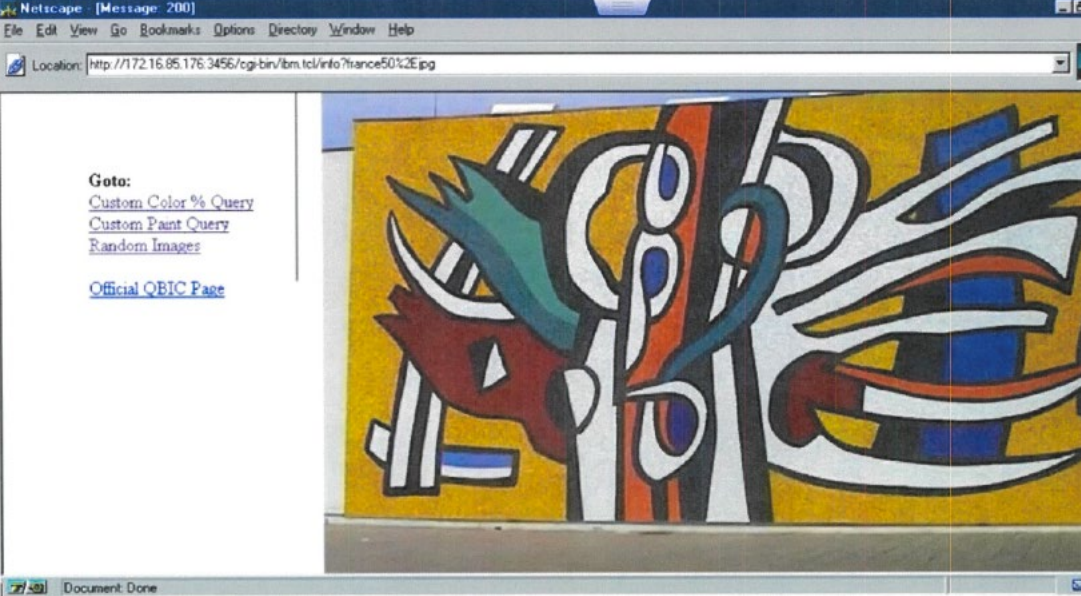
Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>The screenshot shows a Netscape browser window with the title bar "Netscape - [Message: 200]". The address bar contains the URL "http://172.16.85.175:3456/cgi-bin/lbm.tcl/info?france50%2E.jpg". The main content area displays a webpage with the following elements:</p> <ul style="list-style-type: none"><li>Header: "Image france50.jpg"</li><li>Text: "How to Use QBIC" (with a link)</li><li>Text: "Back To Start Page" (with a link)</li><li>Section: "Goto:" followed by links for "Custom Color % Query", "Custom Paint Query", "Random Images", and "Official QBIC Page".</li><li>Image: A large, colorful abstract painting featuring a stylized figure with a green head and white body, set against a yellow and blue background.</li></ul> <p>The status bar at the bottom of the browser window shows "Document: Done".</p>

*Id.* at 3



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		 <p>Flickner Depo at 162</p> <p>3           What -- what -- what features did you use 4           in the trademark demo? 5           A. I don't remember all of them. Texture. 6           We had some shape stuff and layout stuff. The -- 7           the trademark also had text search. So it had 8           keyword text search.</p> <p>Flickner Depo at 217</p>

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		<p>7 Q. And do you see anything here that              8 describes making queries on extracted features from              9 video frames?              10 A. No, I do not.              11 MR. DAÑG: Objection. Lacks foundation.              12 Q. (By Ms. Hayden) These are just -- the --              13 the queries here are just about text queries; is              14 that right?              15 A. Correct.              ...</p> <p>Flickner Depo at 78-79</p>

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		<p>6 Q. How would the Db2 universal search a                      7 query image using QBIC technology?                      8 A. You would create a -- create a manager                      9 QB- -- or create a QBIC catalog.                      10 Q. What's a QBIC catalog?                      11 A. It's an instance of a table that has a                      12 bunch of images in it.                      13 Q. And forgive me, what's an instance of a                      14 table?                      15 A. You create a table -- create a database,                      16 and then in the database you create a table and you                      17 have maybe like a file name, and then the actual                      18 image bits into it.                      19 Q. And how would you search for images using                      20 that table?                      21 A. You could search -- you could use                      22 whatever you wanted to for the -- the SQL query</p> <hr/> <p style="text-align: right;">Page 78</p> <p>1 to -- to filter, and then that would give you a                      2 list of results. And then you'd rank all of those                      3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 185</p>

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		<p>4           So for -- for a search in the MediaMiner</p> <p>5           version of QBIC, would the -- the QBIC query be</p> <p>6           compared to all of the records in the database?</p> <p>7           A. I suspect there was support for text</p> <p>8           refinement, based on what I'm seeing here.</p> <p>9           Q. And this is the text refinement that</p> <p>10          would be keyword searching?</p> <p>11          A. Yeah. As I read this on page 735, it's</p> <p>12          clear that you can do -- use image content as the</p> <p>13          query; "Show me images LIKE this one."</p> <p>14          Q. And -- and that is a search without</p> <p>15          using -- without necessarily using a text search or</p> <p>16          keywords, right?</p> <p>17          A. Right.</p>

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		<p>Flickner Depo at 214-215</p> <p>4 Q. What do you mean by the images of shot                      5 boundaries were indexed?                      6 A. Each -- each shot -- the shot -- the shot                      7 boundary detection is trying to extract key frames                      8 or break the video into small subsec --                      9 subsections -- hang on. Let me think here a                      10 second.                      11 So the shot boundary here is different                      12 than key framing. So I'll -- I'll retract what I                      13 said earlier. This -- while similar, they're not                      14 the same.                      15 Q. What are the differences?                      16 A. Shot boundaries are typically detected at                      17 fade to black, and key frames are supposed to be a                      18 representative still image of the video segment.                      19 Q. How would a shot boundary index allow one                      20 to query a video by content?                      21 A. It gives you semantical information as                      22 related to what the -- that -- that -- that is a --</p> <p style="text-align: right;">Page 214</p> <hr/> <p>1 a reasonable amount of return video. It's -- it's                      2 breaking it into small snippets.                      3 Q. Does it extract features from the key                      4 frames?                      5 A. If there are key frames extracted, it --                      6 it will reference key frames.</p> <p>Flickner Depo at 50.                      Flickner 8/29/23 Depo at 44:</p>

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		<p>2 Q. And how did that problem, going through  3 film stocks being a relatively labor tedious  4 process, how did that play into developing QBIC?  5 A. Well, just like you could query – you  6 could query text based on court documents or things  7 like that, now you can make visual queries.  8 Q. And querying text was known. People were  9 doing that before the QBIC project started?  10 A. Yes.</p> <p><i>Id.</i> at 45–47</p> <p>6 Q. And going back to your testimony about  7 querying text or keywords, does that mean OCR or  8 does that -- does that mean something else?  9 A. You could do OCR.  10 Q. Okay. And OCR --  11 A. I assume OCR, you mean optical character  12 recognition?  13 Q. Correct. So that could include OCR?  14 A. Yeah.  15 Q. And that was a known technology at the  16 time the QBIC project started?  17 A. Yes.  18 MR. EDWARDS: We'll mark Exhibit 2.  19 (Deposition Exhibit 2 was marked.)  20 BY MR. EDWARDS:  21 Q. And, Mr. Flickner, before we get to  22 Exhibit 2, did -- going back to the OCR, did the  23 QBIC system itself do OCR?  24 A. No.  25 Q. It did not. Did the QBIC system ever</p>

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		<p>1 interface with any other software products that did                  2 do OCR?                  3 A. Yes.                  4 Q. What software products?                  5 A. There was a research system that a guy                  6 named Dick Casey built.                  7 (Reporter seeks clarification.)                  8 A. Dick Casey.                  9 Q. And what was the research system called?                  10 A. I don't remember.                  11 Q. And Dick Casey was at IBM?                  12 A. Yeah.                  13 Q. And when you say "research system," are                  14 you referring to just this OCR system or are you                  15 referring to this system that -- a system that                  16 interacted with QBIC?                  17 A. I was referring to the OCR system.                  18 Q. Okay. And was there a system constructed                  19 that interfaced QBIC with this OCR system?                  20 A. I don't recall.                  21 Q. Do you know if there were any IBM                  22 commercial products that implemented QBIC and OCR?                  23 A. I don't recall.                  24 Q. So earlier I'd asked you did the QBIC                  25 system ever interface with any other software</p> <hr/> <p style="text-align: right;">Page 47</p> <p>1 products that did OCR and you said yes, and you said                  2 it was a research system that Dick Casey built; is                  3 that correct?                  4 A. Yeah.                  5 Q. And when you say that it interfaced with                  6 it, was that internally at IBM?                  7 A. Yes.                  8 Q. Okay. And what was the purpose of having                  9 the QBIC system interface with the OCR system?                  10 A. Just to demonstrate new capabilities.</p> <p><i>Id.</i> at 76-77:</p>

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		<p>9 Q. I could have taken a picture of an  10 electronic billboard or display and submit that to  11 the system?  12 A. Yep.  13 Q. Stamps?  14 A. Yep.  15 Q. Posters?  16 A. Why not?  17 Q. Magazine?  18 A. Subject to copyright issues, yes.  19 Q. Certainly.  20 How about a passport? validity  21 A. Could be done.  22 Q. An album cover?  23 A. Could be done.  24 Q. And could those images not only contain  25 objects but also symbols, like a -- like a logo or a</p> <p style="text-align: right;">Page 77</p> <p>1 trademark?  2 A. Yes.</p> <p><i>Id.</i> at 160:</p> <p>4 Q. Does iterated query refinement mean that I  5 can further refine that query to search for things  6 like shape, like a -- you know, some shape in the --  7 in the query image, like a logo or an icon, and that  8 will further refine the results to give me things  9 that have that similar shape inside the results of  10 the color histogram?  11 A. Yes.  12 Q. And then I can -- I can keep doing that, I  13 can further even refine that result by using a  14 keyword, for example?  15 A. Yes. Or you could do it all at once.</p> <p><i>Id.</i> at 163-166:</p>



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		<p>19 Q. Okay. So the first page, IBM 2419. Under                  20 "Introduction," at the time of this paper it says,                  21 last line on the first paragraph, "Several online                  22 demos of QBIC are available at                  23 <a href="http://wwwqbic.almaden.ibm.com">http://wwwqbic.almaden.ibm.com</a>."                  24 Do you see that?                  25 A. Yep.</p> <p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?                  2 A. Yep.                  3 Q. Okay. So let's -- I'm going to have you                  4 jump around, so I apologize in advance. Let's go to                  5 the -- kind of the back, IBM 2428.                  6 A. Okay.                  7 Q. Is that example of the stamps demo that                  8 was available on IBM's website?                  9 A. Yes.                  10 Q. All right. And if you look at the top in                  11 the location URL it has the almaden.ibm website                  12 address; correct?                  13 A. Correct.                  14 Q. All right. Let's flip forward to 2429.                  15 And is 2429 a screenshot of a trademark                  16 demo that was also available in the Almaden --                  17 excuse me -- almaden.ibm website?                  18 A. Yes.                  19 Q. Okay. And that demo looks like the                  20 trademark query is based on shape; is that right?                  21 A. It uses shape as one similarity feature.                  22 Q. Right. So the trademarks are converted to                  23 a binary image, like we talked before -- talked                  24 about before, and then they're -- the matching                  25 process is done based on those binary images?</p>

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		<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p>22 Q. Okay. So 39 would be the -- so the first</p> <p>23 image at the top left is a 39, the one next to it is</p> <p>24 a 46, so the 39 would be a closer match than the 46;</p> <p>25 correct?</p> <hr/> <p style="text-align: right;">Page 166</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 187–188:</p>

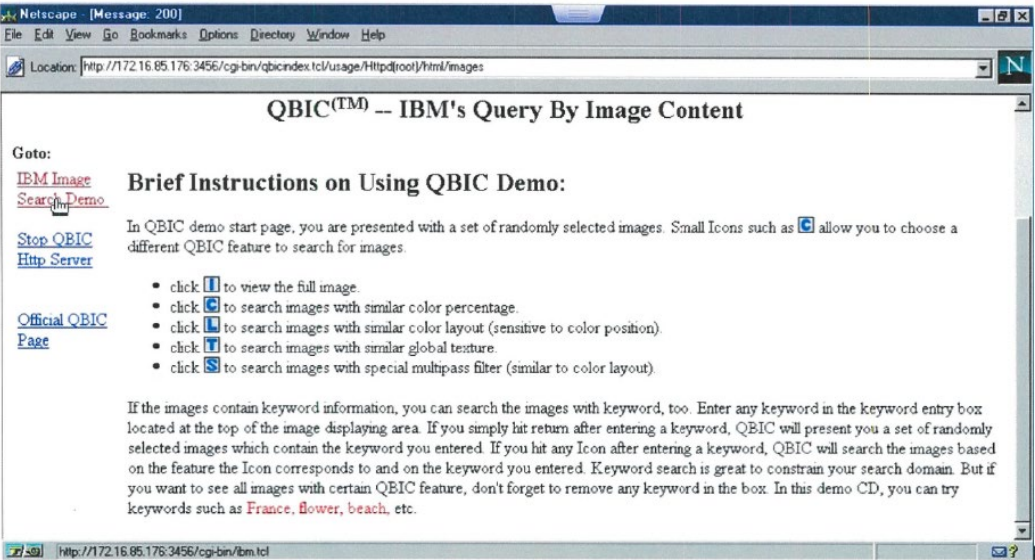
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		<p>8 Q. And if you look at the top paragraph, last                      9 sentence, it says, "You can now search for images by                      10 specifying" -- excuse me. Strike that.                      11 It says, "You can now search for images by                      12 specifying content attributes (such as color,                      13 texture, shape, and layout) and data description                      14 elements (such as category and related character and                      15 numeric business data)."                      16 Do you see that?                      17 A. Um-hum.                      18 Q. And data description elements, are those                      19 things like text or keyword searches that we had                      20 talked about before?                      21 A. Um-hum.                      22 MR. HANSEN: Objection; lacks foundation.                      23 (Reporter seeks clarification.)                      24 BY MR. EDWARDS:                      25 Q. Are those the same as text or keyword  <span style="float: right;">Page 188</span>                      1 searches that we talked about before?                      2 MR. HANSEN: Objection; lacks foundation.                      3 THE WITNESS: Text or feature -- textures and                      4 keywords?                      5 BY MR. EDWARDS:                      6 Q. No. I'm sorry, let me ask it so it's                      7 clear.                      8 Data description elements, such as                      9 category and character and numeric business data,                      10 that would be the same as a text or keyword search                      11 that we talked about before; correct?                      12 A. Correct.</p>

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		<p>Flickner 8/29/23 Depo, Ex. 6:</p>  <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the ’252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode</p>

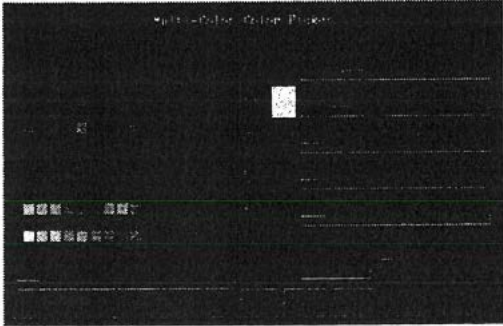
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. '252 Patent, 3:7-16. Indeed, the '252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee’s own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
[18B.ii]	<p>decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type;</p>	<p>QBIC discloses decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type.</p> <p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>

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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>



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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2393-95</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>

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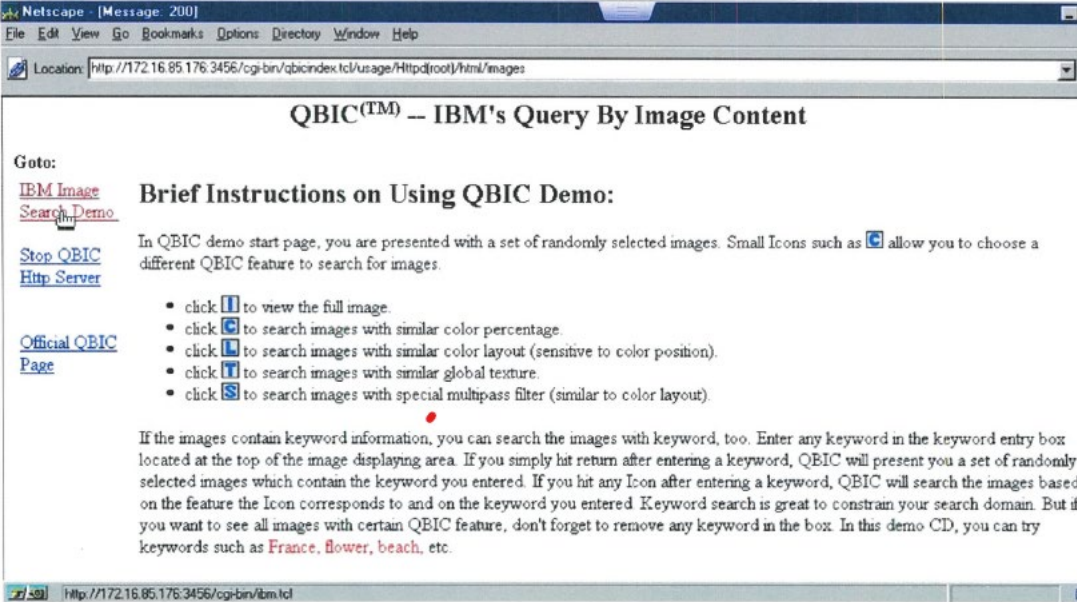
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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data. In addition, the extenders give your applications new ways to search for information.” <i>Id.</i> at p. 3.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):                      “Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>QBIC Demo (IBM000747)</p>




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		 <p>Flickner 8/31/23 Depo at Ex. 6 at 1</p> 

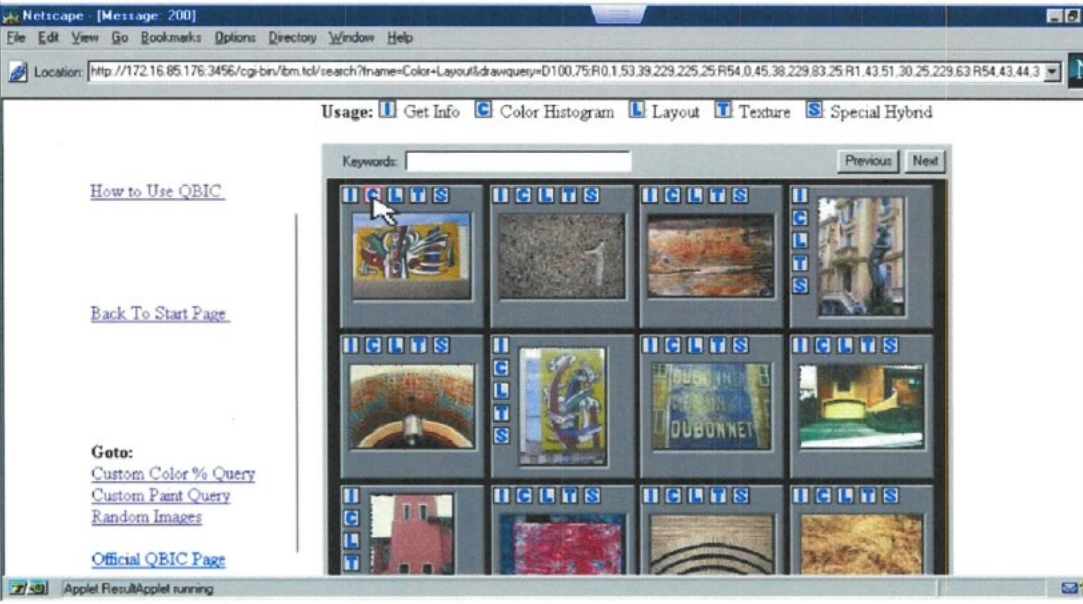
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		<p><i>Id.</i> at 2.</p>  <p>Flickner 8/31/23 Depo Ex. 7 at 1</p>


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		 <p><i>Id.</i> at 2</p>


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		 <p>Flickner 8/31/23 Depo at Ex. 8</p>

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		 <p><i>Id.</i> at 2</p>




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		 <p><i>Id.</i> at 3</p>

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		 <p>The screenshot shows a Netscape browser window with the title "Netscape: [Message: 200]". The address bar contains the URL "http://172.16.86.176:3456/cgi-bin/bm.tcl/info?france50%2Ejpg". The page content includes a "Goto:" section with the following links: <a href="#">Custom Color % Query</a>, <a href="#">Custom Paint Query</a>, <a href="#">Random Images</a>, and <a href="#">Official QBIC Page</a>. To the right of the text is a large abstract painting with bold, colorful shapes in white, black, red, blue, and green on a yellow background. The browser's status bar at the bottom indicates "Document Done".</p> <p>Flickner Depo at 22-25</p>

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		<p>1 Q. Okay. And what would you do with the                  2 image after you hit and extracted the color                  3 histogram from it?                  4 A. Nothing.                  5 Q. Would those features be stored in any                  6 database or --                  7 A. Yes.                  8 Q. Okay. And let's do -- what about                  9 texture, could you extract texture features from an                  10 image?                  11 A. We did.                  12 Q. And how would you do that?                  13 A. I don't remember exact features we were                  14 using. There were -- we published some papers on                  15 them.                  16 Q. Okay. Was there any reasoning behind                  17 picking the features that you chose?                  18 A. Yes.                  19 Q. And what was that reasoning?                  20 A. We wanted to make it so that the results                  21 were perceptually good.                  22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red                  2 color in it or some sort red color histogram; is                  3 that right?                  4 A. Well, you -- you take specific -- you                  5 search for a red color. You'd compute the                  6 histogram and then basically match the histogram,                  7 which would give you images that had more colors in                  8 the reds. This is not -- it's not a unique thing.                  9 Q. Were you always searching for a                  10 particular feature, or could you just search some                  11 sort of example image?                  12 A. We could search an example image.                  13 Q. And how would that process work?                  14 A. Just extract the features from it.                  15 Q. So let's break that down.                  16 So you would submit an example image to                  17 the -- to the system, right?                  18 A. Uh-huh.                  19 Q. And then how do the -- how -- how does                  20 the system select which features to extract?                  21 A. It would compute them all, typically, or                  22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that                  2 this is a better match, that the ordering was                  3 reasonable and...                  4 Q. So by that, do you mean that people would                  5 view the results returned as the closest or close                  6 matches to your -- to your image?                  7 A. It was -- it would satisfy their query.                  8 Q. Okay. So -- so you would have this set                  9 of features in your database.                  10 How would you search for those features?                  11 A. Typically, we -- initially, we did linear                  12 scan where you just actually evaluate the -- the                  13 distance metric against all the features.                  14 Q. So in linear scan, you would compare some                  15 sort of search term against all the features in the                  16 database?                  17 A. Well, it depends on which features you're                  18 using. You didn't have to use all the features.                  19 You could use just color features or just texture                  20 features or just...                  21 Q. So to make sure I'm understanding this                  22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>



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		<p>Flickner Depo at 54-55</p> <p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <hr/> <p style="text-align: right;">Page 54</p> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.                      17 Q. Was there any metadata returned with the                      18 trademarks?                      19 A. I'm sure there was.</p> <p>Flickner Depo at 25-26.</p>

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		<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that                    1 right?                  2 A. That's correct.</p> <p><i>See also</i> Flickner Depo at 89-90, 162, 185, 214-215, 217                      Flickner 8/29/23 Depo at 44</p>

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		<p>2 Q. And how did that problem, going through</p> <p>3 film stocks being a relatively labor tedious</p> <p>4 process, how did that play into developing QBIC?</p> <p>5 A. Well, just like you could query – you</p> <p>6 could query text based on court documents or things</p> <p>7 like that, now you can make visual queries.</p> <p>8 Q. And querying text was known. People were</p> <p>9 doing that before the QBIC project started?</p> <p>10 A. Yes.</p> <p><i>Id.</i> at 45–47</p> <p>6 Q. And going back to your testimony about</p> <p>7 querying text or keywords, does that mean OCR or</p> <p>8 does that -- does that mean something else?</p> <p>9 A. You could do OCR.</p> <p>10 Q. Okay. And OCR --</p> <p>11 A. I assume OCR, you mean optical character</p> <p>12 recognition?</p> <p>13 Q. Correct. So that could include OCR?</p> <p>14 A. Yeah.</p> <p>15 Q. And that was a known technology at the</p> <p>16 time the QBIC project started?</p> <p>17 A. Yes </p> <p>18 MR. EDWARDS: We'll mark Exhibit 2.</p> <p>19 (Deposition Exhibit 2 was marked.)</p> <p>20 BY MR. EDWARDS:</p> <p>21 Q. And, Mr. Flickner, before we get to</p> <p>22 Exhibit 2, did -- going back to the OCR, did the</p> <p>23 QBIC system itself do OCR?</p> <p>24 A. No.</p> <p>25 Q. It did not. Did the QBIC system ever</p>

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		<p>1 interface with any other software products that did                  2 do OCR?                  3 A. Yes.                  4 Q. What software products?                  5 A. There was a research system that a guy                  6 named Dick Casey built.                  7 (Reporter seeks clarification.)                  8 A. Dick Casey.                  9 Q. And what was the research system called?                  10 A. I don't remember.                  11 Q. And Dick Casey was at IBM?                  12 A. Yeah.                  13 Q. And when you say "research system," are                  14 you referring to just this OCR system or are you                  15 referring to this system that -- a system that                  16 interacted with QBIC?                  17 A. I was referring to the OCR system.                  18 Q. Okay. And was there a system constructed                  19 that interfaced QBIC with this OCR system?                  20 A. I don't recall.                  21 Q. Do you know if there were any IBM                  22 commercial products that implemented QBIC and OCR?                  23 A. I don't recall.                  24 Q. So earlier I'd asked you did the QBIC                  25 system ever interface with any other software</p> <hr/> <p style="text-align: right;">Page 47</p> <p>1 products that did OCR and you said yes, and you said                  2 it was a research system that Dick Casey built; is                  3 that correct?                  4 A. Yeah.                  5 Q. And when you say that it interfaced with                  6 it, was that internally at IBM?                  7 A. Yes.                  8 Q. Okay. And what was the purpose of having                  9 the QBIC system interface with the OCR system?                  10 A. Just to demonstrate new capabilities.</p> <p><i>Id.</i> at 76</p>

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		<p>9 Q. I could have taken a picture of an  10 electronic billboard or display and submit that to  11 the system?  12 A. Yep.  13 Q. Stamps?  14 A. Yep.  15 Q. Posters?  16 A. Why not?  17 Q. Magazine?  18 A. Subject to copyright issues, yes.  19 Q. Certainly.  20 How about a passport? validity  21 A. Could be done.  22 Q. An album cover?  23 A. Could be done.  24 Q. And could those images not only contain  25 objects but also symbols, like a -- like a logo or a</p> <p style="text-align: right;">Page 77</p> <p>1 trademark?  2 A. Yes.</p> <p><i>Id.</i> at 187–188</p> <p>8 Q. And if you look at the top paragraph, last  9 sentence, it says, "You can now search for images by  10 specifying" -- excuse me. Strike that.  11 It says, "You can now search for images by  12 specifying content attributes (such as color,  13 texture, shape, and layout) and data description  14 elements (such as category and related character and  15 numeric business data)."  16 Do you see that?  17 A. Um-hum.  18 Q. And data description elements, are those  19 things like text or keyword searches that we had  20 talked about before?  21 A. Um-hum.  22 MR. HANSEN: Objection; lacks foundation.  23 (Reporter seeks clarification.)  24 BY MR. EDWARDS:  25 Q. Are those the same as text or keyword</p>

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		<p style="text-align: right;">Page 188</p> <p>1 searches that we talked about before?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: Text or feature -- textures and                  4 keywords?                  5 BY MR. EDWARDS:                  6 Q. No. I'm sorry, let me ask it so it's                  7 clear.                  8 Data description elements, such as                  9 category and character and numeric business data,                  10 that would be the same as a text or keyword search                  11 that we talked about before; correct?                  12 A. Correct.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the '252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. '252 Patent, 3:7-16. Indeed, the '252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee’s own admission, and by asserting</p>

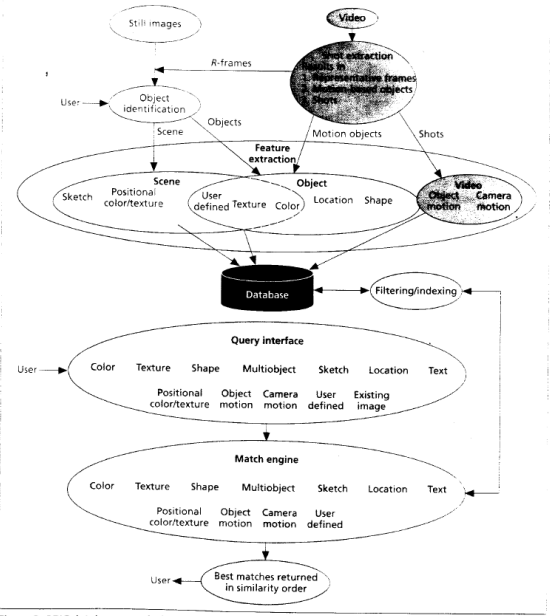
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		<p>this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
[18C]	<p>providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information; and</p>	<p>QBIC discloses providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 3</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally,</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 7</p> <p><b>3. Indexing and Database Issues</b></p> <p>Currently, we store computed feature values for objects and images in either flat files or in a Starburst database [19]. Starburst, a research prototype developed at IBM Research, is an extensible relational database with numerous extensions such as triggers and support for long fields (up to 1.5 gigabytes). Our current database schema using Starburst is shown in Figure 3. Because we are still defining and experimenting with the set features, we most frequently use the flat file format.</p> <p>...</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “Find images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <i>R*</i>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p>

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		<p>“QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content—colors, textures, shapes, and camera and object motion—and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.”  <i>Id.</i> at p. 3.</p>  <p>The diagram illustrates the QBIC system architecture, divided into database population (top) and query (bottom) phases. In the population phase, 'Still images' and 'Video' are processed. 'Still images' go through 'Object identification' (User input) to produce 'Scene' and 'Objects'. 'Video' goes through 'R-frames' to produce 'Motion objects' and 'Shots'. Both 'Objects' and 'Motion objects' feed into 'Feature extraction', which outputs 'Scene' (Sketch, Positional color/texture) and 'Object' (User defined Texture, Color, Location, Shape). 'Shots' feed into 'Video Camera motion' (Object, Camera motion). All extracted features are stored in the 'Database'. A 'Filtering/indexing' step is also shown. In the query phase, a 'Query interface' (User input) allows for queries based on 'Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, User defined, Existing image'. These queries are processed by a 'Match engine' (using the same feature categories) to return 'Best matches returned in similarity order' to the 'User'.</p> <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated</p>



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		<p>queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color queries return items with matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p> <p>Figure 7 shows a histogram query on still images and a color query on video r-frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right.</p> <p>Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture (pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object).</p> <p>An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a</p>

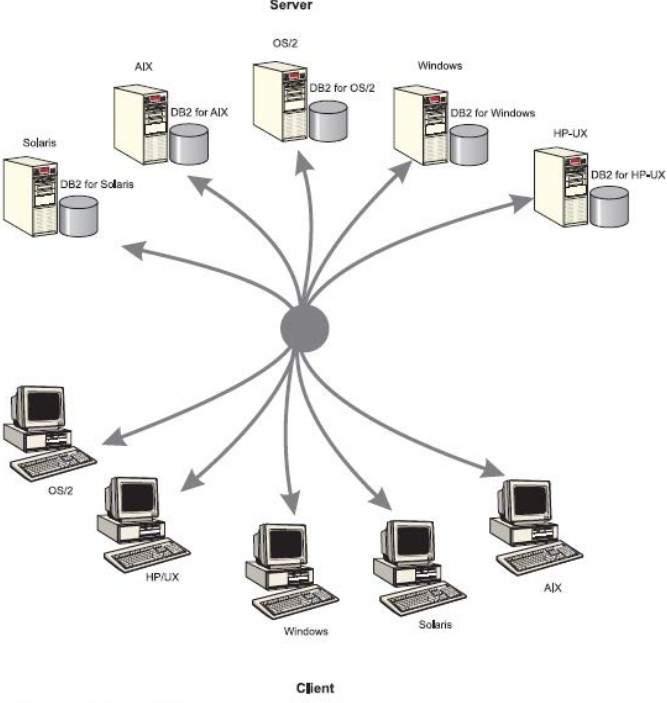
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		<p>green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects and features to implement logical And semantics.</p> <p>....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.” <i>Id.</i> at pp. 7–8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data. In addition, the extenders give your applications new ways to search for information.” <i>Id.</i> at p. 3.</p>

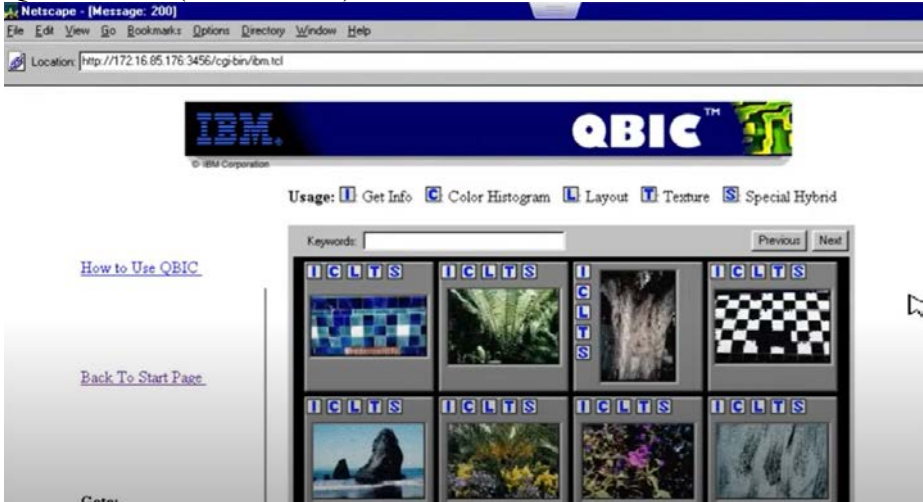
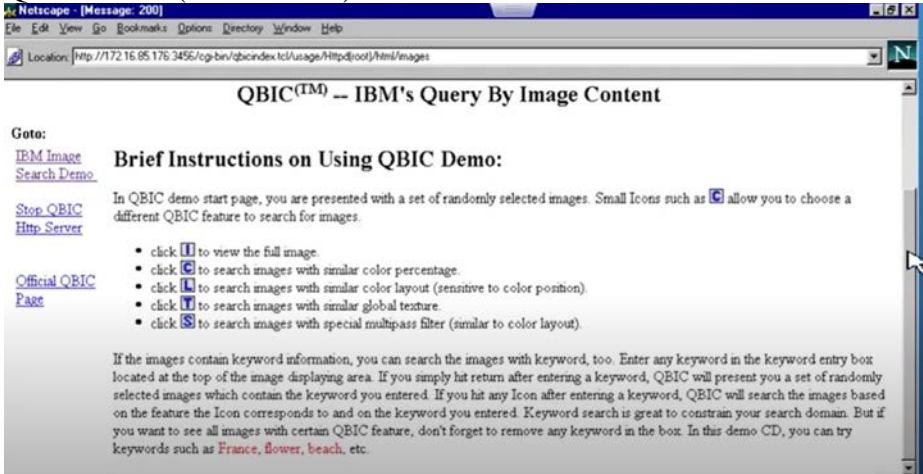
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		 <p>The diagram, labeled 'Figure 6. DB2 extender platforms', illustrates a central 'Server' at the top connected to various 'Client' platforms at the bottom. The server is labeled 'DB2 for OS/2'. It is connected to several server-based clients: 'Solaris' (DB2 for Solaris), 'AIX' (DB2 for AIX), 'OS/2' (DB2 for OS/2), 'Windows' (DB2 for Windows), and 'HP-UX' (DB2 for HP-UX). It is also connected to several desktop-based clients: 'OS/2', 'HP/UX', 'Windows', and 'Solaris'. Arrows point from the central server to each of these client platforms.</p> <p><i>Figure 6. DB2 extender platforms</i></p> <p><i>Id.</i> at p. 12 (Fig. 6).</p> <p>“The DB2 Extenders run in the DB2 client/server environment. This environment consists of a database server and one or more remote database clients. The DB2 extender services run on the server. Before you can access them, you have to start them.” <i>Id.</i> at p. 47.</p>

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		<p><b>QBIC Demo (IBM000747)</b></p>  <p><b>QBIC Demo (IBM000747)</b></p> 

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		<p>Flickner Depo at 20</p> <p>3 Q. Okay. And the steps that -- at least as</p> <p>4 I understand it -- is you'd have database</p> <p>5 population, feature calculation and image query; is</p> <p>6 that right?</p> <p>7 A. Uh-huh. Yes.</p> <p>8 Q. So let's -- let's start with database</p> <p>9 population.</p> <p>10 What was the database population step?</p> <p>11 A. It's a process of taking a set of images,</p> <p>12 and then putting them in -- into the database and</p> <p>13 the extracting the features and putting the</p> <p>14 features in the database.</p> <p>20 Q. And how large were these database</p> <p>21 structures?</p> <p>22 A. In the order of 15,000 images.</p> <p>Flickner Depo at 18</p> <p>14 A. Well, we did stuff with the San Francisco</p> <p>15 Museum, the stamps database, trademark database.</p> <p>16 So we did some of the stuff with Davis --</p> <p>17 Q. Okay.</p> <p>18 A. -- UC Davis. I remember we talked to a</p> <p>19 couple people at Davis.</p> <p>20 Q. So was this an active area of research in</p> <p>21 the 1990s?</p> <p>22 A. Yeah.</p> <p>Flickner Depo at 36</p>

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		<p>10 Q. So underlying this paper, you mentioned</p> <p>11 you did more work on the shape side of things; is</p> <p>12 that right?</p> <p>13 A. I did.</p> <p>14 Q. And what would that work have entailed?</p> <p>15 A. We wanted to query by shape.</p> <p>16 Q. Okay. And how would that have worked?</p> <p>17 A. We created features related to the shape</p> <p>18 of a -- the object of -- as it populated the</p> <p>19 database, and then we would query against those</p> <p>20 features.</p> <p>Flickner Depo at 39-40</p> <p>17 Q. Okay. So you would take -- you would use</p> <p>18 a histogram methodology to extract key frames from</p> <p>19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with</p> <p>22 those key frames?</p>

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		<p>1           A. You just populate image database using                  2           those images.</p> <p>3           Q. Okay. Could you take as -- as you did in                  4           the query by image search system, could you just                  5           search a video using this system?</p> <p>6           A. You could search for a key frame and that                  7           could point you to a video.</p> <p>8           Q. As an input into the system, could you                  9           search -- could you input a whole video and then                  10          the system would extract the key frames and then --</p> <p>11          A. Yes.</p> <p>12          Q. -- search that using that?</p> <p>13          A. If I recall correctly, yes.</p> <p>14          Q. Okay. And the way -- the method by which                  15          it did so, as you mentioned, was -- would it                  16          extract key frames from the video, extract features                  17          from those key frames, and then search those                  18          features; is that right?</p> <p>19          A. Correct.</p> <p>Flickner Depo at 88-89</p>

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		<p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.              16 Q. (By Mr. Dang) Were there any              17 circumstances under which the system would not              18 compute the distance for every image in the              19 database during a search?              20 A. If there was a text filter on it, we              21 didn't.              22 Q. Did the Fine Arts Museum of San Francisco</p> <hr/> <p style="text-align: right;">Page 88</p> <p>1 similarly use the QBIC system?              2 A. They did.              3 Q. When did they use the QBIC system?              4 A. It was in the '90s, if I recall right.              5 Q. How did they use the QBIC system?              6 A. Similar to the way Davis did, as I              7 recall.              8 Q. What sorts of images were they including              9 in their database?              10 A. Paintings.</p> <p>Flickner Depo at 142</p>



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		<p>1 Q. Do you recall what type of indexing was                  2 used in the database associated with the 1998 demo                  3 version?                  4 A. Most likely, it was just a linear index.                  5 Q. And what do you mean by linear index?                  6 A. You just -- you -- you compute the                  7 features on every record in the database -- you                  8 compare the features against every record in the                  9 database.</p> <p>Flickner Depo at 168-169</p> <p>16 Q. What do you mean that it lets you access                  17 the -- the neighbors to your query point?                  18 A. So your incoming query -- say it's an                  19 image -- you compute a feature vector. And then                  20 you compute some orthogonal transform of the                  21 feature vector such as a wave transform or                  22 wavelets. There's a variety --</p> <p style="text-align: right;">Page 168</p> <hr/> <p>1 MR. DeCLERCK: Slow down, please.                  2 THE DEPONENT: Wavelets, other types of                  3 features that do dimensionality reduction. And                  4 then you put the reduced dimensionality feature                  5 vector into the database, and then the database                  6 queries and R*-tree to be able to get points nearby                  7 to the -- in the lower dimensional space.</p>

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		<p>Flickner Depo at 181</p> <p>5           A. I do not recall the -- the UI parts of</p> <p>6           it.</p> <p>7           Q. And earlier you -- you mentioned a query</p> <p>8           engine.</p> <p>9           What did you mean by that phrase?</p> <p>10          A. The architecture QBIC was client server.</p> <p>11          There were -- there's an API to query the database,</p> <p>12          and there was a GUI then to display and control</p> <p>13          through the creation of the queries.</p> <p>14          The GUI evolved because when we started,</p> <p>15          there was no Web. This would have been even</p> <p>16          pre-1990. So all the original versions used the</p> <p>17          X Window system. But as the Web came online, we --</p> <p>18          we migrated the -- the GUI part to the Web.</p> <p>Flickner Depo at 201-202</p>

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		<p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p>

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		<p>1 with -- where you already -- you had already seeked                  2 to the -- the point of the -- of the match.                  3 Q. Would it return the same video as the                  4 query video?                  5 A. It would -- it would return snippets, as                  6 I recall.                  7 Q. And snippets of which videos?                  8 A. Of the video that's -- the -- that the                  9 database has been created with.                  10 Q. Were those video snippets indexed in any                  11 way?                  12 A. I'm sure they were.</p> <p>Flickner Depo at 91-92</p> <p>13 Q. And could you, in general terms, describe                  14 what Virage was?                  15 A. It was a content-based retrieval system                  16 tailored to secure surveillance information.                  17 Q. And you went to their website; was there                  18 something on their website, say, a demonstration?                  19 A. I don't remember.                  20 Q. Was their system commercially available                  21 during the 1990s?                  22 A. Yes.</p>

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		<p>1 Q. How did their content-based retrieval                  2 system work?                  3 A. It was similar to QBIC.                  4 Q. Could you, say, extract features from a                  5 query image?                  6 A. Yes.                  7 Q. And could you search those features into                  8 some sort of reference database?                  9 A. Yes.</p> <p>Flickner Depo at 48-49                  4 Q. What feature extraction methods did the                  5 UC Davis implementation of QBIC rely on?                  6 A. It was similar to the other texture,                  7 shape, color and layout.</p> <p>Flickner Depo at 159                  10 Q. Would either version of the stamps demo                  11 allow a user to submit an unknown image as the                  12 query and ask the system to find images similar to                  13 that query image?                  14 A. I suspect it did.                  15 Q. Why do you suspect that?                  16 A. Because that's one of the nice things you                  17 can do with QBIC.</p> <p>Flickner Depo at 209-210</p>

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		<p>13 Q. Okay. Let me ask -- let me ask that                      14 question using -- using an example.                      15 Say I had a file that -- that was a                      16 snippet of a Star Wars movie.                      17 Could the CueVideo system take that                      18 snippet of the -- of a Star Wars movie and indicate                      19 to the user what Star Wars movie that snippet is                      20 from?                      21 A. Most likely, yes.                      22 Q. And how do you know that?                      1 A. Based on my knowledge in content-based                      2 imagery -- content-based retrieval, in general,                      3 that would be one of the first things you would try                      4 to implement in a video search system.</p> <p><i>See also</i> Flickner Depo at 21, 22-25, 25-26, 54-55, 76, 78-79, 185, 217</p> <p>Flickner 8/29/23 Depo at 53 – 56                      16 Q. And when it refers to "text information,"                      17 what is it referring to?                      18 A. Anything that could be extracted in the                      19 context of how the image was annotated.                      20 Q. And when you say "annotated," annotated by                      21 the user who was populating the database?                      22 A. Could be.                      23 Q. What else could it be?                      24 A. It could be the supplier of the data.                      25 Q. Okay. So you may have some annotations</p>

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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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		<p><i>Id.</i> at 60 – 62</p> <p>25 Q. Okay. And so let's say that objects were</p> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done</p> <p>2 with those objects? Were they stored, for example,</p> <p>3 as a separate image or were they somehow linked to</p> <p>4 or associated with the image from which they were</p> <p>5 extracted?</p> <p>6 A. Typically they were linked.</p> <p>7 Q. They were linked to the source image?</p> <p>8 A. Yeah.</p> <p>9 Q. Okay. And this was done in the database?</p> <p>10 A. Could be done in the database.</p> <p>11 Q. How was it done?</p> <p>12 A. It was probably done in a text database or</p> <p>13 some sort of key index pair database. So database</p> <p>14 has a lot of different meanings.</p> <p>14 Q. Yeah, that was a bad question.</p> <p>15 Once the objects are identified within a</p> <p>16 particular source image that's stored in the</p> <p>17 database, how are the objects linked to the source</p> <p>18 image in the key --</p> <p>19 A. The key would have been, like, the image</p> <p>20 name and the value would have been the definition of</p> <p>21 the -- of the objects.</p> <p><i>Id.</i> at 103</p>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p> <p><i>Id.</i> at 129 – 131</p>

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		<p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	

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		<p><i>Id.</i> at 161</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p>


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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the ’252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. ’252 Patent, 3:7-16. Indeed, the ’252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee’s own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
[18D]	<p>allowing the mobile device to receive the pertinent information over a network.</p>	<p>QBIC discloses allowing the mobile device to receive the pertinent information over a network.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 8  <b>4.1. Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. The interface is made up of four parts (listed from top to bottom): the window menu, the tool selection button the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small image</p>

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		<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Fig. 4</p>  <p>Figure 4: Object Identification Tool. Note for example, the right dog's ear, which has been outlined.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 8</p>

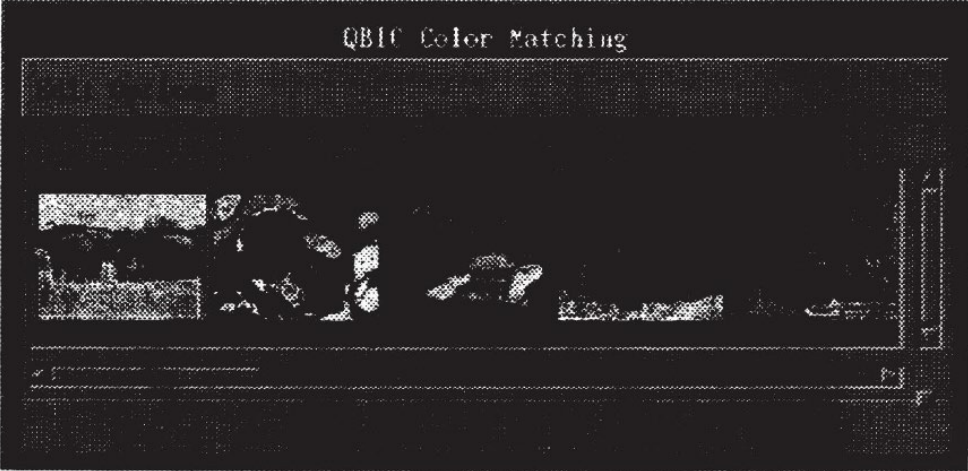
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		<p><b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of <math>(R, G, B)</math> sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <math>n</math>th best match (<math>n</math> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9</p>

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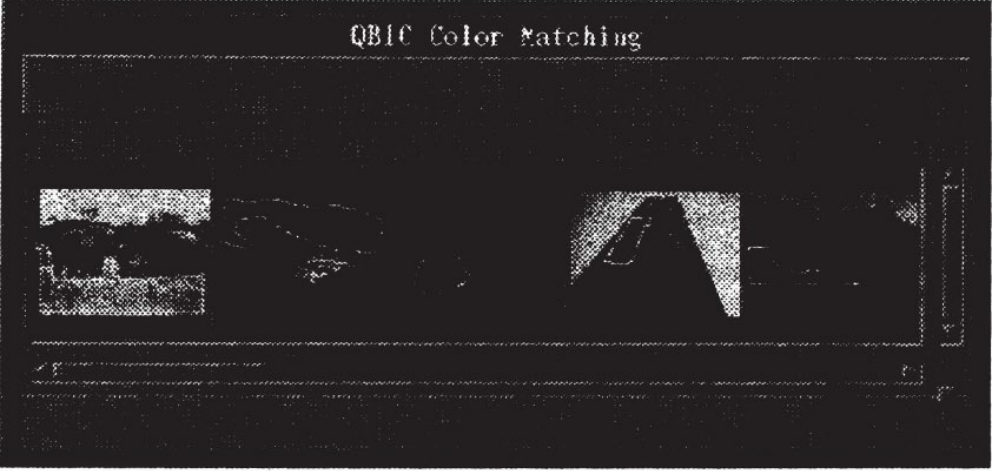
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 7: Result of query by example using color only.</p>



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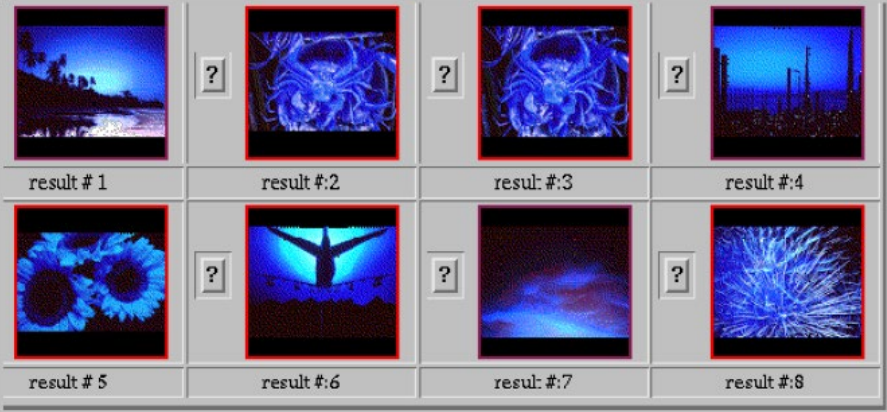
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 8: Result of query by example using texture only.</p>

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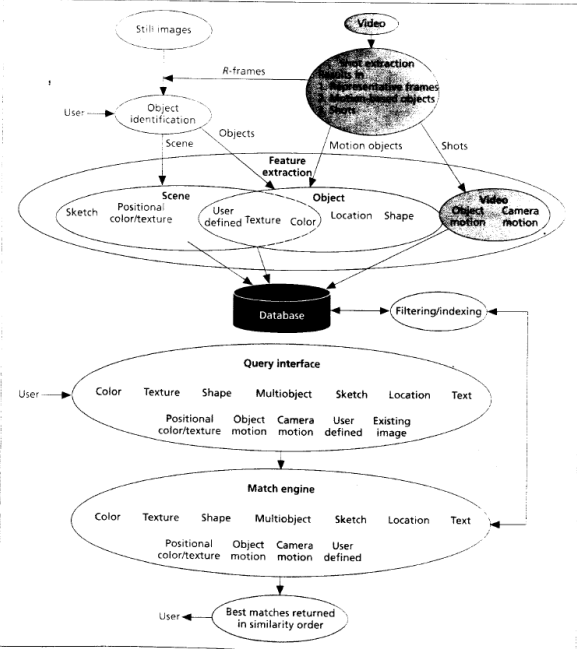
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 9: Result of query by example using color and texture.</p> <p>QBIC (Query by Image Content) at 1</p>  <p>Result of QBIC Search</p>

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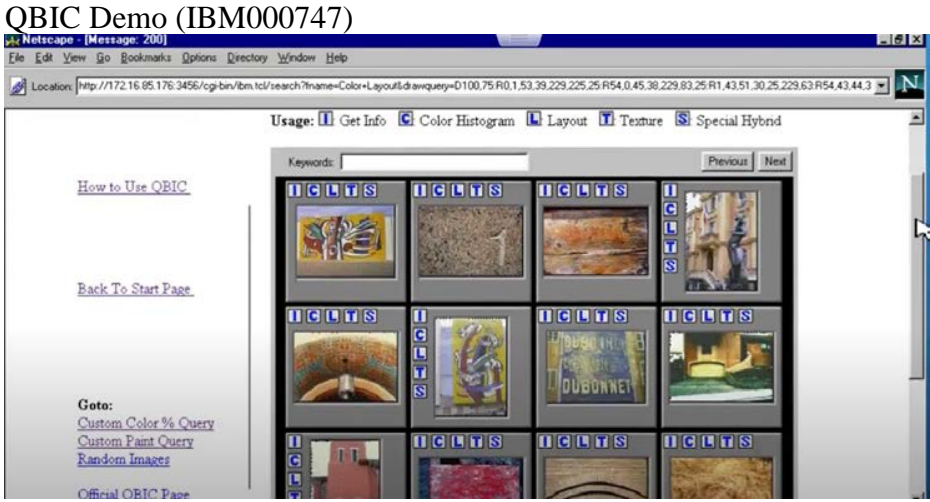
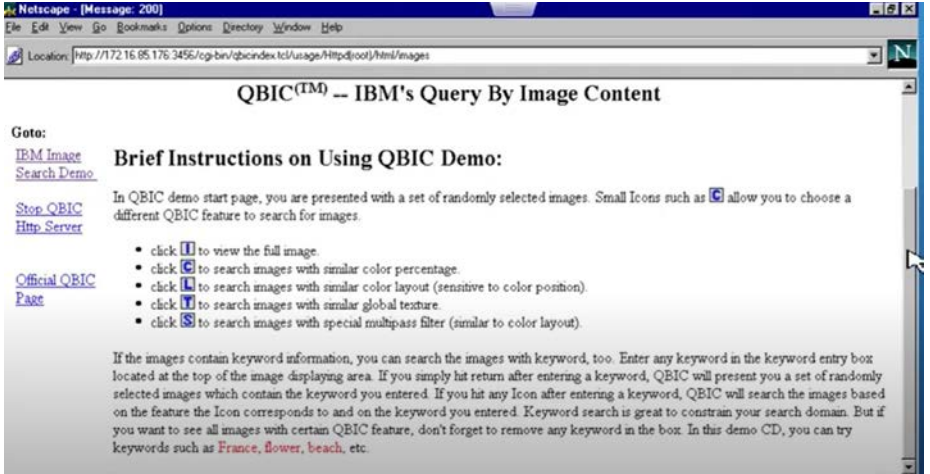
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.”  <i>Id.</i> at p. 3.</p>  <p>The diagram illustrates the QBIC system architecture, divided into database population (top) and query (bottom) processes. In the population phase, 'Still images' and 'Video' are processed. 'Video' is broken down into 'R-frames' and 'I-frames'. 'I-frames' lead to 'Object identification' (User input), which identifies 'Objects' and 'Motion objects'. 'R-frames' lead to 'Feature extraction', which identifies 'Shots' and 'Video camera motion'. Both 'Objects' and 'Video camera motion' lead to 'Feature extraction', which identifies 'Scene' (Sketch, Positional color/texture, User defined Texture, Color) and 'Object' (Location, Shape). These features are stored in a 'Database'. The query phase starts with a 'User' interacting with a 'Query interface' (Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, User defined, Existing image). The 'Query interface' sends data to a 'Match engine' (Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, User defined). The 'Match engine' sends data to 'Filtering/indexing', which then returns 'Best matches returned in similarity order' to the 'User'.</p> <p>Figure 2. QBIC database population (top) and query (bottom) architecture. <i>Id.</i> at Fig. 2.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p>

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		<p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p>

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>QBIC Demo (IBM000747)</b></p>  

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		 <p>Flickner Depo at 41-42</p> <p>18 Q. So if I'm understanding this right, you          19 could take a query video, the system would extract          20 frames, which would then extract features from it,          21 and then the system would return either shot clips          22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>2 Q. Okay. And how many key frames would be          3 returned?</p> <p>4 A. It depends how many you requested.</p> <p>5 Q. Could you alter how many you request?</p> <p>6 A. Probably.</p> <p>7 Q. Could you return key frames based on some          8 defined threshold of the distance?</p> <p>9 A. Probably.</p> <p>Flickner Depo at 50</p>



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		<p>7 Q. And so if I clicked on this T, and it              8 used the texture features, what would -- what would              9 the system do?              10 A. It would return the list of stamps based              11 on similarity and texture.              12 Q. And how would it decide which stamps were              13 the most similar to that query image?              14 A. It would use those texture features to              15 compute it, and then it -- I think it was using L              16 to distance.</p> <p>Flickner Depo at 131-132              14 Q. An action that the QBIC system would              15 automatically take based on the results it would              16 return.              17 A. So you're saying as you return results,              18 you do some post-filtering on the image or the --              19 what -- what kind of --              20 Q. Perhaps not -- not post-filtering.              21 But, for example, displaying a hyperlink              22 along with the results for a specific result.</p>

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		<p>1 A. Yeah, you could do that.</p> <p>2 Q. But did the QBIC system do that?</p> <p>3 A. I don't remember.</p> <p>4 Q. What about advertisements?</p> <p>5 A. There was no support I know of for</p> <p>6 advertisement.</p> <p>7 Q. Did any version of the QBIC system do</p> <p>8 anything with the results other than display them</p> <p>9 to the user?</p> <p>10 A. It lets you use them as a refinement</p> <p>11 query.</p> <p>12 Q. And what do you mean by -- what do you</p> <p>13 mean by use it as a --</p> <p>14 A. You could click on one of the results and</p> <p>15 it would cause another query using that input</p> <p>16 image.</p> <p><i>See also</i> Flickner Depo at 22-25, 25-26, 40-42, 54-55, 76, 78-79, 87, 88, 89-90, 159, 162-163, 201-202, 209-210</p> <p>Flickner 8/31/23 Depo at 68-72</p>



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		<p>22 Q. Okay. And in what form would those                      23 results be displayed to me? For images would they                      24 be displayed as a thumbnail?                      25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those                      2 be displayed to you?                      3 A. It could be as a thumbnail or as a short                      4 video clip or as a single representative frame.                      5 Q. Okay. So they could be -- so for a video,                      6 there's a video that matched the image query of an                      7 r-frame, the results I could get back could include                      8 three things. It could be a still image, it could                      9 be a thumbnail, or it could be an r-frame                      10 representation?                      11 A. R-frame, I think, is representative frame.                      12 So it was a key frame in that video sequence,                      13 summary frame.                      14 Q. Once I ran a query on an r-frame; right?                      15 Well, let's stop there.                      16 If I run a query on still images,                      17 typically the results I would get back are                      18 thumbnails that are most similar to the                      19 characteristics which I queried from the query                      20 image; right?                      21 A. You could get thumbnails back. You could                      22 also get the full-sized image back.                      23 Q. Okay.                      24 A. Thumbnail is a tool for helping you return                      25 lots of results and quickly scan it.</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference	
		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I                  2 have to click on the thumbnail in order to bring up                  3 the full-sized image?                  4 A. You could.                  5 Q. Otherwise I could automatically receive                  6 the full-sized image as part of the result?                  7 A. You could.                  8 Q. Okay. So walk through that process if I'm                  9 using an r-frame of a video. If I do a -- if I run                  10 a query on an r-frame of a video as a -- an image                  11 query, how could I get the results back?                  12 MR. HANSEN: Objection; vague and ambiguous.                  13 BY MR. EDWARDS:                  14 Q. In what form would I get the results back?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: You could get back the still                  17 r-frame, representative frame, you could get back                  18 the thumbnail, or you could get back the entire                  19 video clip that that r-frame represents, a few                  20 frames.                  21 BY MR. EDWARDS:                  22 Q. If I received a thumbnail or the r-frame,                  23 would there be some sort of link I could click on to                  24 get the underlying full video?                  25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic                  2 units initially returned in a video query."                  3 Meaning the r-frames?                  4 A. Correct.                  5 Q. "For example, in a query for shots that                  6 are dominantly red, a set of r-frames will be                  7 displayed. To see the actual video shot, the user                  8 clicks on the displayed r-frame icon."                  9 A. Yep.                  10 Q. And that was one of the ways you were                  11 describing that the results of a r-frame query would                  12 be returned to the user?                  13 A. Right.                  14 Q. Do you know if that was the preferred way                  15 that was used in demos in commercial applications?                  16 MR. HANSEN: Objection; vague and ambiguous,                  17 lacks foundation.                  18 MR. STRAUSSMAN: You can answer.                  19 THE WITNESS: I don't know.                  20 BY MR. EDWARDS:                  21 Q. But, Mr. Flickner, this -- generally this                  22 article represents the status of the QBIC technology                  23 as of the date of this publication, which is                  24 September 1995; is that right?                  25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.                  2 THE WITNESS: As I recall -- I'm not sure                  3 definitely, but, yes, this is -- you could do that.                  4 BY MR. EDWARDS:                  5 Q. So let's go to page IBM 898.                  6 So if you'll take -- just read that                  7 paragraph that starts with the header                  8 "Representative Frame Generation."                  9 MR. STRAUSSMAN: And if you need to read                  10 anything else to put it in context, feel free to do                  11 so.                  12 THE WITNESS: Okay.                  13 (Witness reviews document.)                  14 THE WITNESS: So what was your question, again?                  15 BY MR. EDWARDS:                  16 Q. If you go to the sentence that says,                  17 "First" -- it's the second sentence in that                  18 paragraph. It says, "First, during database                  19 population, r-frames are treated as still images."                  20 See that?                  21 A. Yeah.                  22 Q. And that's what you told me earlier;                  23 correct?                  24 A. Yeah.                  25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --                  2 Q. Okay.                  3 A. -- there's an editorial process.                  4 Q. Say that last part?                  5 A. There's an editorial process. You submit                  6 it, they edit and make changes and eventually it                  7 appears.                  8 Q. Right. So what you're saying is there's                  9 some lag between the time that you wrote the article                  10 and the time it was published?                  11 A. Yeah.                  12 Q. So this article -- but this article                  13 represents the state of the QBIC technology at least                  14 as of September 1995?                  15 A. Yeah. Yes.                  16 Q. And then let's go to IBM 900.                  17 And take your time to orient yourself on                  18 that page, but what I really want to ask you about                  19 is the last paragraph on the left-hand column going                  20 up to the top of the right-hand column.                  21 A. Yep.                  22 Q. So it says this paper describes [as read],                  23 "a prototype system that uses image and video                  24 content as the basis for retrievals."                  25 Is that right?</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 129 – 131</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 161</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p>

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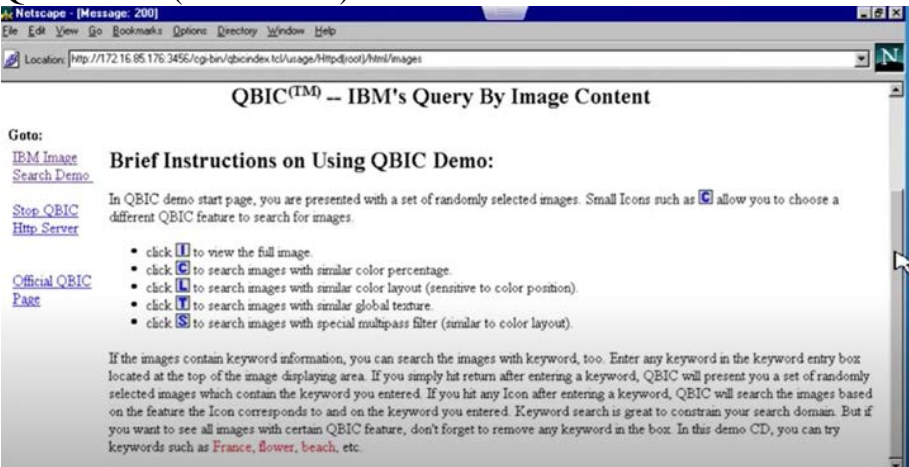

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the '252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. '252 Patent, 3:7-16. Indeed, the '252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee’s own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>

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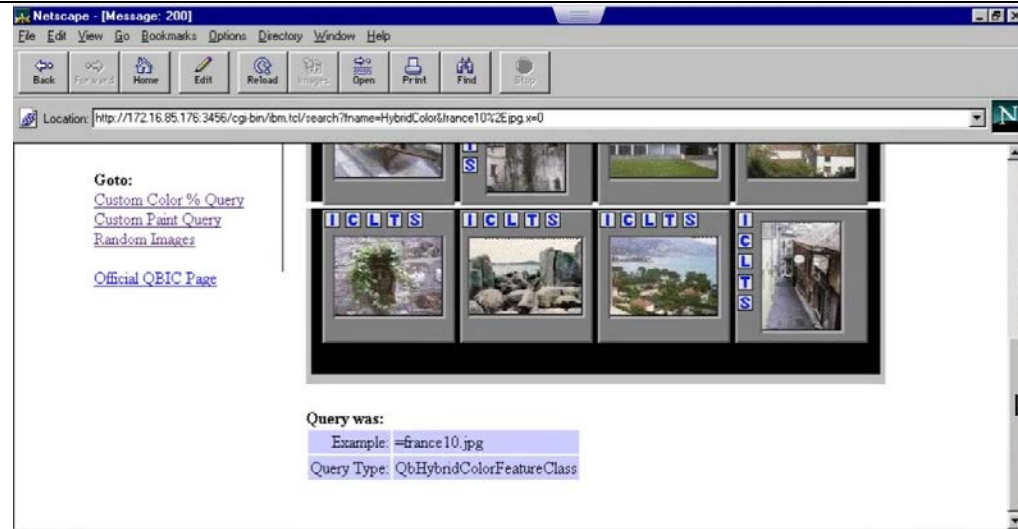
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2. Claim 26

Claim	'252 Claim Recitation	Exemplary Citations in Reference
26	The method of claim 18, wherein the data relating to the image comprises the image.	<p>QBIC discloses the method of claim 18, wherein the data relating to the image comprises the image.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 8</p> <p>4.1. <b>Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. This interface is made up of four parts (listed from top to bottom): the window menu, the tool selection buttons, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images. There are nine drawing tools provided by the interface: Polygon, Rectangle, Ellipse, Paint Brush, Eraser, Line Draw, Object Move, Fill Area, Snake Outline. For example the Polygon tool allows the user to click or drag around bounding edges of the object to be outlined, this can then be refined by the snakes method providing a shrink-wrap effect.</p> <p>QBIC Demo (IBM000747)</p>  <p>In QBIC demo start page, you are presented with a set of randomly selected images. Small Icons such as  allow you to choose a different QBIC feature to search for images.</p> <ul style="list-style-type: none"> <li>• click [I] to view the full image.</li> <li>• click [C] to search images with similar color percentage.</li> <li>• click [L] to search images with similar color layout (sensitive to color position).</li> <li>• click [T] to search images with similar global texture.</li> <li>• click [S] to search images with special multipass filter (similar to color layout).</li> </ul> <p>If the images contain keyword information, you can search the images with keyword, too. Enter any keyword in the keyword entry box located at the top of the image displaying area. If you simply hit return after entering a keyword, QBIC will present you a set of randomly selected images which contain the keyword you entered. If you hit any Icon after entering a keyword, QBIC will search the images based on the feature the Icon corresponds to and on the keyword you entered. Keyword search is great to constrain your search domain. But if you want to see all images with certain QBIC feature, don't forget to remove any keyword in the box. In this demo CD, you can try keywords such as <i>France, flower, beach</i>, etc.</p>

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Flickner Depo at 131-133

- 14 Q. An action that the QBIC system would  
15 automatically take based on the results it would  
16 return.  
17 A. So you're saying as you return results,  
18 you do some post-filtering on the image or the --  
19 what -- what kind of --  
20 Q. Perhaps not -- not post-filtering.  
21 But, for example, displaying a hyperlink  
22 along with the results for a specific result.



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		<p>1 A. Yeah, you could do that.</p> <p>2 Q. But did the QBIC system do that?</p> <p>3 A. I don't remember.</p> <p>4 Q. What about advertisements?</p> <p>5 A. There was no support I know of for</p> <p>6 advertisement.</p> <p>7 Q. Did any version of the QBIC system do</p> <p>8 anything with the results other than display them</p> <p>9 to the user?</p> <p>10 A. It lets you use them as a refinement</p> <p>11 query.</p> <p>12 Q. And what do you mean by -- what do you</p> <p>13 mean by use it as a --</p> <p>14 A. You could click on one of the results and</p> <p>15 it would cause another query using that input</p> <p>16 image.</p> <p>17 Q. I see.</p> <p>18 The user would need to --</p> <p>19 A. Yeah.</p> <p>20 Q. -- create another query based on the</p> <p>21 results?</p> <p>22 A. You -- you could probably hyperlink</p> <p style="text-align: right;">Page 132</p> <hr/> <p>1 browse so you -- you could search that image, you</p> <p>2 click on that image, you change the metrics on</p> <p>3 where you're sorting, and you get a -- basically,</p> <p>4 get a re-sort.</p> <p><i>Id.</i> at 32–33</p>
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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah.</p> <p><i>Id.</i> at 74–75</p>
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			<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 76–77</p> <p>9 Q. I could have taken a picture of an 10 electronic billboard or display and submit that to 11 the system? 12 A. Yep. 13 Q. Stamps? 14 A. Yep. 15 Q. Posters? 16 A. Why not? 17 Q. Magazine? 18 A. Subject to copyright issues, yes. 19 Q. Certainly. 20 How about a passport? 21 A. Could be done. 22 Q. An album cover? 23 A. Could be done. 24 Q. And could those images not only contain 25 objects but also symbols, like a -- like a logo or a</p> <hr/> <p>1 trademark? 2 A. Yes.</p> <p style="text-align: right;">Page 77</p> <p><i>Id.</i> at 114</p>
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		<p>1 Q. If I took all the components off of the CD 2 and put it onto my desktop operating system, could I 3 then add images to that folder? 4 MR. HANSEN: Objection; calls for speculation. 5 THE WITNESS: I think so. 6 BY MR. EDWARDS: 7 Q. Okay. Do you -- do you -- based on your 8 knowledge of putting these demos together, do you 9 see any reason why -- any -- anything that would 10 prohibit me from doing that? 11 MR. HANSEN: Same objection. 12 THE WITNESS: We have to -- at the time there 13 was a big issue with the copyright of the image. 14 BY MR. EDWARDS: 15 Q. Was there a way that you could 16 electronically prevent me from moving those contents 17 from the CD over to a desktop and then adding images 18 to the -- to the folder? 19 A. No.</p> <p><i>Id.</i> at 202</p>
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		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can 2 take an image with a portable camera and submit that 3 to the QBIC system for image query; is that correct? 4 A. Correct. 5 Q. Okay. And that would -- that would 6 include any commercial products that we looked at, 7 like Ultimedia and Enterprise Portal, that use QBIC 8 system. A user could take an image, submit that to 9 those systems and QBIC would be able to extract 10 features from that image from an image query and 11 also for any images that were taken by a portable 12 camera used to store in the database; is that right? 13 MR. HANSEN: Objection; lacks foundation. 14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300</p> <p>6 Q. Did QBIC have a camera? 7 A. Yes. 8 Q. It did? 9 A. There were internal versions that we 10 attached cameras to. 11 Q. I mean, was the camera part of QBIC or 12 something you attached to QBIC? 13 A. Something you attached to QBIC.</p> <p><i>Id.</i> at 312</p>	
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		<p style="text-align: right;">Page 312</p> <p>1 Q. And with respect to -- I think we talked a 2 bit -- a little bit about this before, but I want to 3 make sure my understanding is correct. 4 On the -- on the demo application on the 5 CD, if I took those files off and put it on my 6 computer and ran it, just like Mr. Hansen was 7 running it today from a computer, there's no 8 technical restriction that would prevent me from 9 capturing an image with a portable camera and 10 importing that into the file with all the other 11 images; is that -- 12 MR. HANSEN: Objection; lacks foundation. 13 (Reporter seeks clarification.) 14 THE WITNESS: It would be possible, yes. 15 BY MR. EDWARDS: 16 Q. Okay. The user then could use that 17 captured image in a query? 18 MR. HANSEN: Same objection. 19 THE WITNESS: Yes.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the '252 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in</p>
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		<p>the image or on the object, were traditional methods known in the art and not part of the present invention. '252 Patent, 3:7-16. Indeed, the '252 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 11:56-61. This limitation was thus known in the art by patentee's own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
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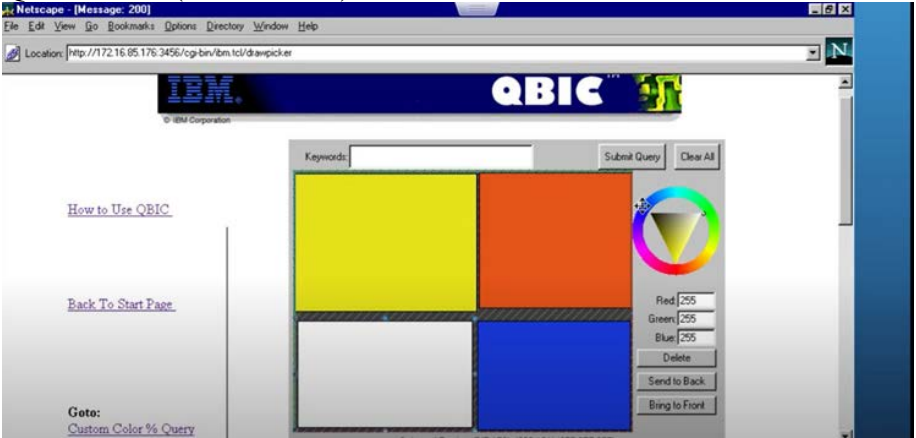

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**3. Claim 27**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
27	<p>The method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p>	<p>QBIC discloses the method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content—colors, textures, shapes, and camera and object motion—and the features are stored in a database.” <i>Id.</i> at p. 3.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “In addition, you can specify conversion options that identify additional changes, such as rotation or compression, that you want to apply to the stored image.” <i>Id.</i> at p. 95.</p> <p>QBIC Demo (IBM000747)</p> 

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		<p><b>QBIC Demo (IBM000747)</b></p>   <p>Flickner Depo at 49-50</p>
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		<p>13 Q. Okay. And what about the L button, it 14 says "Layout," right? 15 A. Yeah. 16 Q. What does that mean? 17 A. You did a crude sketch. 18 Q. Sorry. What was that? 19 A. You would do a crude sketch. 20 Q. A crude sketch. 21 What is a -- what do you mean by a crude 22 sketch?</p> <p>1 A. You would -- it would pop -- pop up a 2 drawing box, and you could draw lines and -- and 3 input different colors, if I recall correctly.</p> <p>Flickner Depo at 214-215</p> <p>Flickner 8/29/23 Depo at 79-80</p>
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		<p>3 Q. What about resizing the image? 4 A. We did -- we probably supported that on 5 import. 6 Q. Say again? 7 A. We supported that on -- most likely we 8 supported that on import, on read. 9 So the read, you request a particular 10 size. 11 Q. You're going to have to repeat it. I 12 didn't understand you. 13 MR. STRAUSSMAN: And speak up. 14 THE WITNESS: So resizing would be done 15 typically when you import the image into the system 16 BY MR. EDWARDS: 17 Q. Okay. So if you're importing the image 18 into the database, is that what you're talking 19 about? 20 A. Correct. 21 Q. Okay. And at that point you would resize 22 the image to reduce the size?</p>	
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		<p>1           How would you resize the image on 2 importation? 3       A. You would request a particular size of 4 image and then use that to populate the database. 5       Q. So if the source images that you were 6 acquiring were say too big for purposes of QBIC, on 7 importation you could resize those to get them to 8 the size that are -- meet the -- meet the 9 requirements of the QBIC system? 10      A. Yes. 11      Q. Was that done as a matter of course in the 12 QBIC system? 13      MR. HANSEN: Objection; vague and ambiguous. 14      THE WITNESS: As I recall, yes. 15      BY MR. EDWARDS: 16      Q. Was it an automatic process? 17      A. As I recall, yes. 18      Q. So if a user were to import source images 19 into the database, when the user did that, the QBIC 20 system would automatically resize it to fit the 21 requirement of the QBIC system? 22      A. Make sure it's in the range that the QBIC 23 system could handle. 24      Q. That's a "yes"? 25      A. That's a "yes."</p> <p><i>Id.</i> at 141 – 142</p>
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		<p>8 Q. Okay. On -- is there any compression done 9 on an image query image, either before or after you 10 extract features? 11 A. Most of them are compressed into JPEGs, 12 the most popular. 13 Q. Okay. They were -- they're compressed 14 into JPEGs -- you take -- so -- strike that. 15 So you take a JPEG image, then you extract 16 the features from that JPEG image? 17 A. You uncompress a JPEG image and you exact 18 the features from the uncompressed image. 19 Q. Okay. And you were doing that in the 20 '90s -- 21 (Reporter seeks clarification.) 22 A. Uncompress. So you get an uncompressed 23 version of the image and you extract the features on 24 the uncompressed image. 25 Q. Okay. So if you have a JPEG image, the page 176</p> <p>1 QBIC system would uncompress it? 2 A. Yep. 3 Q. And then it would extract whatever feature 4 you want from that uncompressed image? 5 A. Correct. 6 Q. And then those extracted features from the 7 uncompressed JPEG image are used in the matching 8 process? 9 A. Correct. 10 Q. Okay. And you were using -- you were 11 doing this for JPEG image -- or the QBIC system was 12 doing this for JPEG images in the -- in the '90s? 13 A. Yes.</p> <p><i>Id.</i> at 201</p>	
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		<p>3 Q. And earlier we talked about JPEG and MPEG 4 are formats that QBIC understood. 5 A. Correct. 6 Q. Among others; correct? 7 A. Correct. 8 Q. This doesn't list JPEG or MPEG. Do you 9 take that -- what do you take that to mean? 10 MR. HANSEN: Objection; lacks foundation. 11 BY MR. EDWARDS: 12 Q. Or do you know? Is this just a -- this is 13 not an all-encompassing list? 14 MR. HANSEN: Same objection. 15 THE WITNESS: I don't remember what the status 16 of JPEG was in '95. 17 BY MR. EDWARDS: 18 Q. Okay. But at some point QBIC was able to 19 handle any types of image and video formats? 20 A. Not any types but most types. 21 Q. Most types. Including JPEG and MPEG? 22 A. Yeah. 23 Q. Okay. You're just not sure if that was as 24 of 1995? 25 A. Right.</p> <p><i>Id.</i> at 300 – 301</p> <table border="1"><tr><td>24 Q. All right. Did any version of QBIC 25 compress an image while it was operating?</td><td></td></tr><tr><td>1 MR. EDWARDS: Objection; form, vague, asked and 2 answered. 3 THE WITNESS: Yes. On output we would compress 4 the data. 5 (Reporter seeks clarification.) 6 THE WITNESS: On output we would compress the 7 data.</td><td>Page 301</td></tr></table>	24 Q. All right. Did any version of QBIC 25 compress an image while it was operating?		1 MR. EDWARDS: Objection; form, vague, asked and 2 answered. 3 THE WITNESS: Yes. On output we would compress 4 the data. 5 (Reporter seeks clarification.) 6 THE WITNESS: On output we would compress the 7 data.	Page 301
24 Q. All right. Did any version of QBIC 25 compress an image while it was operating?						
1 MR. EDWARDS: Objection; form, vague, asked and 2 answered. 3 THE WITNESS: Yes. On output we would compress 4 the data. 5 (Reporter seeks clarification.) 6 THE WITNESS: On output we would compress the 7 data.	Page 301					

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		<p><i>Id.</i> at 332</p> <p>5 Q. Mr. Flickner, the demo that Mr. Hansen 6 showed you today, that used JPEG images; correct? 7 A. It appears to have. 8 Q. Okay. And JPEG is a compression scheme? 9 A. Yes.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 29**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
29	<p>The method of claim 18, wherein image processing further includes converting at least a portion of the data relating to the image into a grayscale image.</p>	<p>QBIC discloses the method of claim 18, wherein image processing further includes converting at least a portion of the data relating to the image into a grayscale image.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404):                      “Texture features: Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The coarseness feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The contrast feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram.” <i>Id.</i> at p. 3.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database.” <i>Id.</i> at p. 3.</p> <p>Ultimedia Manager: Query by Image Content and its Applications (IBM 0002432–237):                      “Texture, measured as coarseness (pebbles vs. sand), contrast (presence of bright and dark image areas) and directionality (ordered vs. unordered edges in the image area), all computed from the luminance or gray level image; useful for searching for ‘flat’ or non-busy image regions, or image areas with many edges.” <i>Id.</i> at pp. 425–26.</p>

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		<p>Flickner Depo at 176-177</p> <p>18           Figure 1 appears to show a gray scale 19 query of some images; is that right? 20           A. It shows a what? 21           Q. Queries it -- it -- it seems to show a 22 demo version or a screenshot of some version of</p> <hr/> <p style="text-align: right;">Page 176</p> <p>1           QBIC that can query gray scale images. 2           A. Yes.</p> <p>Flickner Depo at 54-55</p> <p>Flickner 8/29/23 Depo at 82-83</p>
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		<p>12 Q. Let's put a pin in that because we're 13 going to get to it. 14 What about gray scale? Were any images 15 converted to gray scale before features were 16 extracted? 17 A. Yes. 18 Q. Which -- for which features? 19 A. For shape, for texture. 20 Q. Any others? 21 A. Color wouldn't make any difference. 22 That's all I can think of. 23 Q. At least for shape and texture? 24 A. Yeah. 25 Q. Okay. Then earlier we talked about</p> <p style="text-align: right;">Page 83</p> <p>1 segmentation. And I want you to go to Exhibit 3, 2 please, page IBM 896. 3 Well, and real quick before we get there, 4 Mr. Flickner, going back to the gray scale, when you 5 converted the image to gray scale for shape and 6 texture, was the gray scale -- is the gray scale 7 image stored in the database? 8 A. I don't recall whether we actually stored 9 it or not. Probably yes. 10 Q. Was it at least stored temporary while you 11 process -- 12 A. Temporarily, yes. Yes.</p>	
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*Id.* at 92–93

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		<p>12 Q. And I think earlier you mentioned that 13 gray scaling was used in the texture calculation. 14 For which of those three features is the image 15 converted to gray scale? 16 A. Probably all three. 17 Q. Okay. So coarseness is a measure of the 18 scale of the textures, such as pebbles versus 19 boulders? 20 A. Correct. 21 Q. Contrast is the vividness of a pattern? 22 A. Correct. 23 Q. And then this says that contrast is a 24 function of the variance of the gray-level 25 histogram; is that right?</p> <hr/> <p style="text-align: right;">Page 93</p> <p>1 A. Correct. 2 Q. So at least for contrast that's converted 3 to a gray scale histogram; correct? 4 A. Correct.</p> <p><i>Id.</i> at 280 – 281</p> <p>20 Q. So, like, all the features that we've been 21 talking about today that are extracted, ultimately 22 those are representatives of several binary numbers; 23 right? 24 A. They're representative of the image, which 25 is stored as -- each pixel's either -- could be</p> <hr/> <p style="text-align: right;">Page 281</p> <p>1 binary, could be gray scale, could be color, could 2 be multichannel.</p> <p><i>Id.</i> at 301 – 302</p>	
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		<p>12 Q. Did QBIC -- any version of QBIC ever 13 convert a queried image from color into gray scale? 14 MR. EDWARDS: Objection; form, asked and 15 answered. 16 THE WITNESS: Did any form of QBIC take color 17 and convert into gray scale? 18 It was certainly an option, but you 19 typically do it outside of QBIC. 20 BY MR. HANSEN: 21 Q. Was it an option within QBIC? 22 A. No. Well, actually, in the color queries, 23 you might be able to do . . . 24 Q. I'm sorry, could you speak up? 25 A. I'm thinking. Give me a second.</p> <p>1 You could mimic a gray scale query by 2 selecting a subset of the color features. So you 3 could just select the luminance channel instead of 4 luminance and chrominance, and then you could query 5 gray-level images. 6 Q. So would that process convert the input 7 image to a gray scale image? 8 A. The process converts it to a 9 three-channel. So RGB converts to LIQ. 10 (Reporter seeks clarification.) 11 A. RGB, red/green/blue, converts to LRI -- 12 LIQ. 13 Q. And that's gray scale image? 14 A. L is gray scale. I and Q are chrominance 15 images.</p> <p><i>Id.</i> at 81-86</p> <p>23 Q. Were there any other features that, as 24 part of the -- as part of the extraction process, 25 the image had to be converted to binary before?</p>	
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		<p style="text-align: right;">Page 82</p> <p>1 Well, strike that. Bad question. 2 Were there any features that required the 3 image to be converted to binary before the features 4 were extracted? 5 A. Some features required a binary image, 6 yeah. 7 Q. Which ones? 8 A. Some of the texture features. 9 Q. And when you say "some of the texture 10 features," do you -- do you recall which ones? 11 A. No. 12 Q. Let's put a pin in that because we're 13 going to get to it. 14 What about gray scale? Were any images 15 converted to gray scale before features were 16 extracted? 17 A. Yes. 18 Q. Which -- for which features? 19 A. For shape, for texture. 20 Q. Any others? 21 A. Color wouldn't make any difference. 22 That's all I can think of. 23 Q. At least for shape and texture? 24 A. Yeah. 25 Q. Okay. Then earlier we talked about</p>	<p style="text-align: right;">Page 83</p> <p>1 segmentation. And I want you to go to Exhibit 3, 2 please, page IBM 896. 3 Well, and real quick before we get there, 4 Mr. Flickner, going back to the gray scale, when you 5 converted the image to gray scale for shape and 6 texture, was the gray scale -- is the gray scale 7 image stored in the database? 8 A. I don't recall whether we actually stored 9 it or not. Probably yes. 10 Q. Was it at least stored temporary while you 11 process -- 12 A. Temporarily, yes. Yes. 13 Q. Okay, sorry. So page 896, if you look 14 at -- I apologize. It's hard to describe, but the 15 page is kind of broken up. There's some bolded, 16 highlighted text kind of in the first half of the 17 page and then the second half of the page is what I 18 want to focus you on the left-hand column. It 19 starts with, "applications. As a result." 20 Do you see that? 21 A. Yeah. 22 Q. Okay. If you look at that second sentence 23 there -- well, I'll read the -- I'll read the first 24 two sentences, first two full sentences. It says, 25 "As a result, we have devoted considerable effort to</p>
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		<p style="text-align: right;">Page 84</p> <p>1 developing tools to aid in this step. In recent 2 work, we have successfully used fully automatic 3 unsupervised segmentation methods along with a 4 foreground/background model to identify objects in a 5 restricted class of images.” 6 Did I read that correctly? 7 A. Yep. 8 Q. And can you interpret that for me? What 9 is -- how did -- how were segmentation methods used 10 there? 11 A. This is work by Harpreet Sawhney, and he 12 had algorithms for doing segmentation. So given an 13 input image, identify which pixels belong to which 14 class. So this is a cup, this is a table this is a 15 phone. It's a three-class problem. 16 And you write algorithms that determine 17 what the characteristics of a cup are, what the 18 characteristics of a table is, what the 19 characteristics of a phone cover is. And you 20 populate those in the database. 21 Q. And how are those populated in a database? 22 Are those associated with the underlying image? 23 A. Yes. 24 Q. And that could be done for both a query 25 image and a database image?</p>	
		<p style="text-align: right;">Page 85</p> <p>1 A. It's done for both. 2 Q. Okay. And so let's go back to Exhibit 2. 3 Feature Calculation starts on IBM 2392. 4 So, Mr. Flickner, what I'm going to do is 5 I'm going to walk through each one of these. The -- 6 so for feature calculation, there's a section on 7 color, there's a section on texture and if you turn 8 the page there's a section on shape and sketch. 9 A. Okay. 10 Q. Okay? So I want to talk about color 11 first. So why don't you take your time, take -- you 12 know, read that section and then let me know when 13 you're done and then I want to ask you some 14 questions. 15 (Witness reviews document.) 16 A. Okay. 17 Q. First question, though, is this section is 18 entitled "Feature Calculation"? 19 A. It is. 20 Q. So for each of color, texture, shape, 21 sketch, there are algorithms that are performing 22 some mathematical computation to calculate those 23 features; is that right? 24 A. Yes. 25 Q. Okay. So let's talk about the color</p>	

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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two 2 different color computations that are done. One is 3 average color, the other is color histogram; is that 4 right? 5 A. There certainly are those two. 6 Q. Say again. 7 A. There certainly are those two. 8 Q. Okay. And for average color, let's talk 9 about that first, it says [as read], "We compute the 10 average," and it lists four things, "(R, G, B), (Y, 11 i, q), (L, a, b), and MTM coordinates of each object 12 and image." 13 You see that? 14 A. Yep. 15 Q. So does that mean that it does -- every 16 time it -- if it computes average color, it computes 17 all four of those things? Or are those optional, 18 meaning that it can compute one as opposed -- or 19 some combination of those four? 20 A. Some combination of those four. 21 Q. Okay. Are there different algorithms for 22 each of those four or is it the same algorithm? 23 A. RGB, Yiq and LAB are all linear 24 transformations. 25 Q. Okay.</p>	<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA's Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 31**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
[31]	<p>The method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p>	<p>QBIC discloses the method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390:</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images' content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>QBIC Demo (IBM000747):</p>

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Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).

Flickner Depo at 18:

- 14           A. Well, we did stuff with the San Francisco  
15           Museum, the stamps database, trademark database.  
16           So we did some of the stuff with Davis --  
17           Q. Okay.  
18           A. -- UC Davis. I remember we talked to a  
19           couple people at Davis.  
20           Q. So was this an active area of research in  
21           the 1990s?  
22           A. Yeah.

Flickner Depo at 20:

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		<p>3 Q. Okay. And the steps that -- at least as 4 I understand it -- is you'd have database 5 population, feature calculation and image query; is 6 that right? 7 A. Uh-huh. Yes. 8 Q. So let's -- let's start with database 9 population. 10 What was the database population step? 11 A. It's a process of taking a set of images, 12 and then putting them in -- into the database and 13 the extracting the features and putting the 14 features in the database. 20 Q. And how large were these database 21 structures? 22 A. In the order of 15,000 images.</p> <p>Flickner Depo at 21:</p>
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		<p>1 Q. And you mentioned that you would extract 2 features from the images? 3 A. We did. 4 Q. How would you do that? 5 A. We ran algorithms on the pixels of the 6 image and from that we created a feature. 7 Q. What sort of features would you extract 8 from the images? 9 A. A QBIC system did color, shape and 10 texture. 11 Q. Okay. So let's take color. 12 How would you, say, extract a color 13 feature from an image? 14 A. We typically would compute -- compute a 15 color histogram. 16 Q. And what's a color histogram? 17 A. It's a measure of -- it's an estimate of 18 the probability density of a color being in an 19 image. 20 Q. So you would take an image and extract 21 that color histogram from it? 22 A. Yup.</p> <p>Flickner Depo at 22-25:</p>
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		<p>1 Q. Okay. And what would you do with the 2 image after you hit and extracted the color 3 histogram from it? 4 A. Nothing. 5 Q. Would those features be stored in any 6 database or -- 7 A. Yes. 8 Q. Okay. And let's do -- what about 9 texture, could you extract texture features from an 10 image? 11 A. We did. 12 Q. And how would you do that? 13 A. I don't remember exact features we were 14 using. There were -- we published some papers on 15 them. 16 Q. Okay. Was there any reasoning behind 17 picking the features that you chose? 18 A. Yes. 19 Q. And what was that reasoning? 20 A. We wanted to make it so that the results 21 were perceptually good. 22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red 2 color in it or some sort red color histogram; is 3 that right? 4 A. Well, you -- you take specific -- you 5 search for a red color. You'd compute the 6 histogram and then basically match the histogram, 7 which would give you images that had more colors in 8 the reds. This is not -- it's not a unique thing. 9 Q. Were you always searching for a 10 particular feature, or could you just search some 11 sort of example image? 12 A. We could search an example image. 13 Q. And how would that process work? 14 A. Just extract the features from it. 15 Q. So let's break that down. 16 So you would submit an example image to 17 the -- to the system, right? 18 A. Uh-huh. 19 Q. And then how do the -- how -- how does 20 the system select which features to extract? 21 A. It would compute them all, typically, or 22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that 2 this is a better match, that the ordering was 3 reasonable and... 4 Q. So by that, do you mean that people would 5 view the results returned as the closest or close 6 matches to your -- to your image? 7 A. It was -- it would satisfy their query. 8 Q. Okay. So -- so you would have this set 9 of features in your database. 10 How would you search for those features? 11 A. Typically, we -- initially, we did linear 12 scan where you just actually evaluate the -- the 13 distance metric against all the features. 14 Q. So in linear scan, you would compare some 15 sort of search term against all the features in the 16 database? 17 A. Well, it depends on which features you're 18 using. You didn't have to use all the features. 19 You could use just color features or just texture 20 features or just... 21 Q. So to make sure I'm understanding this 22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with 2 those features that it had extracted from that 3 example? 4 A. Then it became the reference point to the 5 search. 6 Q. And by research point to the search, what 7 do you mean? 8 A. So you have a vector in -- in the 9 individual space. 10 (Reporter clarification.) 11 A. That -- that query represents a point in 12 that space, and you're looking for other things 13 near that space or ordered by that space. 14 Q. And by other things near that space, is 15 that the other features that are in the -- in the 16 database? 17 A. Yes. 18 Q. Okay. So at bottom then, you would -- 19 you would take the image, the system would extract 20 features from it, and then those features would be 21 searched against the reference database -- the 22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>

Flickner Depo at 25-26:

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		<p>1 Q. Okay. And then what would it do with 2 those features that it had extracted from that 3 example? 4 A. Then it became the reference point to the 5 search. 6 Q. And by research point to the search, what 7 do you mean? 8 A. So you have a vector in -- in the 9 individual space. 10 (Reporter clarification.) 11 A. That -- that query represents a point in 12 that space, and you're looking for other things 13 near that space or ordered by that space. 14 Q. And by other things near that space, is 15 that the other features that are in the -- in the 16 database? 17 A. Yes. 18 Q. Okay. So at bottom then, you would -- 19 you would take the image, the system would extract 20 features from it, and then those features would be 21 searched against the reference database -- the 22 features within the referenced database; is that 1 right? 2 A. That's correct. 3 Q. Okay. And once it determined matches, 4 what would the system do next? 5 A. It would display them, display the image. 6 Typically, in thumbnail form. 7 Q. Okay. How many matches would it display? 8 A. On the order of 20, 30. You -- you could 9 get more. It's really an ordering of the whole 10 database. 11 Q. Okay. And could you vary the amounts of 12 matches that it would return? 13 A. Yeah. 14 Q. Okay. And how would you vary the amount 15 of matches? 16 A. I think it was like a configuration 17 related to the X Windows application that has 18 scroll bars on it, and you can assess like how many 19 elements you wanted into it. This is pre-Web.</p>
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Invalidity Chart for U.S. Patent 7,899,252 based on the Query by Image and Video Content (“QBIC”) System

		<p>Flickner Depo at 36:</p> <p>10 Q. So underlying this paper, you mentioned 11 you did more work on the shape side of things; is 12 that right?</p> <p>13 A. I did.</p> <p>14 Q. And what would that work have entailed?</p> <p>15 A. We wanted to query by shape.</p> <p>16 Q. Okay. And how would that have worked?</p> <p>17 A. We created features related to the shape 18 of a -- the object of -- as it populated the 19 database, and then we would query against those 20 features.</p> <p>Flickner Depo 38-41:</p>
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		<p>1 project at this time?                  2 A. I don't know that.                  3 Q. Okay. Would reviewing -- let's see.                  4 Let's turn to page -- let's turn to page -- this                  5 one is Bates-stamped, so the page ending in                  6 Network1_007316.                  7 Would reviewing this page refresh your                  8 recollection as to whether --                  9 A. Yes.                  10 Q. Okay. Perfect. Feel free.                  11 MR. DeCLERCK: Just give him a chance to                  12 finish his question before you respond.                  13 MR. DANG: Thank you.                  14 THE DEPONENT: Is there a question                  15 standing?                  16 Q. (By Mr. Dang) Sure. Yeah.                  17 So was there any video search                  18 functionality included as part of the QBIC system                  19 at this time?                  20 A. Evidently, yes.                  21 Q. Okay. And how did that video search                  22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using                  2 those images.                  3 Q. Okay. Could you take as -- as you did in                  4 the query by image search system, could you just                  5 search a video using this system?                  6 A. You could search for a key frame and that                  7 could point you to a video.                  8 Q. As an input into the system, could you                  9 search -- could you input a whole video and then                  10 the system would extract the key frames and then --                  11 A. Yes.                  12 Q. -- search that using that?                  13 A. If I recall correctly, yes.                  14 Q. Okay. And the way -- the method by which                  15 it did so, as you mentioned, was -- would it                  16 extract key frames from the video, extract features                  17 from those key frames, and then search those                  18 features; is that right?                  19 A. Correct.                  20 Q. Okay. Other than the use of shots and                  21 key frames, is there any difference between the                  22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>
		<p>1 A. You detect shots in -- transitions in                  2 video and then treat -- treat those as still images                  3 in the QBIC system.                  4 Q. So to break that down, you -- what do you                  5 mean by detecting shots?                  6 A. You try to find some key frame in a video                  7 sequence or multiple key frames in a video                  8 sequence, to give you a summarization of the video.                  9 Q. And how would you detect those key                  10 frames?                  11 A. There were algorithms to do it. I didn't                  12 personally work on any of those algorithms.                  13 Q. Are you otherwise aware of any of those                  14 algorithms?                  15 A. Well, they used histogram methodologies.                  16 I remember that.                  17 Q. Okay. So you would take -- you would use                  18 a histogram methodology to extract key frames from                  19 the video; is that what -- is that right?                  20 A. That's one way to do it.                  21 Q. Okay. And then what would you do with                  22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?                  2 A. There may have been.                  3 Q. Can you think of any now?                  4 A. No.                  5 Q. When you searched for -- or when you                  6 searched a video using this system, what would                  7 the -- or what would the system return?                  8 A. I don't remember if we returned the                  9 stills or a small -- small video clip.                  10 Q. Say it returned the stills, could you use                  11 those stills to point you to a video?                  12 A. Yeah.                  13 Q. And how would you do that?                  14 A. Well, the -- each -- each key frame                  15 typically represents a frame in the video. So                  16 there's a -- the key frame is -- is one frame of                  17 the video so you just seek to that point.                  18 Q. So if I'm understanding this right, you                  19 could take a query video, the system would extract                  20 frames, which would then extract features from it,                  21 and then the system would return either shot clips                  22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>

Flickner Depo at 41-42:



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		<p>18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p> <p>1 A. Right. 2 Q. Okay. And how many key frames would be 3 returned? 4 A. It depends how many you requested. 5 Q. Could you alter how many you request? 6 A. Probably. 7 Q. Could you return key frames based on some 8 defined threshold of the distance? 9 A. Probably.</p> <p>Flickner Depo at 48-49: 4 Q. What feature extraction methods did the 5 UC Davis implementation of QBIC rely on? 6 A. It was similar to the other texture, 7 shape, color and layout.</p> <p>Flickner Depo at 50:</p>
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		<p>7 Q. And so if I clicked on this T, and it 8 used the texture features, what would -- what would 9 the system do? 10 A. It would return the list of stamps based 11 on similarity and texture. 12 Q. And how would it decide which stamps were 13 the most similar to that query image? 14 A. It would use those texture features to 15 compute it, and then it -- I think it was using L 16 to distance.</p> <p>Flickner Depo at 54-55:</p>
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		<p>13 Q. Was there also a demo online comparing 14 trademarks at this time? 15 A. There was a trademark demo. I don't 16 remember the time frame. 17 Q. And how would the trademark demo work? 18 A. Similar to the stamp demo, just different 19 database. The features were a little bit different 20 features. Most trademarks are black-and-white. 21 Q. What sort of features would be extracted? 22 A. I don't remember which features we were</p> <hr/> <p style="text-align: right;">Page 54</p> <p>1 using on trademarks. 2 Q. Could you search for -- could you search 3 an example trademark into a database of other 4 trademarks? 5 A. I believe so. 6 Q. And would that work in a similar fashion 7 to this stamps demo? 8 A. I believe so. 9 Q. And would that identify the stamp -- or 10 the trademark that you were searching in any way? 11 A. What do you mean by identify? 12 Q. Would the -- would the trademarks 13 returned ever match the trademark that you 14 searched, or were they always different trademarks? 15 A. Well, if your query was in a database, it 16 would match.</p> <p>QBIC could integrate with a camera, such as a portable camera; a user could take an image using a portable camera and submit that image to the QBIC system for query.</p> <p>Flickner Depo at, 62-63 (user could take a picture or video and submit it to the QBIC system):</p>
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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p>
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		<p>10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right? 1 A. Right.</p> <p>Flickner Depo at 63: 13 Q. And what would the system return, once a 14 user searched an example image? 15 A. A list of images. Typically, thumbnails.</p> <p>Flickner Depo at 72-73:</p>
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		<p>21 Q. Did MediaMiner support any indexing 22 structures for the image database?</p> <p style="text-align: center;">Page 72</p> <hr/> <p>1 MS. HAYDEN: Objection. Foundation. 2 THE DEPONENT: I don't remember. 3 Q. (By Mr. Dang) Turn to page 735 at the 4 bottom, the Bates number ending in 735. 5 You see on the third bullet on this page 6 it says "Indexing of images as an automatic 7 preprocessing step." 8 What does that mean? 9 A. When you create the database, you build 10 the indexes. 11 Q. What indexes could you incorporate? 12 A. Any -- any index your scheme has 13 supported. 14 Q. Could you incorporate a clustered index? 15 A. You could. 16 Q. Could you incorporate specifically that 17 clustering index that was mentioned in the 1998 18 paper? 19 MS. HAYDEN: Objection. Calls for 20 speculation. 21 THE DEPONENT: You could. 22</p> <p>Flickner Depo at 75-76:</p>
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		<p>11 Q. What's a Db2 universal extender?</p> <p>12 A. It's the extension of Db2 for other media</p> <p>13 types, for other types of data.</p> <p>14 Q. What do you mean by extension?</p> <p>15 Would it add functionality to the Db2</p> <p>16 database?</p> <p>17 A. Correct.</p> <p>18 Q. Is one of those added functionalities the</p> <p>19 image extender?</p> <p>20 A. Most likely.</p> <p>21 Q. What's an image extender?</p> <p>22 A. It's ability to image queries or</p> <p>1 similarity queries on image data -- on image</p> <p>2 datasets.</p> <p>3 Q. Did the image extender incorporate QBIC</p> <p>4 technology?</p> <p>5 A. I believe it did.</p> <p>6 Q. Did the image extender allow a user of</p> <p>7 the Db2 universal database to search images by</p> <p>8 their content?</p> <p>9 A. I believe it did.</p> <p>Flickner Depo at 78-79:</p>
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		<p>6 Q. How would the Db2 universal search a 7 query image using QBIC technology? 8 A. You would create a -- create a manager 9 QB- -- or create a QBIC catalog. 10 Q. What's a QBIC catalog? 11 A. It's an instance of a table that has a 12 bunch of images in it. 13 Q. And forgive me, what's an instance of a 14 table? 15 A. You create a table -- create a database, 16 and then in the database you create a table and you 17 have maybe like a file name, and then the actual 18 image bits into it. 19 Q. And how would you search for images using 20 that table? 21 A. You could search -- you could use 22 whatever you wanted to for the -- the SQL query</p> <hr/> <p>Page 78</p> <p>1 to -- to filter, and then that would give you a 2 list of results. And then you'd rank all of those 3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 88:</p>
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		<p>7 Q. (By Mr. Dang) Suppose you search for a 8 set of features or you search using a query image 9 in this demonstration, what would the system do? 10 MS. HAYDEN: Objection. Foundation. 11 THE DEPONENT: The system would 12 compute -- in the query image case, the system 13 would compute the features on that -- that image 14 and then compute the distance associated with each 15 one of the images in the database.</p> <p>Flickner Depo at 88-89:</p>
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		<p>7 Q. (By Mr. Dang) Suppose you search for a 8 set of features or you search using a query image 9 in this demonstration, what would the system do? 10 MS. HAYDEN: Objection. Foundation. 11 THE DEPONENT: The system would 12 compute -- in the query image case, the system 13 would compute the features on that -- that image 14 and then compute the distance associated with each 15 one of the images in the database. 16 Q. (By Mr. Dang) Were there any 17 circumstances under which the system would not 18 compute the distance for every image in the 19 database during a search? 20 A. If there was a text filter on it, we 21 didn't. 22 Q. Did the Fine Arts Museum of San Francisco</p> <hr/> <p>1 similarly use the QBIC system? 2 A. They did. 3 Q. When did they use the QBIC system? 4 A. It was in the '90s, if I recall right. 5 Q. How did they use the QBIC system? 6 A. Similar to the way Davis did, as I 7 recall. 8 Q. What sorts of images were they including 9 in their database? 10 A. Paintings.</p> <p>Flickner Depo at 89-90:</p>
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		<p>11 Q. Was that used to the QBIC system publicly 12 available anywhere?</p> <p>13 A. You mean was the Fine Arts demo 14 available?</p> <p>15 Q. Yes.</p> <p>16 A. I think it was on our site, but I can't 17 remember for...</p> <p>18 Q. How did their system work to identify art 19 prints?</p> <p>20 A. Art what?</p> <p>21 Q. How would one identify an art print using 22 their system?</p> <p>2 THE DEPONENT: Well, you had a picture -- 3 you could take a picture of a painting and then you 4 could use that as a query content. And you could, 5 for example, determine its -- its heritage or its 6 lineage.</p> <p>7 Q. (By Mr. Dang) So you could identify 8 image about -- or you could identify information 9 about the painting using the system?</p> <p>10 A. Right.</p> <p>Flickner Depo at 91-92:</p>
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		<p>13 Q. And could you, in general terms, describe 14 what Virage was?</p> <p>15 A. It was a content-based retrieval system 16 tailored to secure surveillance information.</p> <p>17 Q. And you went to their website; was there 18 something on their website, say, a demonstration?</p> <p>19 A. I don't remember.</p> <p>20 Q. Was their system commercially available 21 during the 1990s?</p> <p>22 A. Yes.</p> <p>1 Q. How did their content-based retrieval 2 system work?</p> <p>3 A. It was similar to QBIC.</p> <p>4 Q. Could you, say, extract features from a 5 query image?</p> <p>6 A. Yes.</p> <p>7 Q. And could you search those features into 8 some sort of reference database?</p> <p>9 A. Yes.</p> <p>Flickner Depo at 131-132:</p> <p>14 Q. An action that the QBIC system would 15 automatically take based on the results it would 16 return.</p> <p>17 A. So you're saying as you return results, 18 you do some post-filtering on the image or the -- 19 what -- what kind of --</p> <p>20 Q. Perhaps not -- not post-filtering. 21 But, for example, displaying a hyperlink 22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p>
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Flickner Depo at 142:

1 Q. Do you recall what type of indexing was  
2 used in the database associated with the 1998 demo  
3 version?

4 A. Most likely, it was just a linear index.

5 Q. And what do you mean by linear index?

6 A. You just -- you -- you compute the  
7 features on every record in the database -- you  
8 compare the features against every record in the  
9 database.

Flickner Depo at 159:

10 Q. Would either version of the stamps demo  
11 allow a user to submit an unknown image as the  
12 query and ask the system to find images similar to  
13 that query image?

14 A. I suspect it did.

15 Q. Why do you suspect that?

16 A. Because that's one of the nice things you  
17 can do with QBIC.

Flickner Depo at 162-163:

18 Q. How did the trade -- how did the  
19 technology implemented in the trademark demo decide  
20 how many results to return to the user?

21 A. So it was -- it was an exact match or a  
22 binary search for the text fields using some  
metric, like string at a distance, or something  
like that, and that would give you a list and a  
rank by the image features.

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		<p>7 Q. Okay. What about the -- the stamps demo, 8 going back to that, did the stamps demo return a 9 set number of results for each query? 10 For example, was it always the original 11 image and 11 results? 12 A. Again, the output -- the number of 13 results output was probably a parameterized 14 option -- option, and I don't recall having text 15 ability on the stamp demo. 16 Q. So you think that the user may have been 17 able to indicate to the QBIC system how many 18 results he wanted to see? 19 A. The user could configure the -- the GUI 20 to display a certain number of results.</p> <p>Flickner Depo at 168-169:</p>
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		<p>16 Q. What do you mean that it lets you access 17 the -- the neighbors to your query point? 18 A. So your incoming query -- say it's an 19 image -- you compute a feature vector. And then 20 you compute some orthogonal transform of the 21 feature vector such as a wave transform or 22 wavelets. There's a variety --</p> <p style="text-align: right;">Page 168</p> <hr/> <p>1 MR. DeCLERCK: Slow down, please. 2 THE DEPONENT: Wavelets, other types of 3 features that do dimensionality reduction. And 4 then you put the reduced dimensionality feature 5 vector into the database, and then the database 6 queries and R*-tree to be able to get points nearby 7 to the -- in the lower dimensional space.</p> <p>Flickner Depo at 181:</p>
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		<p>5           A. I do not recall the -- the UI parts of 6           it. 7           Q. And earlier you -- you mentioned a query 8           engine. 9           What did you mean by that phrase? 10          A. The architecture QBIC was client server. 11          There were -- there's an API to query the database, 12          and there was a GUI then to display and control 13          through the creation of the queries. 14          The GUI evolved because when we started, 15          there was no Web. This would have been even 16          pre-1990. So all the original versions used the 17          X Window system. But as the Web came online, we -- 18          we migrated the -- the GUI part to the Web.</p>
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		<p>1           A. You just populate image database using 2 those images.</p> <p>3           Q. Okay. Could you take as -- as you did in 4 the query by image search system, could you just 5 search a video using this system?</p> <p>6           A. You could search for a key frame and that 7 could point you to a video.</p> <p>8           Q. As an input into the system, could you 9 search -- could you input a whole video and then 10 the system would extract the key frames and then --</p> <p>11          A. Yes.</p> <p>12          Q. -- search that using that?</p> <p>13          A. If I recall correctly, yes.</p> <p>14          Q. Okay. And the way -- the method by which 15 it did so, as you mentioned, was -- would it 16 extract key frames from the video, extract features 17 from those key frames, and then search those 18 features; is that right?</p> <p>19          A. Correct.</p> <p>Flickner Depo at 201:</p>
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		<p>5 Q. Now, to search a video by content using 6 CueVideo, how would the features be extracted from 7 the video? 8 MS. HAYDEN: Objection. Foundation. 9 THE DEPONENT: You typically would 10 extract -- you -- you try to find key frames and 11 then you populate the image database with key 12 frames. 13 Q. (By Mr. Dang) And how would you search 14 for those key frames in the image data? 15 A. You could use a QBIC-like engine. 16 Q. And by QBIC-like engine, what do you 17 mean? 18 A. Some image content-based retrieval 19 system. 20 Q. And what would the CueVideo system return 21 in response to a video query? 22 A. Typically, video snippets or videos</p> <p>Flickner Depo at 201-202:</p>
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		<p>5 Q. Now, to search a video by content using 6 CueVideo, how would the features be extracted from 7 the video? 8 MS. HAYDEN: Objection. Foundation. 9 THE DEPONENT: You typically would 10 extract -- you -- you try to find key frames and 11 then you populate the image database with key 12 frames. 13 Q. (By Mr. Dang) And how would you search 14 for those key frames in the image data? 15 A. You could use a QBIC-like engine. 16 Q. And by QBIC-like engine, what do you 17 mean? 18 A. Some image content-based retrieval 19 system. 20 Q. And what would the CueVideo system return 21 in response to a video query? 22 A. Typically, video snippets or videos</p>
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		<p>1 with -- where you already -- you had already sought 2 to the -- the point of the -- of the match. 3 Q. Would it return the same video as the 4 query video? 5 A. It would -- it would return snippets, as 6 I recall. 7 Q. And snippets of which videos? 8 A. Of the video that's -- the -- that the 9 database has been created with. 10 Q. Were those video snippets indexed in any 11 way? 12 A. I'm sure they were.</p> <p>Flickner Depo at 209-210: 13 Q. Okay. Let me ask -- let me ask that 14 question using -- using an example. 15 Say I had a file that -- that was a 16 snippet of a Star Wars movie. 17 Could the CueVideo system take that 18 snippet of the -- of a Star Wars movie and indicate 19 to the user what Star Wars movie that snippet is 20 from? 21 A. Most likely, yes. 22 Q. And how do you know that? 1 A. Based on my knowledge in content-based 2 imagery -- content-based retrieval, in general, 3 that would be one of the first things you would try 4 to implement in a video search system.</p>
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		<p>Flickner Depo at 212-213:</p> <p>7 Q. So comparing your -- the understanding of 8 CueVideo that you've described so far and this 9 manual, would you -- would you defer to the 10 description of the product in this manual as 11 opposed to your own recollection? 12 Please -- please feel free to review the 13 document. 14 A. Okay. 15 MR. DANG: Objection. Lacks foundation. 16 Q. (By Ms. Hayden) Let's go through the -- 17 let's go through a couple specific questions about 18 the document, and then I can re-ask -- re-ask my 19 question. 20 If you can turn to page -- the page -- 21 page 9 or the page that's Bates-stamped 100044. 22 There's -- there's a point that's numbered point 2.</p> <hr/> <p style="text-align: right;">Page 212</p> <p>1 Point 1 is the "Preprocessing." And then point 2 2 is the generation of shot boundary index and 3 speech -- speech index. 4 For the -- I know that there was some 5 description of a video system in one of the 6 articles we discussed, the -- the one that you 7 had -- had been the first author on. 8 Is it your -- from this description, is 9 the shot boundary index similar to what was 10 described in that article? 11 MR. DANG: Objection. Lacks foundation. 12 THE DEPONENT: Yes. 13</p> <p>Flickner Depo at 214-215:</p>
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		<p>4 Q. What do you mean by the images of shot 5 boundaries were indexed? 6 A. Each -- each shot -- the shot -- the shot 7 boundary detection is trying to extract key frames 8 or break the video into small subsec -- 9 subsections -- hang on. Let me think here a 10 second. 11 So the shot boundary here is different 12 than key framing. So I'll -- I'll retract what I 13 said earlier. This -- while similar, they're not 14 the same. 15 Q. What are the differences? 16 A. Shot boundaries are typically detected at 17 fade to black, and key frames are supposed to be a 18 representative still image of the video segment. 19 Q. How would a shot boundary index allow one 20 to query a video by content? 21 A. It gives you semantical information as 22 related to what the -- that -- that -- that is a --</p> <hr/> <p style="text-align: center;">Page 214</p> <p>1 a reasonable amount of return video. It's -- it's 2 breaking it into small snippets. 3 Q. Does it extract features from the key 4 frames? 5 A. If there are key frames extracted, it -- 6 it will reference key frames.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902): “We have developed the QBIC (Query by Image Content) system to explore content- based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors,</p>
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		<p>textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.</p> <p>For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects-for example, a car moving across the screen.</p> <p>Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color queries return items with</p>
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		<p>matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p> <p>Figure 7 shows a histogram query on still images and a color query on video r-frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right. Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture (pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object).</p> <p>An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects and features to implement logical And semantics.</p> <p>....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods</p>
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		<p>that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.</p> <p><b>INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION.</b> Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at pp. 7–8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image</p>
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		<p>score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions-which we call objects-in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target</p>
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images. It then computes a score that indicates how similar the feature values of the target images are to the source.

You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” *Id.* at pp. 20–21.

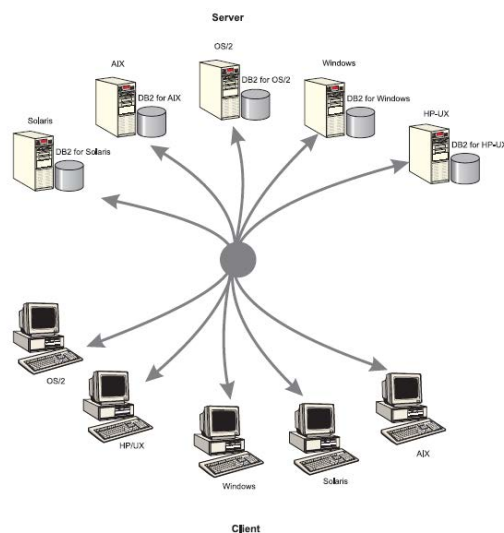


Figure 6. DB2 extender platforms

*Id.* at p. 12 (Fig. 6).

“The DB2 Extenders run in the DB2 client/server environment. This environment consists of a database server and one or more remote database clients. The DB2 extender services run on the server. Before you can access them, you have to start them.” *Id.* at p. 47.

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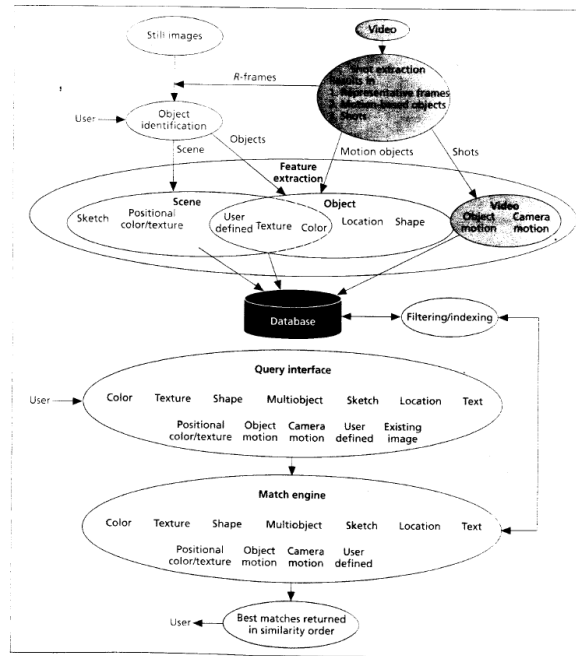


Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.

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QBIC Demo (IBM000747) – showing compatibility with images captured by a mobile phone camera

© IBM Corporation

Usage: **I**: Get Info **C**: Color Histogram **L**: Layout **T**: Texture **S**: Special Hybrid

[How to Use QBIC](#)

[Back To Start Page](#)







**Goto:**  
[Custom Color % Query](#)  
[Custom Paint Query](#)  
[Random Images](#)  
[Official QBIC Page](#)

(Use a Java-capable Web browser to enable additional functionality.)

Query was:  
Example: =AS\_test/check1.jpg  
Query Type: Color Layout

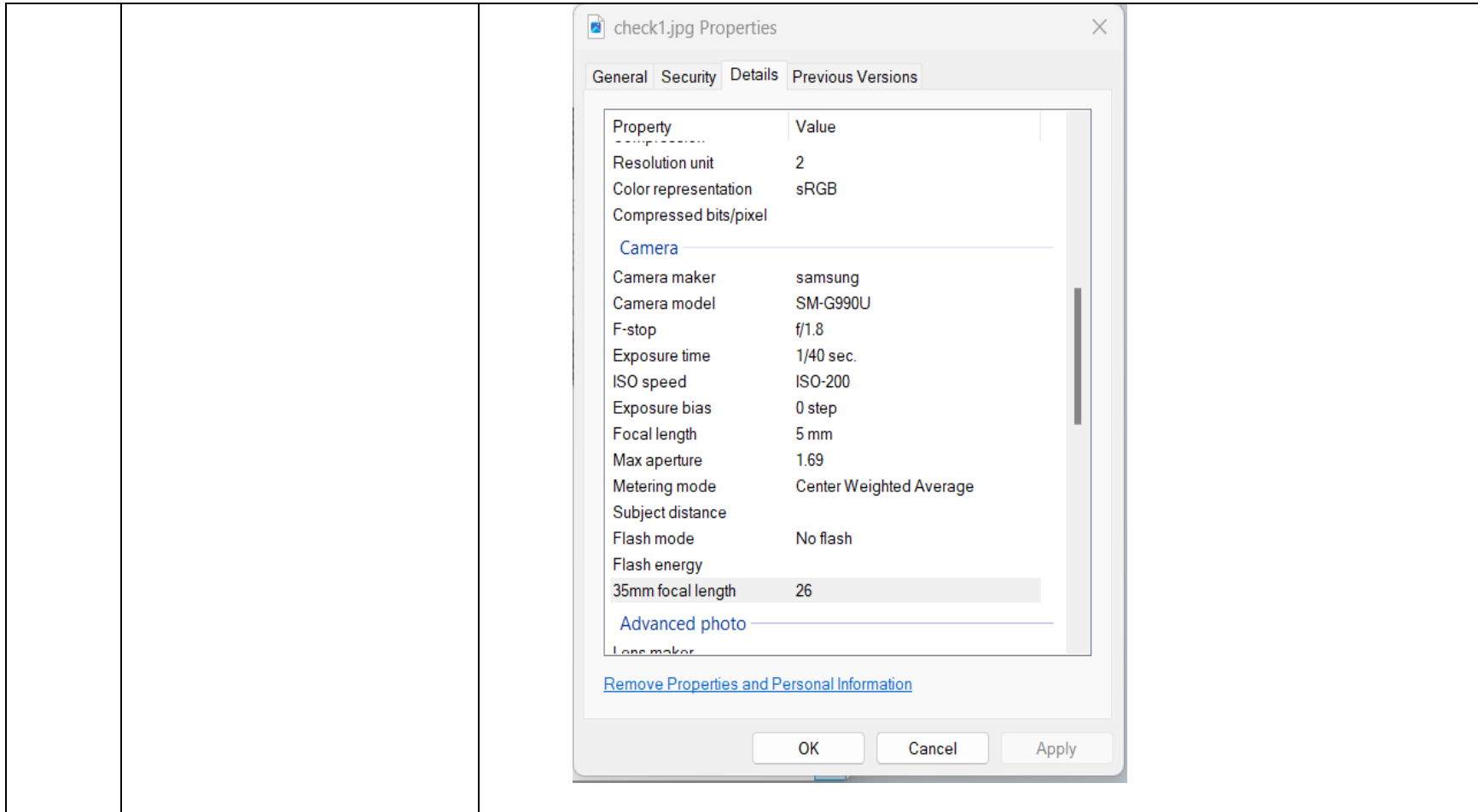
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		 <p>check1.jpg.thumb0.jpg</p>  <p>check2_orig.jpg.thumb0.jpg</p>  <p>check3.jpg.thumb0.jpg</p>  <p>check4.jpg.thumb0.jpg</p>  <p>check5.jpg.thumb0.jpg</p>  <p>check5_rotate_crop_fix.jpg.thumb0.jpg</p>	
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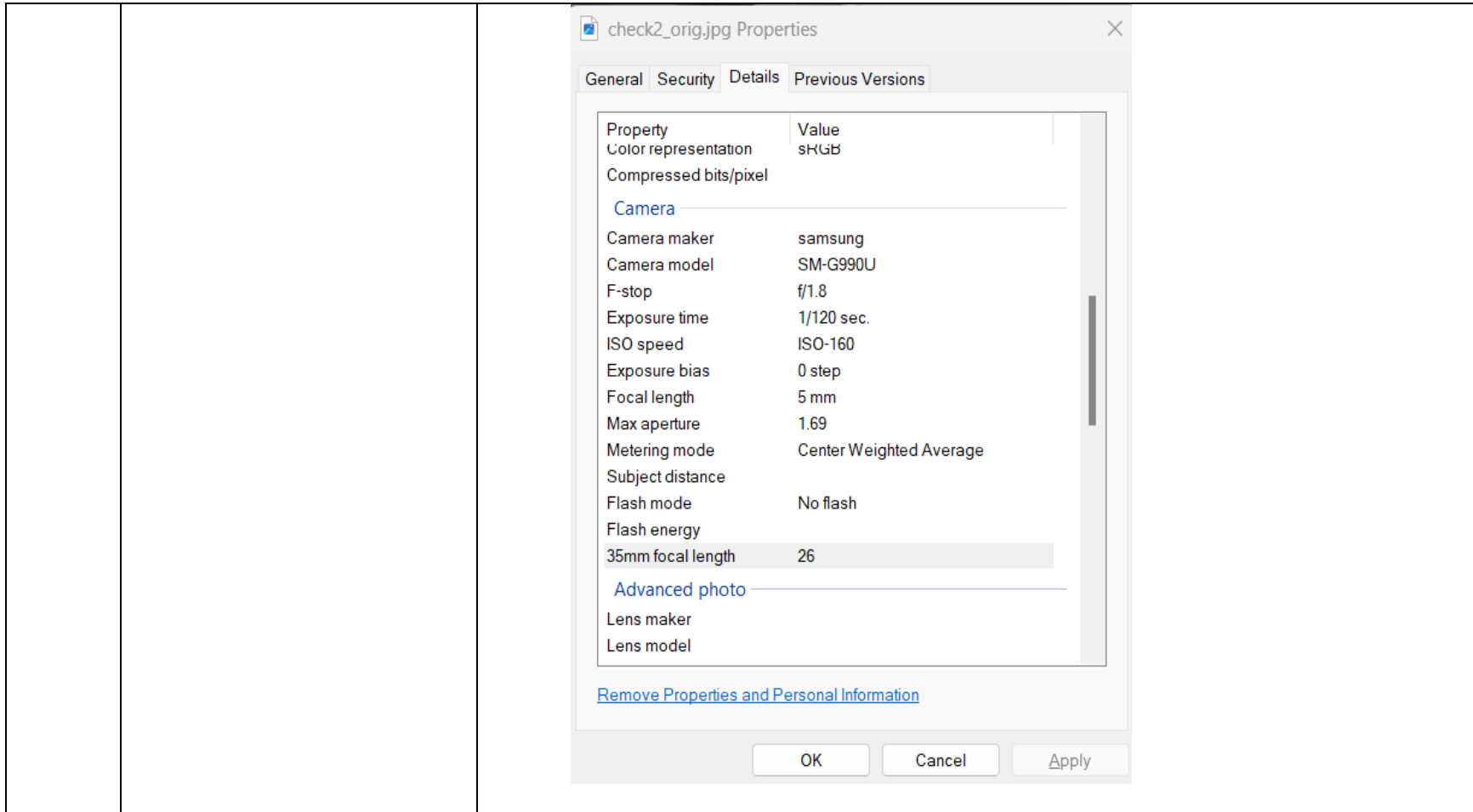
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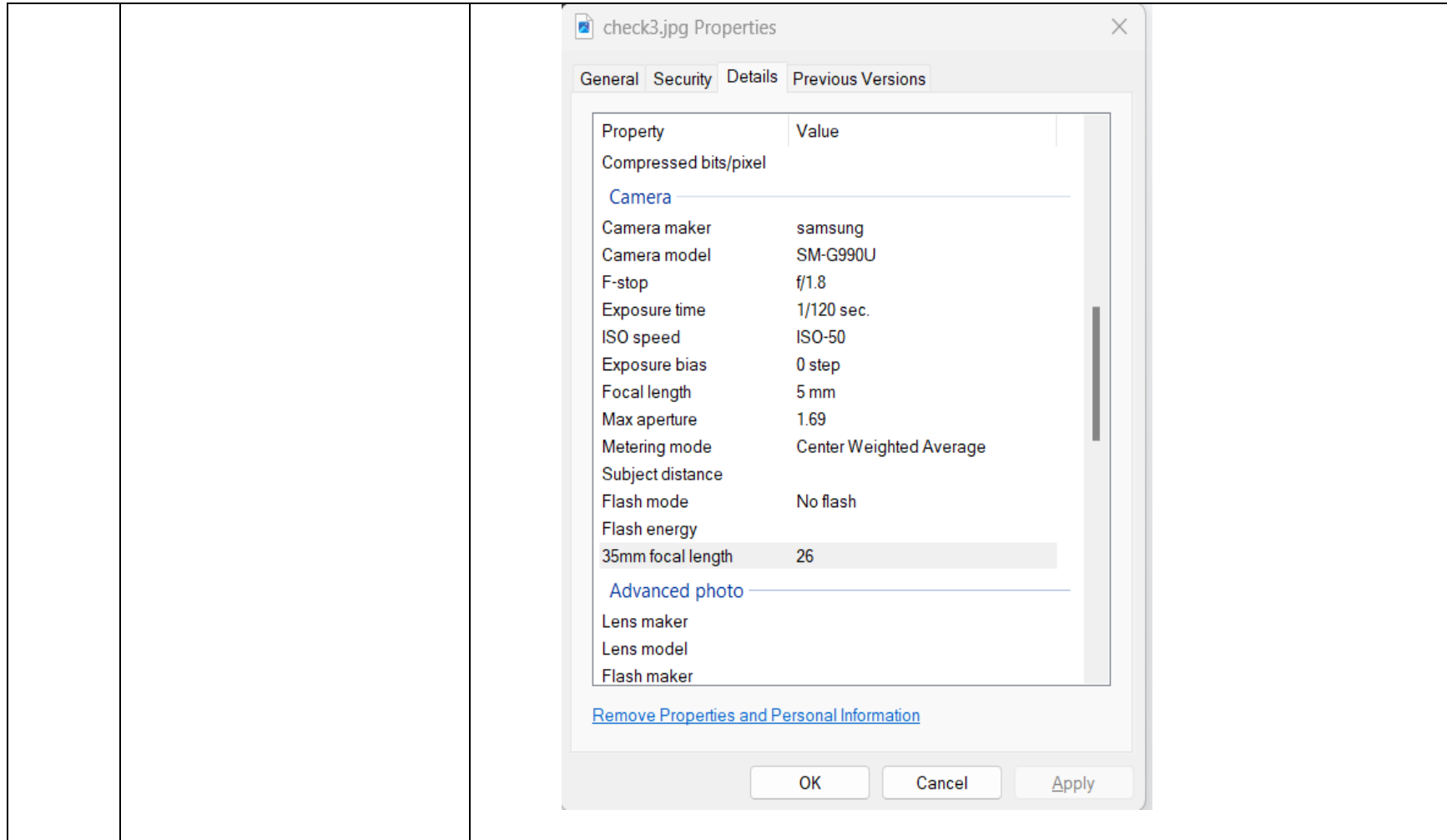
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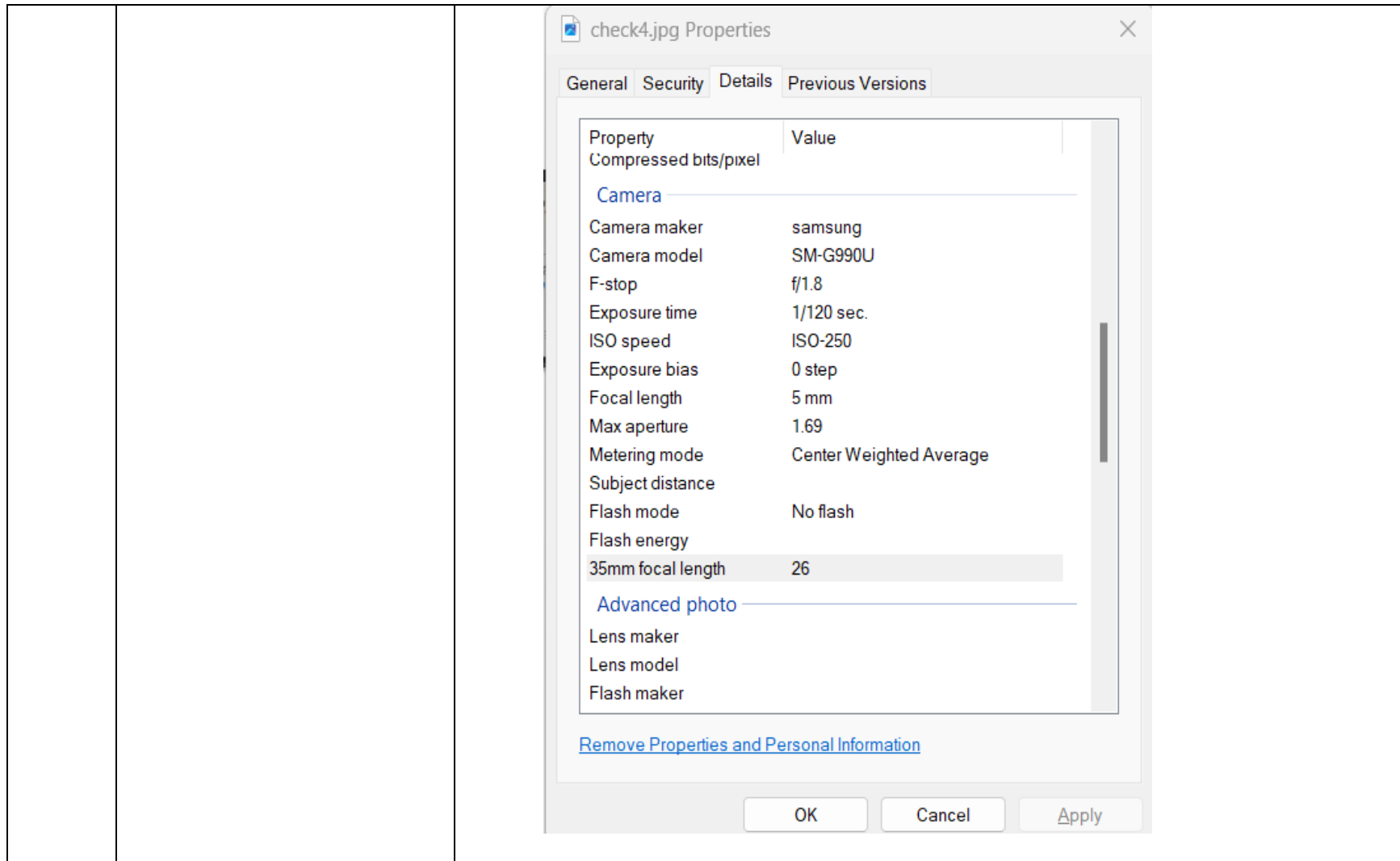
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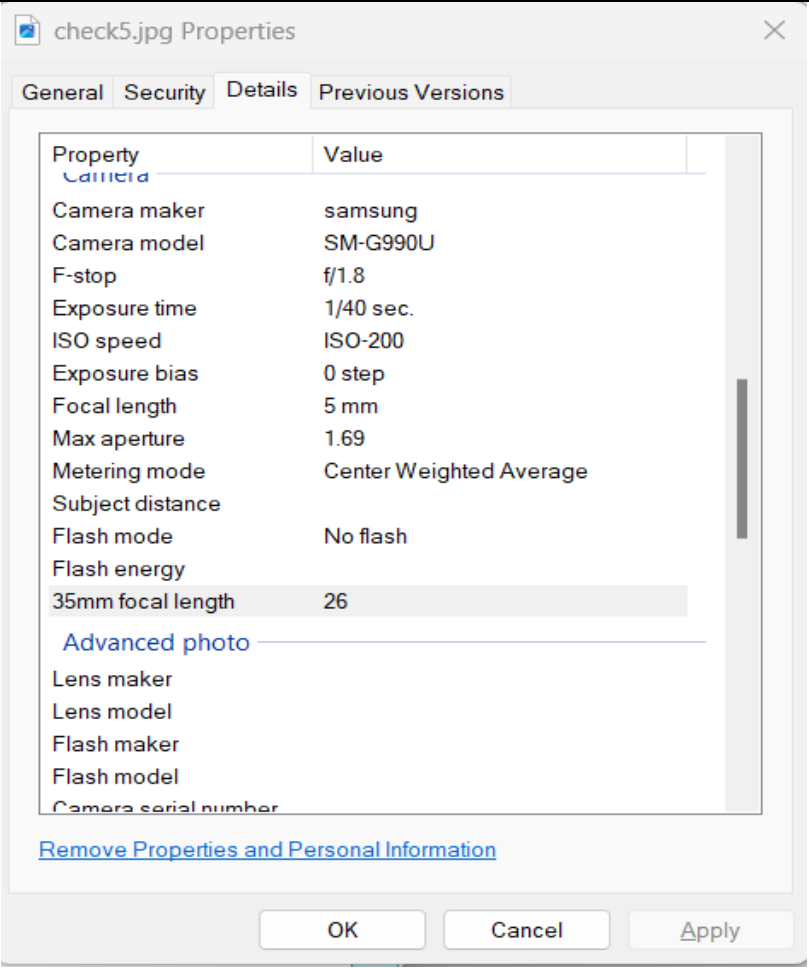
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		 <p>The screenshot shows the 'check5.jpg Properties' dialog box with the 'Details' tab selected. It displays a table of camera metadata:</p> <table border="1"><thead><tr><th>Property</th><th>Value</th></tr></thead><tbody><tr><td>Camera maker</td><td>samsung</td></tr><tr><td>Camera model</td><td>SM-G990U</td></tr><tr><td>F-stop</td><td>f/1.8</td></tr><tr><td>Exposure time</td><td>1/40 sec.</td></tr><tr><td>ISO speed</td><td>ISO-200</td></tr><tr><td>Exposure bias</td><td>0 step</td></tr><tr><td>Focal length</td><td>5 mm</td></tr><tr><td>Max aperture</td><td>1.69</td></tr><tr><td>Metering mode</td><td>Center Weighted Average</td></tr><tr><td>Subject distance</td><td></td></tr><tr><td>Flash mode</td><td>No flash</td></tr><tr><td>Flash energy</td><td></td></tr><tr><td>35mm focal length</td><td>26</td></tr></tbody></table> <p>Below the table, there is an 'Advanced photo' section with fields for Lens maker, Lens model, Flash maker, Flash model, and Camera serial number. At the bottom of the dialog are 'OK', 'Cancel', and 'Apply' buttons, and a link to 'Remove Properties and Personal Information'.</p>	Property	Value	Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/40 sec.	ISO speed	ISO-200	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26
Property	Value																													
Camera maker	samsung																													
Camera model	SM-G990U																													
F-stop	f/1.8																													
Exposure time	1/40 sec.																													
ISO speed	ISO-200																													
Exposure bias	0 step																													
Focal length	5 mm																													
Max aperture	1.69																													
Metering mode	Center Weighted Average																													
Subject distance																														
Flash mode	No flash																													
Flash energy																														
35mm focal length	26																													
<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404)</p> <p>IBM0002390 at 2390:</p>																														

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		<p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images' content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>IBM0002390 at 2391:</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>
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containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.

In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.

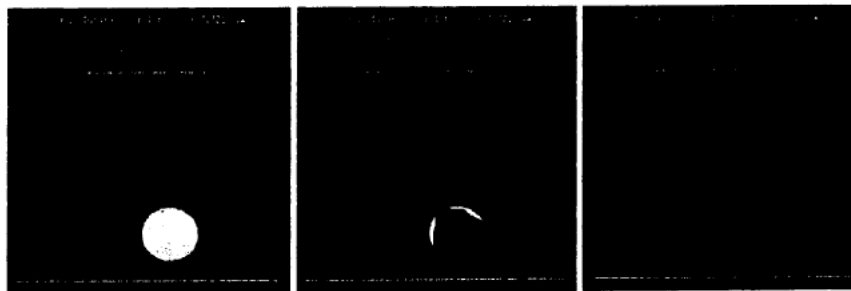


Figure 1: Original image, approximate user outline, and automatically refined outline of sun.

IBM0002390 at 2391-92:

## 2.2. Feature Calculation

The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:

*Color features:* We compute the average  $(R, G, B)$ ,  $(Y, i, q)$ ,  $(L, a, b)$ , and *MTM* (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a  $k$  element color histogram, where  $k$  is user-settable. (We currently run with  $k = 64$ .) Because the original color images may include any of  $(2^8)^3 = 16M$  colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in  $R, G, B$  to 16 levels, giving a color space of 4096 cells. We then compute the *MTM* coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any  $(R, G, B)$  triple to its supercell number. To compute an image or object color histogram, we take the  $(R, G, B)$  for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.

*Texture features:* Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The *coarseness* feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The *contrast* feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The *directionality* feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2 / Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}</math>, <math>M_{[2,3]} \times M_{[3,2]}</math>, <math>M_{[3,3]}</math>, <math>M_{[3,4]} \times M_{[4,3]}</math>, <math>M_{[4,4]}</math>, <math>M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2393-95:</p>
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>
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similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.

The matching methods and similarity functions for the different feature types are described below:

**Color:** For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the *L* component of an (*L, a, b*) query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.

Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let *X* be the query histogram and *Y* the histogram of an item in the database, both normalized. We compute the element by element difference histogram *Z*. Then the similarity between *X* and *Y* is given by  $\|Z\| = Z^T A Z$ , where *A* is a symmetric color similarity matrix with

$$a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$$

where *c<sub>i</sub>* and *c<sub>j</sub>* are the *i*th and *j*th colors in the color histograms, and *d(c<sub>i</sub>, c<sub>j</sub>)* is the *MTM* color distance, and *d<sub>max</sub>* is the maximum distance between any two colors ([8] used *Luv* distance.) This metric gives the (weighted) length of the difference vector between *X* and *Y*, weighted by *A*, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).

Based on our experience, we also found it useful for the user to be able to request images with *x*% of color 1, *y*% of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.

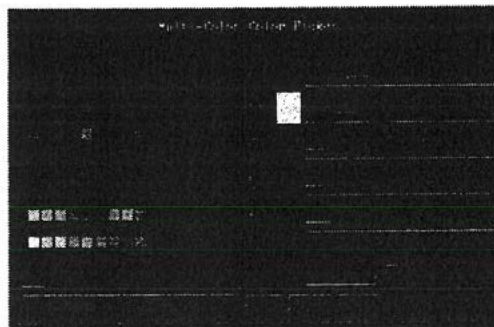


Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.

**Texture:** Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the



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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2395</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “ Find all images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <math>R^*</math>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>IBM 0002390 at 2396-97</p> <p>4.2. Performing Queries</p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of <math>(R, G, B)</math> sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <math>n</math>th best match (<math>n</math> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p>
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**5. Sample Query Results**

Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.

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The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2400, Fig. 4



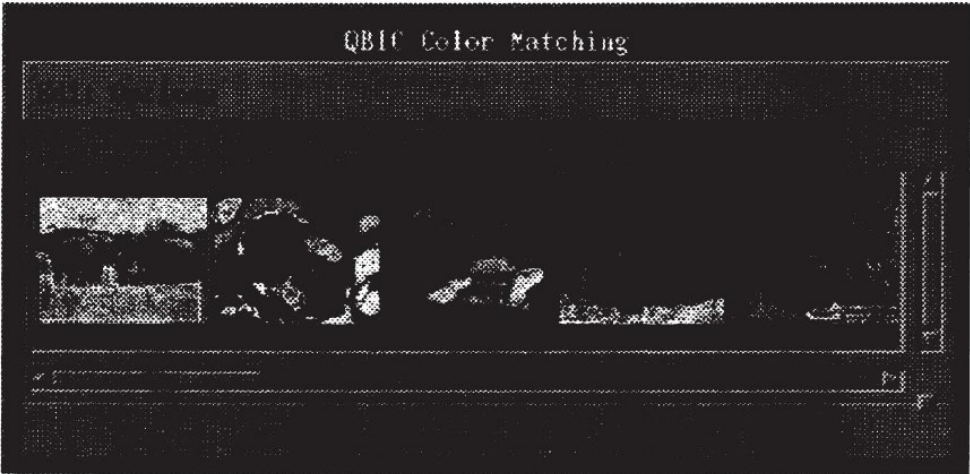
Figure 4: Object Identification Tool. Note for example, the right dog's ear, which has been outlined.

The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9

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		 <p>The screenshot displays a software interface titled "QBIC Color Matching". It features a horizontal row of five image thumbnails. The first thumbnail on the left is a query image showing a landscape with a body of water and trees. The subsequent four thumbnails show similar landscape images, representing search results. The interface includes a search bar at the top and a vertical scrollbar on the right side.</p>
<p>Figure 7: Result of query by example using color only.</p>		

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Figure 8: Result of query by example using texture only.

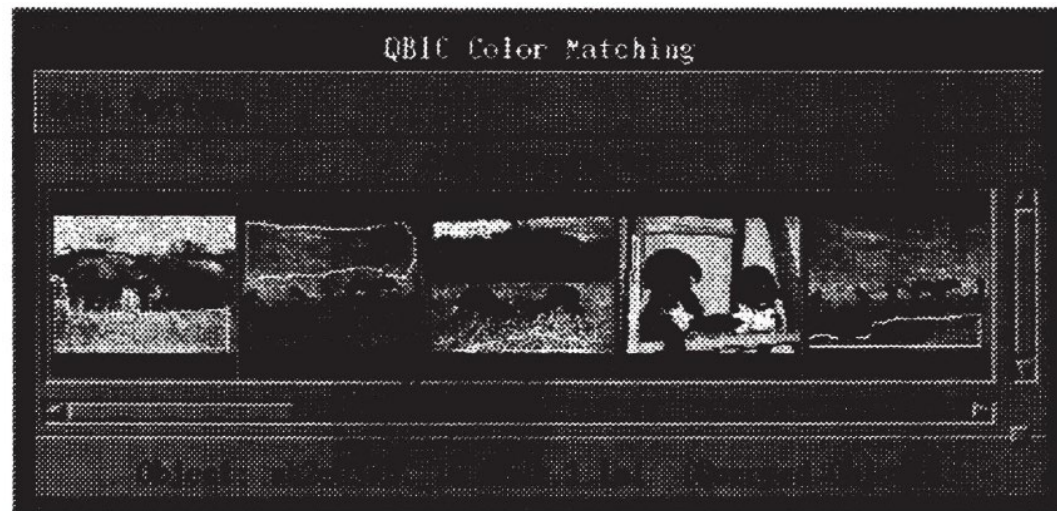


Figure 9: Result of query by example using color and texture.

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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p>
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		<p style="text-align: right;">Page 84</p> <p>1 developing tools to aid in this step. In recent 2 work, we have successfully used fully automatic 3 unsupervised segmentation methods along with a 4 foreground/background model to identify objects in a 5 restricted class of images." 6 Did I read that correctly? 7 A. Yep. 8 Q. And can you interpret that for me? What 9 is -- how did -- how were segmentation methods used 10 there? 11 A. This is work by Harpreet Sawhney, and he 12 had algorithms for doing segmentation. So given an 13 input image, identify which pixels belong to which 14 class. So this is a cup, this is a table this is a 15 phone. It's a three-class problem. 16 And you write algorithms that determine 17 what the characteristics of a cup are, what the 18 characteristics of a table is, what the 19 characteristics of a phone cover is. And you 20 populate those in the database. 21 Q. And how are those populated in a database? 22 Are those associated with the underlying image? 23 A. Yes. 24 Q. And that could be done for both a query 25 image and a database image?</p> <hr/> <p style="text-align: right;">Page 85</p> <p>1 A. It's done for both.</p>
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		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various 8 features of various versions of QBIC; right? 9           A. Correct. 10          Q. Do they describe any features -- does the 11 demo you operated include any features that weren't 12 described in these articles? 13          A. That weren't described in the articles? 14 No.</p> <p><i>Id.</i> at 35:</p> <p>6           Q. Okay. And the analytics that you're 7 talking about, where you extract these characters 8 from the image, that is -- those run on both the 9 query image and the images that are stored in the 10 database; is that right? 11          A. Yeah. We call them features. 12          Q. Features. Okay. 13                So when you say "features," you're talking 14 about the features that we talked about before: 15 Color, texture, shape, sketch? 16          A. For example. 17          Q. Any other ones you can think of? 18          A. Nothing comes to mind. 19          Q. But when you refer to features they at 20 least include those four; is that correct? 21          A. Yes. Well, at least includes, yeah.</p>
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		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does 13 content-based search based on color histogram, color 14 position and texture. 15 Do you see that? 16 A. Yep. 17 Q. That's a limited number of the features 18 that QBIC could extract; right? 19 A. Correct. 20 Q. Was there -- for those demo applications 21 that you -- that you all created, was there a 22 conscious effort to limit the number of 23 characteristics you put on the demo? 24 A. Probably limited by the size of the CD. 25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to 23 highlight the capabilities of QBIC to people 24 external to IBM; isn't that correct? 25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>
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		Page 313
1	A. Correct.	
2	Q. Exhibits 2, 3 and 10 are the papers that	
3	you co-authored. If your counsel can provide those	
4	to you just so that you have them in front of you.	
5	A. I have them here.	
6	MR. STRAUSSMAN: Okay.	
7	THE WITNESS: Okay.	
8	BY MR. EDWARDS:	
9	Q. And can you just confirm for me,	
10	Mr. Flickner, Exhibits 2, 3 and 10 were papers you	
11	co-authored?	
12	A. Yes.	
13	Q. You would have included accurate	
14	information in those -- in those papers at the time	
15	that you authored them; is that correct?	
16	MR. HANSEN: Objection; vague and ambiguous.	
17	THE WITNESS: Yes.	
18	BY MR. EDWARDS:	
19	Q. And the information in those papers	
20	accurately reflected the functionality of QBIC at	
21	the time those articles were published; is that	
22	correct?	
23	A. Correct.	

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published, correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultrimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>	
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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“ A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content. You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b></p> <p>The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b></p> <p>Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b></p>
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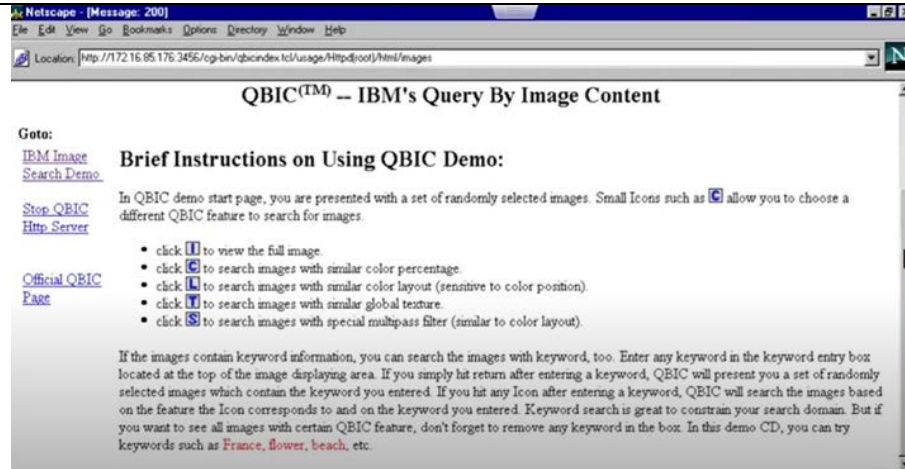
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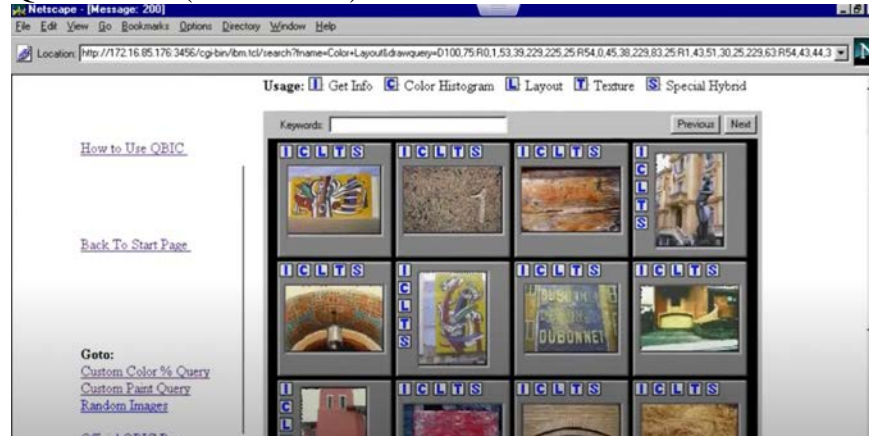
		<p>The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b></p> <p>Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p>
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**QBIC Demo (IBM000747):**



**QBIC Demo (IBM000747):**

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QBIC Demo (IBM000747):

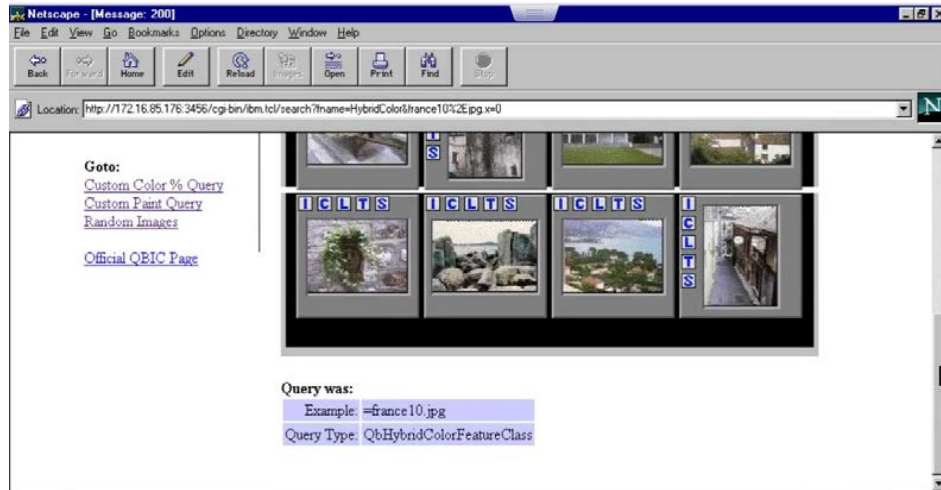


QBIC Demo (IBM000747):



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QBIC Demo (IBM000747):

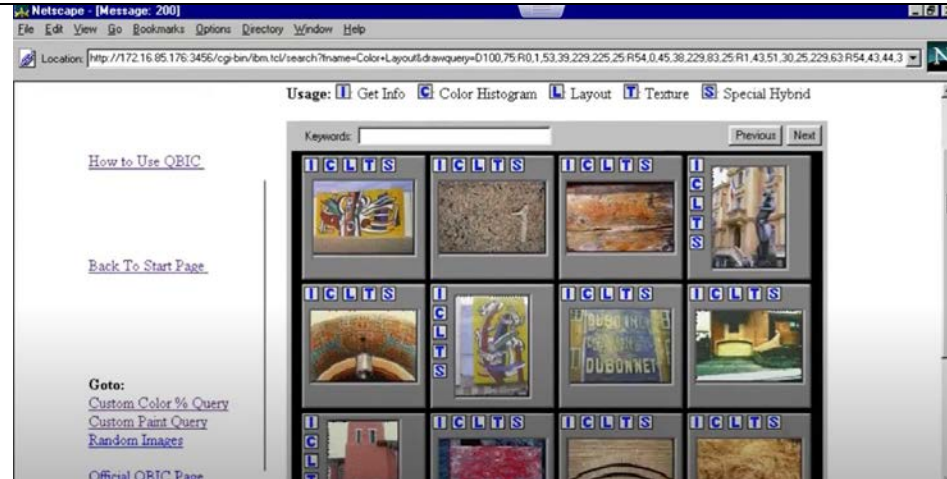


QBIC Demo (IBM000747):



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QBIC Demo (IBM000747):



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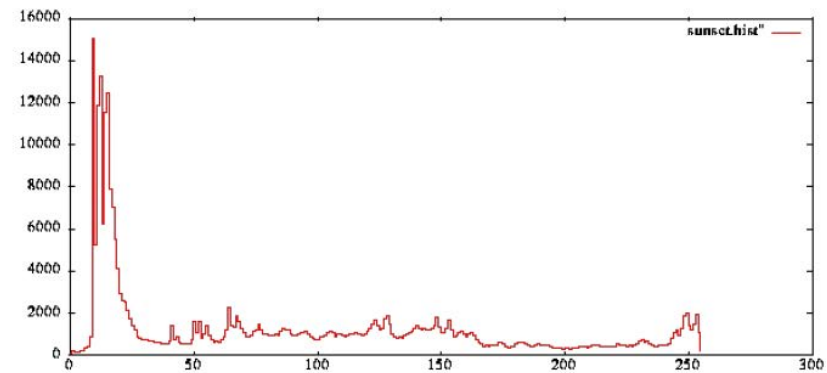
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QBIC (Query by Image Content) at 1  
Query by example using *color histograms*

- Example image:



- One of the colour histograms for the example image is shown in Fig. 28.1.



**Colour Histogram of Image**

- Store a histogram vector for each image in the database.  
compare images using mean squared difference.  
return images sorted by this metric.

IBM000001 at 39 – 41

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**Data structures**

**Handles**

When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a **handle** to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object’s attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.

User Table

ID	Name	Picture
		Handle 1
		Handle 2

Administrative Support Tables

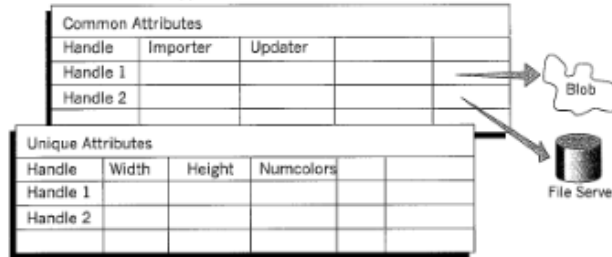


Figure 8. Handles

**QBIC catalogs**

A **QBIC catalog** is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.

You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.

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		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® DB2® Universal Database: Image, Audio, and Video Extenders</p> <p>IBM 000040</p>
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		<p style="text-align: right;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"><li>• Shot catalog file name</li><li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li><li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li><li>• Shot number</li><li>• Starting frame number</li><li>• Ending frame number</li><li>• Representative frame number</li><li>• Name of a file that contains the contents of the representative frame</li></ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"><li>• Shot handle</li><li>• Video table name</li></ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts 21 IBM 000041</p> <p>IBM0002263 at 2264</p>
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		<p style="text-align: center;"><b>Description</b></p> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <p style="text-align: center;"><b>Image Classification</b></p> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <p style="text-align: center;"><b>Image Query</b></p> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p>and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <p style="text-align: center;"><b>Image Formats</b></p> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCK</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <p style="text-align: center;"><b>Product Positioning</b></p> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <p style="text-align: center;">255-042 <span style="margin-left: 100px;">-2-</span> <span style="float: right;">IBM 0002264</span></p>
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		<p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b> You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b> This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"><li>• Improved installation procedures</li><li>• Additional connectors for relational databases Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li><li>• Advanced information mining and search capabilities Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li><li>• Workflow capabilities By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li><li>• Federated level access control You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li><li>• Additional support for Content Manager:<ul style="list-style-type: none"><li>- List, add, retrieve, update, and delete of content class</li><li>- Asynchronous retrieval of object content</li></ul></li></ul>	
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Flickner 8/29/23 Depo at 34:

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		<p>6 Earlier you talked about both still images 7 and video were part of your responsibilities for 8 these architecture interfaces; correct? 9 A. Correct. 10 Q. Okay. If I refer to "images," do you 11 understand that is including both a still image or, 12 for example, a frame of a video image? 13 A. Sure. 14 Q. Okay. So when I say "image," I'm 15 including both in my questions from now on out. 16 A. Okay. 17 Q. Okay? 18 A. Okay.</p> <p><i>Id.</i> at 60–61:</p>	
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		<p>13 Q. Okay. Did you do that type of 14 segmentation to differentiate foreground objects 15 from the background in this database population 16 step? 17 A. We did research prototypes of it. I don't 18 know what all went out. 19 Q. You don't know whether those made it into 20 a commercial product? 21 A. I would say they probably didn't. 22 Q. Okay. Were they in the -- were they used 23 in the -- in demo applications that you referred to? 24 A. They might have been. 25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done 2 with those objects? Were they stored, for example, 3 as a separate image or were they somehow linked to 4 or associated with the image from which they were 5 extracted? 6 A. Typically they were linked. 7 Q. They were linked to the source image? 8 A. Yeah.</p> <p><i>Id.</i> at 32–33:</p> <p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p style="text-align: right;">P</p> <p>1 A. Some of them did, yeah.</p>	
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		<i>Id.</i> at 74–75:
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			<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114:</p> <p>1 Q. If I took all the components off of the CD 2 and put it onto my desktop operating system, could I 3 then add images to that folder? 4 MR. HANSEN: Objection; calls for speculation. 5 THE WITNESS: I think so. 6 BY MR. EDWARDS: 7 Q. Okay. Do you -- do you -- based on your 8 knowledge of putting these demos together, do you 9 see any reason why -- any -- anything that would 10 prohibit me from doing that? 11 MR. HANSEN: Same objection. 12 THE WITNESS: We have to -- at the time there 13 was a big issue with the copyright of the image. 14 BY MR. EDWARDS: 15 Q. Was there a way that you could 16 electronically prevent me from moving those contents 17 from the CD over to a desktop and then adding images 18 to the -- to the folder? 19 A. No.</p> <p><i>Id.</i> at 202:</p>
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		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can 2 take an image with a portable camera and submit that 3 to the QBIC system for image query; is that correct? 4 A. Correct. 5 Q. Okay. And that would -- that would 6 include any commercial products that we looked at, 7 like Ultimedia and Enterprise Portal, that use QBIC 8 system. A user could take an image, submit that to 9 those systems and QBIC would be able to extract 10 features from that image from an image query and 11 also for any images that were taken by a portable 12 camera used to store in the database; is that right? 13 MR. HANSEN: Objection; lacks foundation. 14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300: 6 Q. Did QBIC have a camera? 7 A. Yes. 8 Q. It did? 9 A. There were internal versions that we 10 attached cameras to. 11 Q. I mean, was the camera part of QBIC or 12 something you attached to QBIC? 13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312:</p>	
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1 Q. And with respect to -- I think we talked a  
2 bit -- a little bit about this before, but I want to  
3 make sure my understanding is correct.

4 On the -- on the demo application on the  
5 CD, if I took those files off and put it on my  
6 computer and ran it, just like Mr. Hansen was  
7 running it today from a computer, there's no  
8 technical restriction that would prevent me from  
9 capturing an image with a portable camera and  
10 importing that into the file with all the other  
11 images; is that --

12 MR. HANSEN: Objection; lacks foundation.  
13 (Reporter seeks clarification.)

14 THE WITNESS: It would be possible, yes.

15 BY MR. EDWARDS:

16 Q. Okay. The user then could use that  
17 captured image in a query?

18 MR. HANSEN: Same objection.

19 THE WITNESS: Yes.

Flickner 8/29/23 Depo at 42:

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		<p>4 Q. So let's just start at a high level. Tell 5 me generally what is QBIC? 6 A. QBIC was a technology -- stands for query 7 by image content. It was a way of extracting 8 features of various types, putting those features in 9 a database and then searching the database to get 10 images that looked visually similar or semantically 11 similar. 12 Q. And when you say "semantically similar," 13 what do you mean? 14 A. You could query based on semantics. You 15 could ask for what does a microphone look like and 16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206:</p>
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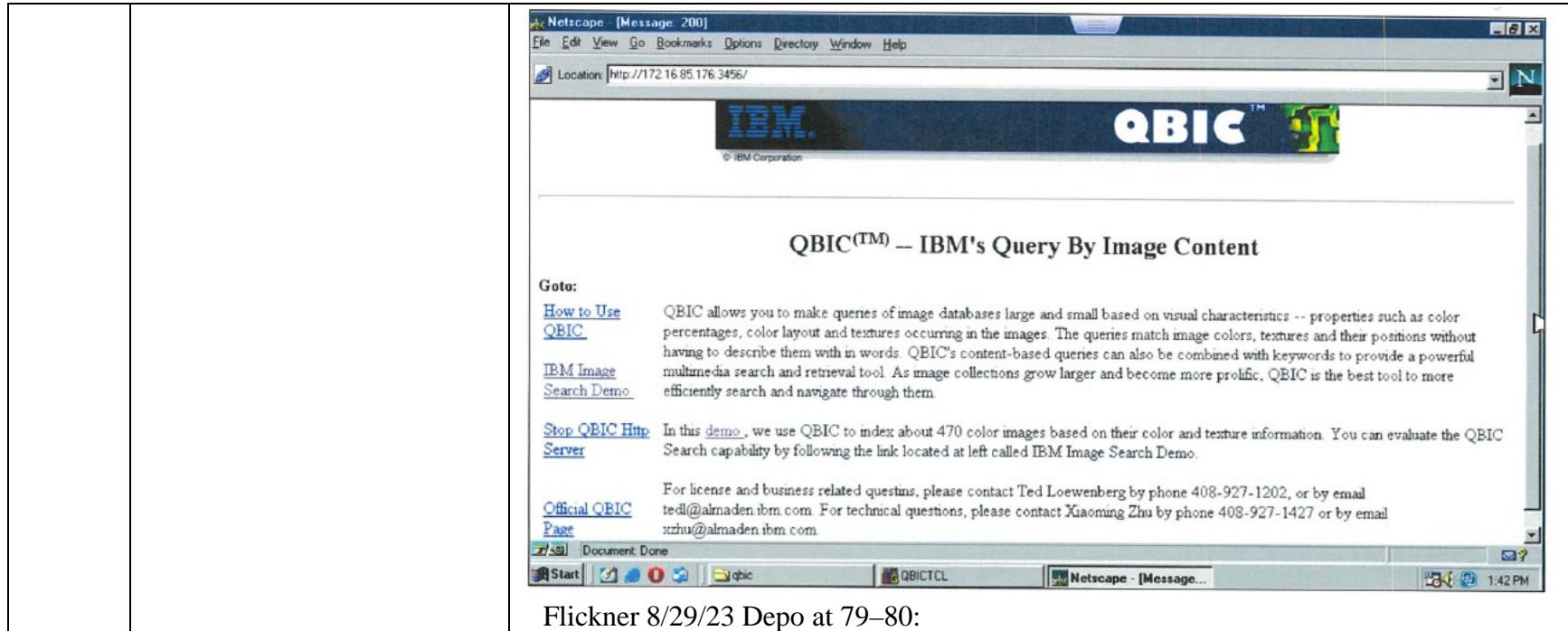
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		<p>10 Q. All right. I want to -- you've been 11 testifying about different systems today. We've 12 heard about Ultimedia Manager. We've heard about 13 DB2. We've heard about image extender. I want to 14 ask you about QBIC piece of things, just to make 15 sure I have the delineation --</p> <p>16 A. Okay.</p> <p>17 Q. -- straight, okay?</p> <p>18 QBIC stood for query by image content; 19 right?</p> <p>20 (Reporter seeks clarification.)</p> <p>21 Q. QBIC stands for query by image content?</p> <p>22 A. Yes.</p> <p>23 Q. Okay. And there are essentially three 24 logical steps associated with QBIC, one of which is 25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.</p> <p>2 Q. Another one of which is called feature 3 calculation?</p> <p>4 A. Feature extraction.</p> <p>5 Q. Okay. Feature extraction. And then image 6 query; is that right?</p> <p>7 A. Yeah.</p> <p>8 Q. Okay. So basically all the steps involved 9 in QBIC fall into one of those three categories; is 10 that right?</p> <p>11 A. Sounds about right.</p> <p>Flickner 8/29/23 Depo at Ex. 5:</p>
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		<p>16 Q. Well, for example, if, for example, you -- 17 the image was sourced from a camera and there was a 18 noise from the image sensor on the image, were there 19 any methodologies used by IBM in the QBIC system to 20 reduce that noise or grain in the image? 21 A. I don't recall. 22 Q. What about -- and, again, I'm talking 23 about preprocessing steps, before you're actually 24 extracting features. 25 Were there any methodologies to enhance</p> <hr/> <p style="text-align: right;">Page 79</p> <p>1 the contrast of the image? 2 A. I don't remember. 3 Q. What about resizing the image? 4 A. We did -- we probably supported that on 5 import. 6 Q. Say again? 7 A. We supported that on -- most likely we 8 supported that on import, on read. 9 So the read, you request a particular 10 size. 11 Q. You're going to have to repeat it. I 12 didn't understand you. 13 MR. STRAUSSMAN: And speak up. 14 THE WITNESS: So resizing would be done 15 typically when you import the image into the system. 16 BY MR. EDWARDS: 17 Q. Okay. So if you're importing the image 18 into the database, is that what you're talking 19 about? 20 A. Correct. 21 Q. Okay. And at that point you would resize 22 the image to reduce the size?</p>	
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		<p>1 How would you resize the image on 2 importation? 3 A. You would request a particular size of 4 image and then use that to populate the database. 5 Q. So if the source images that you were 6 acquiring were say too big for purposes of QBIC, on 7 importation you could resize those to get them to 8 the size that are -- meet the -- meet the 9 requirements of the QBIC system? 10 A. Yes. 11 Q. Was that done as a matter of course in the 12 QBIC system? 13 MR. HANSEN: Objection; vague and ambiguous. 14 THE WITNESS: As I recall, yes. 15 BY MR. EDWARDS: 16 Q. Was it an automatic process? 17 A. As I recall, yes. 18 Q. So if a user were to import source images 19 into the database, when the user did that, the QBIC 20 system would automatically resize it to fit the 21 requirement of the QBIC system? 22 A. Make sure it's in the range that the QBIC 23 system could handle. 24 Q. That's a "yes"? 25 A. That's a "yes."</p> <p><i>Id.</i> at 80–81:</p>
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		<p>6 Q. How about converting the images to binary?</p> <p>7 A. Threshold. There probably was a threshold</p> <p>8 control.</p> <p>9 Q. And what do you mean by "threshold</p> <p>10 control"?</p> <p>11 A. Just change the value of the threshold.</p> <p>12 You make a binary decision, is a pixel bigger than</p> <p>13 a -- is a pixel bigger than a particular number or</p> <p>14 is it smaller and you put a 01 based on that.</p> <p>15 Q. And that would have been done prior to</p> <p>16 feature extraction?</p> <p>17 A. For some features it would be done that</p> <p>18 way.</p> <p>19 Q. So, for example, for shape, was it</p> <p>20 required to convert the image to binary before you</p> <p>21 did your shape analysis?</p> <p>22 A. No.</p> <p>23 Q. Were there any other features that, as</p> <p>24 part of the -- as part of the extraction process,</p> <p>25 the image had to be converted to binary before?</p>
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		<p>2           Were there any features that required the 3 image to be converted to binary before the features 4 were extracted? 5       A. Some features required a binary image, 6 yeah. 7       Q. Which ones? 8       A. Some of the texture features. 9       Q. And when you say "some of the texture 10 features," do you -- do you recall which ones? 11      A. No. 12      Q. Let's put a pin in that because we're 13 going to get to it. 14           What about gray scale? Were any images 15 converted to gray scale before features were 16 extracted? 17      A. Yes. 18      Q. Which -- for which features? 19      A. For shape, for texture. 20      Q. Any others? 21      A. Color wouldn't make any difference. 22           That's all I can think of. 23      Q. At least for shape and texture? 24      A. Yeah.</p> <p><i>Id.</i> at 94–97: 18      Q. So that's why I ask is it the first step 19 in calculating shape to convert the image to binary? 20      A. Yes.</p> <p><i>Id.</i> at 101–102:</p>
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		<p>3           Okay. So first sketch used something 4 called an edge map of each image? 5           A. Yeah. 6           Q. What is an edge map? 7           A. It's an estimate of the edges, the major 8 edges of the image. 9           Q. Okay. Sort of the outline; is that fair? 10          A. The outline is slightly different, but 11 outlines would be closed, whereas sketch would -- 12 you didn't have to always do closed objects, you 13 could do -- you could draw a circle or you could 14 also draw a U. 15          The circle would find sun-like objects and 16 the U would find things that had a dominant curve -- 17 turn to it. 18          Q. So you could draw -- so, for example, you 19 could draw a flower -- 20          A. Right. 21          Q. -- have the circle part for the flower and 22 then for the stem it would just be a line? 23          And that's where you're saying -- 24          A. Right. 25          Q. -- it doesn't necessarily -- it's broader</p>
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			<p>1 than outline? 2 A. Right. 3 Q. Understood. Okay. 4 And so the steps are you would convert the 5 image to binary to calculate the sketch feature; 6 right? 7 A. No, you're inputting . . . I'm not sure 8 how we did database population. Give me a minute. 9 Yeah, it was done on a binary image. 10 Q. Okay. So you convert the image to binary 11 image; right? 12 A. Right, using a Canny edge operator. 13 Q. Okay. And then that gives you a binary 14 edge map? 15 A. Right. 16 Q. All right. And then you reduce the size 17 of that binary edge map? 18 A. Right.</p> <p><i>Id.</i> at 140–141: 23 Q. So if I needed to resize the image we 24 would need to do that -- the system would do that 25 before features are extracted from the image query?</p> <hr/> <p style="text-align: right;">Page 141</p> <p>1 A. Yes. 2 Q. And for certain things, like you said, for 3 like texture and shape, for example, you had to 4 convert the image to binary, as an example, that 5 would need to be done for the image query -- the 6 image query image as well; correct? 7 A. Correct.</p>	
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		<p><i>Id.</i> at 164–165:</p> <p>14 Q. All right. Let's flip forward to 2429. 15 And is 2429 a screenshot of a trademark 16 demo that was also available in the Almaden -- 17 excuse me -- almaden.ibm website? 18 A. Yes. 19 Q. Okay. And that demo looks like the 20 trademark query is based on shape; is that right? 21 A. It uses shape as one similarity feature. 22 Q. Right. So the trademarks are converted to 23 a binary image, like we talked before -- talked 24 about before, and then they're -- the matching 25 process is done based on those binary images?</p> <hr/> <p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct. 2 Q. Okay. And here we're showing the query 3 image is a -- is a heart -- a heart pattern with 4 Love's next to it. It's in the top part of the 5 screenshot. 6 A. Yep.</p> <p><i>Id.</i> at 82:</p> <p>12 Q. Let's put a pin in that because we're 13 going to get to it. 14 What about gray scale? Were any images 15 converted to gray scale before features were 16 extracted? 17 A. Yes. 18 Q. Which -- for which features? 19 A. For shape, for texture.</p>
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		<p><i>Id.</i> at 83-85:</p> <div style="border: 1px solid black; padding: 5px;"><p>22 Q. Okay. If you look at that second sentence 23 there -- well, I'll read the -- I'll read the first 24 two sentences, first two full sentences. It says, 25 "As a result, we have devoted considerable effort to</p></div> <p>Flickner 8/29/23 Depo at 55–61:</p> <p>16 Q. And what is object identification? 17 A. It's to be taking a region of an image and 18 putting a label on it. 19 Q. Say the last part? 20 A. Putting a label on it. 21 Q. Taking a region of an image and putting a 22 label on it? 23 A. Yeah. 24 Q. Okay. And how would you -- and back up. 25 The user who was populating the database</p>
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		<p>1 would do this?</p> <p>2 A. Or an annotator, yeah.</p> <p>3 Q. Okay. And how would they do that?</p> <p>4 A. They could do it manually or they could</p> <p>5 use tools to help identify objects.</p> <p>6 Q. And manually how would that work?</p> <p>7 A. You look at the image and specify what</p> <p>8 objects are in the image.</p> <p>9 Q. And how would they specify it?</p> <p>10 A. Typing in a text phrase.</p> <p>11 Q. Okay. So if it was an image of a dog,</p> <p>12 they could type in "dog," for example?</p> <p>13 A. Yeah, exactly.</p> <p>14 Q. What if there were multiple objects in the</p> <p>15 image, was there a way for the user to outline or</p> <p>16 demarcate those objects?</p> <p>17 A. Yes.</p> <p>18 Q. How would they do that?</p> <p>19 A. They could just put "German Shepherd" and</p> <p>20 "Retriever" to determine the type of dogs. So they</p> <p>21 could do it using annotations of text --</p> <p>22 Q. Was there a way --</p> <p>23 A. -- or they could use extracting tools</p> <p>24 where you could outline the object more accurately.</p> <p>25 Q. So you could outline the edges of the</p> <hr/> <p>1 shape of the object?</p> <p>2 A. Right.</p> <p>3 Q. And you could do that with a manual -- the</p> <p>4 user could do that with a manual tool?</p> <p>5 A. Yeah.</p>	
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		<p>6 Q. Were there automatic tools that did -- 7 that did things like look for objects? So, for 8 example, were there automatic tools that QBIC used, 9 like edge detection or segmentation, that extracted 10 object -- 11 A. You could -- 12 Q. -- shapes? 13 A. You could use edge detection. 14 Q. Okay. Did QBIC use edge detection? 15 A. Yes, in certain aspects. 16 Q. In what aspects? 17 A. So on the annotation tool, if you compute 18 gradients, you can make a better prediction of 19 helping the person annotate. 20 So it's very tedious to go through and 21 annotate everything. Whereas if you have a tool, 22 it'll tell you where it thinks the boundaries are. 23 And you could speed up annotation quite a bit doing 24 that. 25 Q. So this tool that you're referring to, a</p>	
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		<p style="text-align: right;">Page 58</p> <p>1 user would provide a rough outline of the object and  2 then the tool would essentially conform that outline  3 better to the actual object in the image?  4 A. That was one way to do it. The other way  5 to do it is to have the next prediction of the  6 outline to be driven by the tool with the user  7 input.  8 Q. And what was the -- I assume an algorithm  9 did that?  10 A. Yeah.  11 Q. Do you know the -- what algorithm was  12 used?  13 A. We were doing a lot of stuff with splines  14 at the time.  15 (Reporter seeks clarification.)  16 A. Splines. S-p-l-i-n-e-s.  17 Q. Okay. And what are splines?  18 A. Splines are curves, mathematical  19 representation of curves -- or a mathematical  20 representation of curves.  21 Q. And so was also any automatic tools, like  22 Canny edge detection or any other edge detection  23 used that didn't require assistance from the user?  24 A. There were -- yeah, there were some that  25 were more automatic. Some tools were more</p>	<p style="text-align: right;">Page 60</p> <p>1 that was --  2 (Reporter seeks clarification.)  3 A. Simple convolution filter that was used  4 for edge detection. Sobel was an advanced version  5 of it.  6 Q. And what about segmentation, do you know  7 what segmentation is?  8 A. Yeah.  9 Q. Okay. Segmentation, as I understand it,  10 essentially separates foreground objects from the  11 background. Is that a high level of explaining it?  12 A. That's a two-class segmentation, yeah.  13 Q. Okay. Did you do that type of  14 segmentation to differentiate foreground objects  15 from the background in this database population  16 step?  17 A. We did research prototypes of it. I don't  18 know what all went out.  19 Q. You don't know whether those made it into  20 a commercial product?  21 A. I would say they probably didn't.  22 Q. Okay. Were they in the -- were they used  23 in the -- in demo applications that you referred to?  24 A. They might have been.  25 Q. Okay. And so let's say that objects were</p>	
		<p style="text-align: right;">Page 59</p> <p>1 automatic.  2 Q. And those were in the form of algorithms?  3 A. Yeah.  4 Q. Do you recall any of the algorithms, the  5 names?  6 A. We did various edge detection stuff.  7 Q. Okay.  8 (Reporter seeks clarification.)  9 A. Just various types. There were things  10 like Sobel operators that we used --  11 (Reporter seeks clarification.)  12 A. Sobel.  13 Q. How do you spell Sobel?  14 A. S-o-b-e-l, I think.  15 Q. Okay.  16 A. That's one form of an edge detector.  17 Q. Any others that you can recall?  18 A. This is kind of image processing 101.  19 There were Gabor filters.  20 (Reporter seeks clarification.)  21 Q. How do you spell that?  22 A. G-a-b-o-r.  23 There was . . . it's been so long. I  24 don't remember what they call it. Very simple  25 filters, but there's a simple convolution filter</p>	<p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done  2 with those objects? Were they stored, for example,  3 as a separate image or were they somehow linked to  4 or associated with the image from which they were  5 extracted?  6 A. Typically they were linked.  7 Q. They were linked to the source image?  8 A. Yeah.  9 Q. Okay. And this was done in the database?  10 A. Could be done in the database.  11 Q. How was it done?  12 A. It was probably done in a text database or  13 some sort of key index pair database. So database  14 has a lot of different meanings.  15 MR. HANSEN: Text database.  16 BY MR. EDWARDS:  17 Q. And, Mr. Flickner, you said probably done  18 in a text database, is that what you said?  19 A. Yeah.  20 MR. STRAUSSMAN: Make sure to speak up.  21 THE WITNESS: Okay.  22 BY MR. EDWARDS:  23 Q. Or some sort of key index database, is  24 that the other one?  25 A. Yes.</p>	

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		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various 8 features of various versions of QBIC; right? 9       A. Correct. 10       Q. Do they describe any features -- does the 11 demo you operated include any features that weren't 12 described in these articles? 13       A. That weren't described in the articles? 14 No.</p> <p><i>Id.</i> at 35:</p>
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		<p>6 Q. Okay. And the analytics that you're 7 talking about, where you extract these characters 8 from the image, that is -- those run on both the 9 query image and the images that are stored in the 10 database; is that right? 11 A. Yeah. We call them features. 12 Q. Features. Okay. 13 So when you say "features," you're talking 14 about the features that we talked about before: 15 Color, texture, shape, sketch? 16 A. For example. 17 Q. Any other ones you can think of? 18 A. Nothing comes to mind. 19 Q. But when you refer to features they at 20 least include those four; is that correct? 21 A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to 23 highlight the capabilities of QBIC to people 24 external to IBM; isn't that correct? 25 A. Correct.</p> <p><i>Id.</i> at 312-313:</p>
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		<p>21 Q. For every implementation of QBIC, if an 22 input image has an object and the object has colors, 23 the color histogram feature would match those stored 24 image that include objects with similar colors; 25 correct?</p> <hr/> <p>1 A. Correct.</p> <p><i>Id.</i> at 313-317:</p> <p>Page 313</p> <p>1 A. Correct. 2 Q. Exhibits 2, 3 and 10 are the papers that 3 you co-authored. If your counsel can provide those 4 to you just so that you have them in front of you. 5 A. I have them here. 6 MR. STRAUSSMAN: Okay. 7 THE WITNESS: Okay. 8 BY MR. EDWARDS: 9 Q. And can you just confirm for me, 10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you 11 co-authored? 12 A. Yes. 13 Q. You would have included accurate 14 information in those -- in those papers at the time 15 that you authored them; is that correct? 16 MR. HANSEN: Objection; vague and ambiguous. 17 THE WITNESS: Yes. 18 BY MR. EDWARDS: 19 Q. And the information in those papers 20 accurately reflected the functionality of QBIC at 21 the time those articles were published; is that 22 correct? 23 A. Correct.</p>
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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultrimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p> <p>Flickner 8/29/23 Depo at 33-37:</p>
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		<p>4 Q. And the second thing you mentioned was you 5 were responsible for the architecture interface for 6 running analytics. What did that detail? 7 A. You wanted -- you're writing programs to 8 determine similarity. And to do that you would take 9 the image and you'd transform -- you'd extract 10 features from the image, then you would put the 11 features in the database and you'd query the 12 database for the features. 13 Q. And when you say you are determining 14 similarity, you mean similarity between features 15 from one image to another image; is that right? 16 A. Correct. 17 Q. Okay. And what features were you looking 18 at? 19 A. We had features in color, in texture, in 20 shape. A few other categories. 21 Q. Sketch? 22 A. Yep. 23 Q. What's sketch? 24 A. You could draw a sketch -- a rough sketch 25 of an image and query. And so you could draw a</p>	
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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>	

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		<p><i>Id.</i> at 52–53:</p> <p>12 Q. Underneath there's a sentence that says, 13 "There are three logical steps in a QBIC 14 application: Database population, feature 15 calculation, and image query." 16 Do you see that? 17 A. Yeah. 18 Q. You agree with that? 19 A. Yeah. 20 Q. All right. Well, let's talk about the 21 first step, database population. 22 What is database population? 23 A. It's taking a set of images, extracting 24 the features and putting them in a database. 25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that 2 in the database as well? 3 A. Could be. 4 Q. So if you look at -- under 2.1 Database 5 Population, it says, "The first step in population 6 is to simply load the images into the system." 7 Is that right? 8 A. Yep. 9 Q. And the next sentence says then you can 10 also add the image to the database, preparing a 11 reduced thumbnail and adding any available text 12 information to the database. 13 A. Yep. 14 Q. Is that correct? 15 A. Yep.</p> <p><i>Id.</i> at 77–78:</p>
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		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99:</p> <p>20 Q. So for each of color, texture, shape,</p> <p>21 sketch, there are algorithms that are performing</p> <p>22 some mathematical computation to calculate those</p> <p>23 features; is that right?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's talk about the color</p>
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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two                  2 different color computations that are done. One is                  3 average color, the other is color histogram; is that                  4 right?                  5 A. There certainly are those two.                  6 Q. Say again.                  7 A. There certainly are those two.                  8 Q. Okay. And for average color, let's talk                  9 about that first, it says [as read], "We compute the                  10 average," and it lists four things, "(R, G, B), (Y,                  11 i, q), (L, a, b), and MTM coordinates of each object                  12 and image."                  13 You see that?                  14 A. Yep.                  15 Q. So does that mean that it does -- every                  16 time it -- if it computes average color, it computes                  17 all four of those things? Or are those optional,                  18 meaning that it can compute one as opposed -- or                  19 some combination of those four?                  20 A. Some combination of those four.                  21 Q. Okay. Are there different algorithms for                  22 each of those four or is it the same algorithm?                  23 A. RGB, Yiq and LAB are all linear                  24 transformations.                  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed                  2 over time going forward from 1993?                  3 A. Most likely they did.                  4 Q. Do you recall any details for how they may                  5 have changed?                  6 A. No.                  7 Q. Do you know if functionality was added to                  8 compute average color?                  9 A. No.                  10 Q. Do you -- do you recall any other                  11 algorithms or methodologies that were used besides                  12 the four that are listed here?                  13 A. No.                  14 Q. Okay. Second methodology to compute color                  15 is referred to as color histogram here; is that                  16 correct?                  17 A. Yes.                  18 Q. And so at a high level can you explain to                  19 me what a color histogram is?                  20 A. A histogram is a count of each value. And                  21 so, for example, if you have 1, 2, 3 as a value and                  22 you say 1, 2, 3 again, the histogram would say 2                  23 because there are two 1s, two 2s, and two 3s. So                  24 it's a count of the number of values across the                  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my                  2 head.                  3 Q. That's something different from a linear                  4 transformation?                  5 A. It might be a different linear                  6 transformation. I don't recall.                  7 Q. Okay. So for average color, the                  8 algorithms will compute that based on some                  9 combination of those four methodologies?                  10 A. Yes.                  11 Q. Okay. Do you know if those methodologies                  12 evolved over time? So this -- so, for example, this                  13 argu- -- excuse me -- article was written in 1993.                  14 Do you know if the way in which QBIC computed                  15 average color changed over time or did it stay the                  16 same?                  17 MR. STRAUSSMAN: Objection; compound.                  18 MR. EDWARDS: Let me rephrase.                  19 THE WITNESS: I don't recall.                  20 MR. EDWARDS: Let me rephrase.                  21 BY MR. EDWARDS:                  22 Q. So this article was written in 1993, and                  23 it lists four methodologies for computing average                  24 color features.                  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?                  2 A. Pixels, color.                  3 Q. So is it measuring the probability                  4 density --                  5 A. It's a --                  6 Q. -- of a color being in an image?                  7 A. It's a PDF estimator.                  8 Q. And what does PDF stand for?                  9 A. Probability density function.                  10 Q. Okay. Once the color histogram is                  11 computed, is it normalized after that?                  12 A. Yes, it was normalized.                  13 Q. And why did you normalize the color                  14 histogram?                  15 A. Because different images would have                  16 different color balances.                  17 (Reporter seeks clarification.)                  18 A. Balances, yeah.                  19 Q. Is a -- is a reason why you normalize the                  20 color histogram in -- for stored images -- well,                  21 strike that.                  22 Did you -- did you normalize color                  23 histograms when you extract -- strike that.                  24 When you calculated the color histogram                  25 features from a query image and a stored image, is</p>

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>



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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or          2 more of these features than the other?          3 A. Yes.          4 Q. Which one?          5 A. Shape.          6 Q. Okay.          7 (Witness reviews document.)          8 A. So one thing I can state is originally I          9 couldn't remember the name of the edge operator --          10 and the name is Canny, the Canny edge operator --          11 when we were talking about finding edges.          12 Q. Okay. So this -- the paragraph on          13 IBM 2393 refreshed your memory that shape          14 calculation used Canny edge detection?          15 A. No, that's sketch.          16 Q. Oh, I'm sorry.          17 A. I'm just stating that originally I was          18 asked a question about standard edge operators. I          19 couldn't remember the name. The name was Canny.          20 Q. Canny. And Canny is used in the sketch          21 calculation?          22 A. Yeah, it's used in the sketch calculation.          23 Q. Understood. Okay. Let's go back to          24 shape.          25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.          2 Q. Can you say the name of the word again?          3 A. I think it's called perround.          4 Q. Per round?          5 A. Yeah.          6 Q. Those -- are those two words, p-e-r,          7 r-o-u-n-d?          8 A. P-e-r -- one word.          9 Q. Okay. Perround, one word.          10 A. It's basically the perimeter squared over          11 area.          12 (Reporter seeks clarification.)          13 A. Perimeter squared over area.          14 (Reporter seeks clarification.)          15 A. Length of the -- over area.          16 Q. Okay. So let's step back a little bit.          17 So it says -- the second paragraph says [as read],          18 "Our shape features are based on a combination of          19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features          20 area, circularity, eccentricity, major access          21 orientation and a set of algebraic moment          22 invariants," i-n-v-a-r-i-a-n-t-s.          23 Did I read that correctly?          24 A. Um-hum.          25 Q. Okay. For circularity, that is computed</p>
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.          2 To calculate the shape feature in a query          3 image or a stored database image, is the first step          4 to convert that image into a binary image?          5 A. I don't think so.          6 Q. So if you look at the second paragraph --          7 and the reason why I ask is -- it's the second          8 sentence in the second paragraph under "Shape          9 features." It says [as read], "All shapes are          10 assumed to be non-occluded planar shapes allowing          11 for each shape to be represented as a binary image."          12 See that?          13 A. Yeah.          14 Q. And then the next sentence says [as read],          15 "The area is computed as the number of pixels set in          16 the binary image."          17 A. Right.          18 Q. So that's why I ask is it the first step          19 in calculating shape to convert the image to binary?          20 A. Yes.          21 Q. And then once you convert it to binary          22 image, then what do you do next in order to          23 calculate the shape?          24 A. You're computing something called          25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?          2 A. Right.          3 Q. All right. Area is the number of pixels          4 in the binary image?          5 A. In the binary blob.          6 Q. In the binary what?          7 A. Blob.          8 Q. Blob. And when you say "blob," what does          9 that refer to?          10 A. The outline of the object that you're          11 doing a shape query on.          12 Q. And so are each of these, area,          13 circularity, eccentricity, major axis orientation          14 and algebraic moment invariants, are those each          15 different algorithms or is it all the same          16 algorithm?          17 A. It's different algorithms.          18 Q. Okay. And since you worked on the shape          19 feature the most, do you recall any other details          20 that are not disclosed in this paragraph?          21 A. Well, this evolved and we ended up doing          22 an implementation of something that's not in here.          23 Q. Okay. And what was that implementation?          24 A. Something called turning angle per round,          25 turning angle, which is -- it looks at the tangent</p>



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			<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So</p> <p>2 you're computing the turning angle. You're</p> <p>3 computing this angle that represents a shape in a</p> <p>4 very interesting way.</p> <p>5 They don't seem to be very good for</p> <p>6 human -- so if you asked a human whether these two</p> <p>7 shapes are similar, they would say "yes," but under</p> <p>8 that feature set.</p> <p>9 Q. And you call that something per round?</p> <p>10 What was the name of it? Started with a T.</p> <p>11 Turrent?</p> <p>12 A. Turning angle.</p> <p>13 Q. Oh, turning angle.</p> <p>14 A. Yeah.</p> <p>15 Q. Well, it said -- your answer -- you did</p> <p>16 say turning angle, but you said something called</p> <p>17 something per round, and it started with a T. I</p> <p>18 thought you said turrent, but maybe I misunderstood.</p> <p>19 MR. STRAUSSMAN: Tangent?</p> <p>20 THE WITNESS: Tangent angle, yeah.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Okay. So something called tangent per</p> <p>23 round, is that what you would call it, this --</p> <p>24 A. No.</p> <p>25 Q. -- this implementation?</p>	
			<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle.</p> <p>2 Q. Okay. So the name of the new</p> <p>3 implementation you're talking about for shape</p> <p>4 calculation is called turning angle?</p> <p>5 A. It used turning angle as a major feature.</p> <p>6 Q. Okay. Was there any other name it went</p> <p>7 by?</p> <p>8 A. I don't recall.</p> <p>9 Q. All right. And that was -- that</p> <p>10 methodology was implemented to calculate shape on a</p> <p>11 query image and an image stored in the database post</p> <p>12 this article?</p> <p>13 A. Yes.</p> <p>14 Q. Was that the -- did that -- did that</p> <p>15 implementation, the turning angle, did that replace</p> <p>16 the methodology in this article or was it</p> <p>17 supplementing the metho--</p> <p>18 A. Supplementing.</p> <p>19 Q. Okay. Other than turning angle, were</p> <p>20 there any other methodologies used after this</p> <p>21 article?</p> <p>22 A. Not that I recall.</p> <p>23 Q. Okay. Okay. Let's go sketch features, if</p> <p>24 you take a look at that and then let me know when</p> <p>25 you're done reading it.</p>	

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*Id.* at 119–128:

		<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>
		<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p>

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then  2 you're looking for blue water, white sand.  3 BY MR. EDWARDS:  4 Q. Do you recall what the methodologies  5 used -- that were used to calculate the orientation  6 of those colors in the image?  7 MR. HANSEN: Objection; lacks foundation.  8 THE WITNESS: There's no orientation per se.  9 It's just position.  10 BY MR. EDWARDS:  11 Q. Well, then position. Do you recall what  12 the methodologies are to calculate the position?  13 MR. HANSEN: Same objection.  14 THE WITNESS: Position is something the user  15 inputs.  16 BY MR. EDWARDS:  17 Q. Something you use what?  18 A. The user had to input.  19 Q. Okay. And then let's move on to the next  20 one, T. It says, "Click T to search images with  21 similar global texture."  22 A. Yeah.  23 Q. Do you recall, in your work on the QBIC  24 project, a feature called global texture that could  25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?  2 A. G-a-b-o-r.  3 Q. So switch over and look at the second page  4 of this Exhibit 6.  5 So -- well, first back -- go back to -- go  6 back to the first page. If you see on the left-hand  7 side it says, "Goto: IBM Image Search Demo," and a  8 little finger there is clicking it.  9 You see it's in red?  10 A. Yeah.  11 Q. Okay. So that's clicking on that link.  12 And then the second page is going to the IBM image  13 search demo.  14 A. Okay.  15 Q. Okay? On the second page it is showing  16 thumbnails with the different icons that we just  17 walked through, I, C, L, T, S, on each of those  18 icons.  19 Do you see that?  20 A. Yep.  21 Q. Do you recognize this as a similar layout  22 to the QBIC demos you hosted in the '90s?  23 A. I don't.  24 Q. You don't?  25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .  2 Q. Say again?  3 A. I missed one of your words. A feature  4 called what?  5 Q. I said do you recall in your work on the  6 QBIC project a feature called global texture that  7 was extracted from the image?  8 A. Yes.  9 Q. Okay. Is that -- is that akin to texture  10 that we looked at earlier?  11 A. Yes.  12 Q. Okay. And the last one is S. It's,  13 "Search images with special multipass filter."  14 Do you recall, in your work on the QBIC  15 project, being able to calculate a feature called  16 multipass filter?  17 A. Probably Gabor functions.  18 Q. Say again?  19 A. Gabor functions.  20 Q. One more time and louder.  21 A. Gabor functions.  22 Q. Gabor functions. Okay. What are Gabor  23 functions?  24 A. Gabor functions are a way of producing  25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM  2 website that was the ALX operating system in  3 Exhibit 3, that did not have a similar thumbnail  4 layout like this?  5 A. A thumbnail, yes. I don't recall it had  6 the buttons, the I, C, L, T, S.  7 Q. You don't recall it had all the buttons or  8 some of the buttons?  9 A. All the buttons.  10 Q. Okay. So you don't recall that it had any  11 buttons?  12 A. I don't -- yeah. I don't recall.  13 Q. It could have, it couldn't have, you just  14 don't remember?  15 A. I just don't remember, yeah.  16 Q. Okay. But the one that you hosted on  17 IBM's website, it did have thumbnails in a similar  18 format here?  19 A. Yeah, it had thumbnails.  20 Q. And these thumbnails represent the images  21 that are stored in the database?  22 A. Yes.  23 Q. Okay. Here, the 470 images would be  24 reflected at least -- one, two, three, four, five,  25 six, seven -- eight of them right here in this</p>

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		<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>
		<p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

*Id.* at 135 – 136:

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		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p><i>Id.</i> at 139–165:</p>
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		<p>5 Q. And for the image that you use as a base 6 for the query, the things we all talked about in 7 terms of feature extraction for average color, color 8 histogram, shape, texture, sketch, all of those 9 things, the same algorithms would be used in order 10 to extract those features from the image query? 11 A. They're different algorithms. You would 12 use an algorithm. 13 Q. I'm sorry. Say that again? 14 A. The algorithms are different between the 15 shape features and the color features and sketch 16 features. 17 Q. Yeah. Understood. What I'm trying -- 18 what I'm trying to understand is, the process that 19 we talked about before, when you populate the 20 database and you extract the features from the 21 images that are stored in the database. 22 You know, we went through all those 23 different algorithms that are used for shape, color, 24 both average color and histogram, texture and 25 sketch.</p>
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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>
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		<p style="text-align: right;">Page 142</p> <p>1 QBIC system would uncompress it?</p> <p>2 A. Yep.</p> <p>3 Q. And then it would extract whatever feature</p> <p>4 you want from that uncompressed image?</p> <p>5 A. Correct.</p> <p>6 Q. And then those extracted features from the</p> <p>7 uncompressed JPEG image are used in the matching</p> <p>8 process?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And you were using -- you were</p> <p>11 doing this for JPEG image -- or the QBIC system was</p> <p>12 doing this for JPEG images in the -- in the '90s?</p> <p>13 A. Yes.</p> <p>14 Q. Okay. So once the system -- now, we're</p> <p>15 only talking about image-based queries, image using</p> <p>16 as input for the queries.</p> <p>17 Once you submit an image for the query, if</p> <p>18 it's a -- you do your preprocessing that need to be</p> <p>19 done. Features are extracted. So now we've got</p> <p>20 just the extracted features, whatever those are.</p> <p>21 What happens with those extracted features</p> <p>22 next?</p> <p>23 A. They're put in the database and then</p> <p>24 potentially there are indexes built that help you do</p> <p>25 fast search against those features.</p>	<p style="text-align: right;">Page 144</p> <p>1 that does a comparison for say texture?</p> <p>2 A. You say the matching algorithm?</p> <p>3 Q. Correct.</p> <p>4 A. Yes, they could be different.</p> <p>5 Q. Well, let's talk about them. We can get</p> <p>6 into detail here.</p> <p>7 Well, before we -- before we get there, so</p> <p>8 how does the QBIC system display the results of</p> <p>9 matches to the user?</p> <p>10 A. Typically just thumbnails in a window in</p> <p>11 multiple ordered hits.</p> <p>12 Q. Okay. And it displays them in the order</p> <p>13 by which they're most similar. So the, you know,</p> <p>14 best match to the next best match to the next best</p> <p>15 match, so on and so forth?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And you said the system determines</p> <p>18 similarity based on some distance measure between</p> <p>19 the extracted features in the image query versus the</p> <p>20 stored image?</p> <p>21 A. The features of the stored image.</p> <p>22 Q. But it's a -- it's some sort of distance</p> <p>23 measure?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's go back to Exhibit 2.</p>
		<p style="text-align: right;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm</p> <p>2 talking about for a query, so I'm taking an image</p> <p>3 and submitting it to a system as a query.</p> <p>4 A. Query by example.</p> <p>5 Q. Query by example. Okay. Once those</p> <p>6 features extracted for that image, what happens next</p> <p>7 in the process?</p> <p>8 A. You take the feature vector and you</p> <p>9 present it to the database and say return the best</p> <p>10 matches to this feature vector.</p> <p>11 Q. Okay. So the system would compare -- the</p> <p>12 QBIC system would compare the features that are</p> <p>13 calculated from the input image to stored calculated</p> <p>14 features of the images in the database and come up</p> <p>15 with a match?</p> <p>16 A. Yes.</p> <p>17 Q. Okay. And those matches would be sorted</p> <p>18 or arranged in order of most similar?</p> <p>19 A. Yes.</p> <p>20 Q. And would algorithms do these comparisons?</p> <p>21 A. Yes.</p> <p>22 Q. Would it be a different algorithm for each</p> <p>23 of the features? So, for example, would there be an</p> <p>24 algorithm that does the comparison for color</p> <p>25 histogram and then there's a different algorithm</p>	<p style="text-align: right;">Page 145</p> <p>1 So if you turn to page IBM 2393 and</p> <p>2 rolling over to IBM 2395, that's a discussion on the</p> <p>3 image query. And so what I want to do -- I have a</p> <p>4 couple high-level questions, but then I want to walk</p> <p>5 through each one. Color starts on 2394, then</p> <p>6 texture and then shape and sketch are on 2395.</p> <p>7 So in terms of the -- in terms of the</p> <p>8 distance measure, Mr. Flickner, if -- I know you</p> <p>9 said that the results are termed based on those that</p> <p>10 are most similar but it could come up with something</p> <p>11 that's an exact match; is that right?</p> <p>12 A. It's possible.</p> <p>13 Q. Like the distance measure, the result</p> <p>14 would be zero if it was an exact match; right?</p> <p>15 A. Typically you'd get that only if you had</p> <p>16 the query image the same as a result image.</p> <p>17 Q. Right. But that's a possibility?</p> <p>18 A. Yeah.</p> <p>19 Q. Okay. So let's take a look at color --</p> <p>20 it's on -- starting at the top of 2394. You know,</p> <p>21 take your time and read that and then I want to ask</p> <p>22 you some questions about it.</p> <p>23 (Witness reviews document.)</p> <p>24 A. Okay.</p> <p>25 Q. Okay. So let's first start with average</p>



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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between</p> <p>2 the query image and the database image using</p> <p>3 weighted Euclidean distance; is that right?</p> <p>4 A. Yep.</p> <p>5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.</p> <p>6 And can you just tell us at a high level</p> <p>7 what -- if you can -- what Euclidean distance is?</p> <p>8 A. So if you have multiple features or</p> <p>9 multiple scaler features, you have to ask the</p> <p>10 question I'm trying to build a distance from that</p> <p>11 vector to a query vector.</p> <p>12 And as you build that -- the distance, you</p> <p>13 have -- you may want to weight different elements of</p> <p>14 the vector differently. And we found out that using</p> <p>15 variance normalization, where weights of the</p> <p>16 variance of the feature, gave good aesthetic</p> <p>17 results.</p> <p>18 (Reporter seeks clarification.)</p> <p>19 A. Aesthetic results.</p> <p>20 Q. And I apologize, I couldn't hear what you</p> <p>21 said. You said, "And we found out that using</p> <p>22 variance" . . .</p> <p>23 A. So you normalize each feature with its</p> <p>24 variance.</p> <p>25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)</p> <p>2 Q. Well, let me ask my -- let me get my</p> <p>3 question out first.</p> <p>4 So we talked about the features for</p> <p>5 average color before are RGB, Yiq, LAB and MTM.</p> <p>6 A. Correct.</p> <p>7 Q. And so, for example, for the RGB, you're</p> <p>8 saying that you would take the R and you would</p> <p>9 divide it by the variants of red and green, for</p> <p>10 example --</p> <p>11 A. Just variants of red.</p> <p>12 Q. Okay. And so you could do the same for</p> <p>13 the others, for Yiq or LAB?</p> <p>14 A. Exactly.</p> <p>15 Q. Okay. You do that for both the image</p> <p>16 input query and the stored image; correct?</p> <p>17 A. Correct.</p> <p>18 Q. And then you're calculating the distance</p> <p>19 between them, so determining how similar they are</p> <p>20 based on the distance?</p> <p>21 A. Yeah, or vector distance.</p> <p>22 Q. Understood.</p> <p>23 A. Two vectors of differences --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. Two vectors with a distance calculation on</p>
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.</p> <p>2 Q. With its variance.</p> <p>3 A. And then compute the average.</p> <p>4 Q. Okay.</p> <p>5 A. Or, I'm sorry, compute the weighted sum.</p> <p>6 So red divided by the variants of red, plus green</p> <p>7 divided by the variants of green --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 A. Red divided by the variants of red, green</p> <p>10 divided by the variants of green, L divided by the</p> <p>11 variants of L, that's how you combine the various</p> <p>12 features.</p> <p>13 Q. Understand. And L represents what?</p> <p>14 A. Luminance.</p> <p>15 Q. Okay. And this is -- you're talking</p> <p>16 specifically with respect to average color?</p> <p>17 A. Well, the variance normalization is well</p> <p>18 known in terms of multidimensional feature merging.</p> <p>19 Q. But for average color, you wouldn't use</p> <p>20 luminance, right, as a -- as a variant?</p> <p>21 A. Luminance would just -- you wouldn't use</p> <p>22 just luminance. You could use luminance . . .</p> <p>23 Q. Well, so the color features we talked</p> <p>24 about before would be RGB, Yiq, LAB --</p> <p>25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.</p> <p>2 Q. You're going to have to repeat that and be</p> <p>3 just a little bit louder, Mr. Flickner. Sorry.</p> <p>4 A. That's all right. Let me get my thoughts</p> <p>5 together.</p> <p>6 So we have multiple dimensional features.</p> <p>7 It's not unusual to take each dimension and</p> <p>8 normalize it by the variance because that gives</p> <p>9 you -- what that does is if you have tight variances</p> <p>10 you divide it by, you get bigger numbers. So you</p> <p>11 have more information close by.</p> <p>12 Q. What was the word you said before "close</p> <p>13 by"?</p> <p>14 A. I don't remember.</p> <p>15 THE REPORTER: Information?</p> <p>16 THE WITNESS: Information close by?</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Okay. So now let's talk about</p> <p>19 color histograms.</p> <p>20 A. Okay.</p> <p>21 Q. Okay? Well, stop. Let's go back to</p> <p>22 average color. So is there -- you described the</p> <p>23 weighted Euclidean distance that's calculated</p> <p>24 between the query image and the database image for</p> <p>25 average color.</p>

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall</p> <p>2 that's not disclosed in the paragraph at IBM 2394?</p> <p>3 A. Not that I recall.</p> <p>4 Q. Okay. Do you recall whether this distance</p> <p>5 methodology changed after this article or it stayed</p> <p>6 the same?</p> <p>7 A. It changed.</p> <p>8 Q. Are you certain or do you know?</p> <p>9 A. I'm not certain, but I'm pretty certain.</p> <p>10 Q. And how did it change?</p> <p>11 A. Different features were shaped like an</p> <p>12 inch in color. The algorithm evolved. It wasn't</p> <p>13 static.</p> <p>14 Q. And how did it evolve?</p> <p>15 A. I don't recall all the details.</p> <p>16 Q. Do you recall whether it supplemented the</p> <p>17 weighted Euclidean distance or replaced it?</p> <p>18 A. I don't recall.</p> <p>19 Q. Is it fair to say there was always some</p> <p>20 distance measurement to determine similarity for</p> <p>21 average color in the QBIC system?</p> <p>22 A. There's some measurement, yeah.</p> <p>23 Q. Okay. Let's talk about color histogram.</p> <p>24 So in order to determine the similarity</p> <p>25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was</p> <p>2 determined by weighted Euclidean distance; is that</p> <p>3 right?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 THE WITNESS: Correct.</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. And how did -- how was that weighted</p> <p>8 Euclidean distance determined?</p> <p>9 A. It was inverse variance.</p> <p>10 (Reporter seeks clarification.)</p> <p>11 A. Variance.</p> <p>12 Q. And it was inverse variance for components</p> <p>13 like coarseness, contrast and directionality?</p> <p>14 A. Correct.</p> <p>15 Q. Okay. And do you recall if that</p> <p>16 methodology changed or stayed the same after this</p> <p>17 article for the QBIC system?</p> <p>18 A. Most likely it evolved.</p> <p>19 Q. Do you know for sure?</p> <p>20 A. No.</p> <p>21 Q. Do you recall any details?</p> <p>22 A. No.</p> <p>23 Q. All right. Let's talk about shape next.</p> <p>24 The similarity between the query image and</p> <p>25 the database image also used weighted Euclidean</p>
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines</p> <p>2 distance between normalized histograms?</p> <p>3 A. Correct.</p> <p>4 Q. Do you recall any details of how that</p> <p>5 worked?</p> <p>6 A. Not off the top of my head.</p> <p>7 Q. Do you recall whether that methodology</p> <p>8 evolved for matching color histograms after this</p> <p>9 article?</p> <p>10 A. Not that I recall.</p> <p>11 Q. Okay. All right. Let's talk about</p> <p>12 texture next. And I don't know if you've read that,</p> <p>13 but that's at the bottom of 2394 and it goes to just</p> <p>14 barely at the top of 2395.</p> <p>15 (Witness reviews document.)</p> <p>16 A. Okay.</p> <p>17 Q. So for texture, the similarity is</p> <p>18 determined by the distance or the weighted Euclidean</p> <p>19 distance between the query object and -- the query</p> <p>20 object image and the database object image; is that</p> <p>21 right?</p> <p>22 MR. HANSEN: Objection; vague and ambiguous.</p> <p>23 THE WITNESS: Can you repeat.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?</p> <p>2 A. Correct.</p> <p>3 Q. And do you recall how that worked?</p> <p>4 A. There's computing moments. And we used</p> <p>5 the shape measure, which I mentioned earlier,</p> <p>6 curvature and turning angle.</p> <p>7 (Reporter seeks clarification.)</p> <p>8 A. Curvature and turning angle.</p> <p>9 Q. And the curvature and turning angle would</p> <p>10 be compared between the image query and the database</p> <p>11 image; correct?</p> <p>12 A. Correct.</p> <p>13 Q. And do you recall if that methodology</p> <p>14 changed after this article came out in '93?</p> <p>15 A. Yes, it did.</p> <p>16 Q. How so?</p> <p>17 A. Well, in the IEEE computer paper, we</p> <p>18 described a different way of doing shape measures.</p> <p>19 And they included the moment calculations.</p> <p>20 Q. And you use the moment calculations to</p> <p>21 determine a distance between the image query and</p> <p>22 the -- and the database image?</p> <p>23 A. Yes.</p> <p>24 Q. Sorry?</p> <p>25 A. Yeah. Yes.</p>

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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?  2 A. Given a binary blob, certain high-level  3 moments and then you create -- compute the  4 eigenvectors of certain matrices that are created --  5 (Reporter seeks clarification.)  6 A. Eigenvectors, e-i-g-e -- i-n -- to compute  7 the eigenvectors of certain matrices. And that  8 would give you translation and rotation and  9 variance.  10 Q. And so after the Exhibit 3 1995 IEEE  11 article, did that methodology change to compute the  12 distance for shape?  13 A. I don't recall.  14 Q. So the methodology for shape that you just  15 described using moment calculations, that is  16 different from what is described in the 1993 article  17 for weighted Euclidean distance?  18 A. We still might have used weighted  19 Euclidean distance when the underlying features are  20 different.  21 Q. Understood.  22 And the underlying features are different  23 in the sense that in the 1995 article you're using  24 what features?  25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment  2 invariants.  3 (Witness reviews document.)  4 A. Is there any other papers that we have  5 here?  6 Q. Nope.  7 A. Everything else is screenshots?  8 MR. STRAUSSMAN: I don't think you introduced  9 any other papers.  10 THE WITNESS: I saw it earlier today.  11 BY MR. EDWARDS:  12 Q. Why don't we do it this way. In terms of  13 the feature calculations that were -- for shape on  14 page IBM 900 of Exhibit 3 versus page --  15 A. So if you look at 2393.  16 Q. What page are you directing me to?  17 A. 2393.  18 Q. Okay.  19 A. So it talks about the moment invariants as  20 well.  21 Q. Okay.  22 A. These are those matrices that you compute  23 eigenvectors of.  24 (Reporter seeks clarification.)  25 A. Matrices that you compute eigenvectors of.</p>
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)  2 Q. I think the page you may be looking for is  3 IBM 900 on the left side.  4 (Witness reviews document.)  5 A. What else do we have here?  6 Q. So if you'll look at -- if you'll -- if  7 you'll compare page IBM 900 from Exhibit 3 to page  8 IBM 2393 from Exhibit 2, those are the descriptions  9 in both articles about the features that are  10 calculated.  11 A. I'm trying to remember what --  12 MR. STRAUSSMAN: Can you direct him a little  13 closer?  14 BY MR. EDWARDS:  15 Q. Can I show you? Do you mind?  16 I believe this is what you're looking for.  17 So if you look right here (indicating).  18 (Witness reviews document.)  19 A. That's the same as this one (indicating).  20 We had another -- there's another discussion about  21 moments.  22 Q. So if you look at -- under "Shape  23 features" at 2393, right there, where you're looking  24 at --  25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment  2 invariants in the 1993 SPIE article?  3 A. Correct.  4 Q. Right. And then if you go to the IEEE  5 article that you primarily co-authored, on page 900,  6 it refers to shape queries using area, circularity,  7 eccentricity, major-axis direction and features  8 derived from the object moments.  9 A. Right.  10 Q. Is that the same thing as algebraic moment  11 invariants?  12 A. Right.  13 Q. So it looks like the methodologies are the  14 same for the features that are extracted between the  15 papers; is that right?  16 A. I thought one paper had algebraic moments  17 and one had turning angle. Maybe they both had  18 turning angle.  19 (Reporter seeks clarification.)  20 A. Turning angle. Algebraic moments.  21 Turning angles.  22 Q. The 1993 paper refers to algebraic moment  23 invariants. The IEEE paper, on IBM 900, refers to  24 features derived from object moments.  25 Are those the same thing?</p>

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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.</p> <p>2 Q. Okay. And so turning angles, which you've</p> <p>3 previously testified on, do you think that</p> <p>4 calculating shape features based on turning angles</p> <p>5 came after these papers?</p> <p>6 A. No. They're mentioned in these papers.</p> <p>7 Q. Okay. So they're included in these</p> <p>8 papers?</p> <p>9 A. Yes.</p> <p>10 Q. And so any distance measurement using</p> <p>11 weighted Euclidean distance would have taken into</p> <p>12 account turning angles?</p> <p>13 A. As a feature, yeah. Yes.</p> <p>14 Q. For both -- for both papers?</p> <p>15 A. For both papers.</p> <p>16 Q. Okay. Let's talk about sketch, which</p> <p>17 is -- if you'll just stick with 2395, which is</p> <p>18 Exhibit 2.</p> <p>19 MR. STRAUSSMAN: Can you direct him?</p> <p>20 THE WITNESS: I found it.</p> <p>21 MR. STRAUSSMAN: Okay.</p> <p>22 (Witness reviews document.)</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Let me know when you're finished reading</p> <p>25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the</p> <p>2 best matches based on order of similarity?</p> <p>3 A. Um-hum.</p> <p>4 Q. Does iterated query refinement mean that I</p> <p>5 can further refine that query to search for things</p> <p>6 like shape, like a -- you know, some shape in the --</p> <p>7 in the query image, like a logo or an icon, and that</p> <p>8 will further refine the results to give me things</p> <p>9 that have that similar shape inside the results of</p> <p>10 the color histogram?</p> <p>11 A. Yes.</p> <p>12 Q. And then I can -- I can keep doing that, I</p> <p>13 can further even refine that result by using a</p> <p>14 keyword, for example?</p> <p>15 A. Yes. Or you could do it all at once.</p> <p>16 Q. Okay. So the results of the query -- so</p> <p>17 we talked about before that the results of the</p> <p>18 queries display thumbnails of the database images</p> <p>19 based on similarity of which they match; correct?</p> <p>20 A. Correct.</p> <p>21 Q. And then those thumbnails can provide</p> <p>22 links to the original image or, if it was an</p> <p>23 r-frame, it could be -- you could provide a link to</p> <p>24 the video; correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.</p> <p>2 Q. For sketch, the similarity between the</p> <p>3 query image and the database image uses an algorithm</p> <p>4 that performs logical binary correlation of the</p> <p>5 binary image?</p> <p>6 A. Yes.</p> <p>7 Q. Are there any other details you recall for</p> <p>8 the sketch comparison beyond what's disclosed in</p> <p>9 this paragraph on IBM 2395?</p> <p>10 A. Not that I recall.</p> <p>11 Q. Do you recall the methodology for</p> <p>12 determining similarity of the input image and the</p> <p>13 database image for sketch changing after this</p> <p>14 article?</p> <p>15 A. Not that I recall.</p> <p>16 Q. So if you go to the next page,</p> <p>17 Mr. Flickner, which is 2396, the Section 4.2 talks</p> <p>18 about performing queries.</p> <p>19 A. Um-hum.</p> <p>20 Q. And in the last sentence it refers to</p> <p>21 something called iterated query refinement.</p> <p>22 A. Yes.</p> <p>23 Q. And what does that refer to?</p> <p>24 A. It's a way you can refine the query.</p> <p>25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links</p> <p>2 to information about the image that was associated</p> <p>3 with the image in the database?</p> <p>4 A. Yes.</p> <p>5 Q. And, again, that can be that -- whatever</p> <p>6 information that the user inputted or was associated</p> <p>7 with the image from the source?</p> <p>8 A. Yes.</p> <p>9 Q. Could the results also display a matching</p> <p>10 score so the user could see how well the particular</p> <p>11 result matched to the -- to the query image?</p> <p>12 A. It could.</p> <p>13 Q. Okay.</p> <p>14 MR. EDWARDS: I'm going to hand you the next</p> <p>15 exhibit, Mr. Flickner.</p> <p>16 (Deposition Exhibit 10 was marked.)</p> <p>17 MR. EDWARDS: Handing you what's been marked as</p> <p>18 Exhibit 10.</p> <p>19 For the record, it's IBM Bates Nos. 002418</p> <p>20 to 2430.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. The title of this article is "Updates to</p> <p>23 the QBIC system."</p> <p>24 Do you see that?</p> <p>25 A. Yes.</p>

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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?</p> <p>2 A. Yes.</p> <p>3 Q. You are listed as a co-author of this</p> <p>4 article; is that correct?</p> <p>5 A. Yes.</p> <p>6 Q. And it is a paper that is published in the</p> <p>7 SPIE; correct?</p> <p>8 A. Correct.</p> <p>9 Q. In 1997; correct?</p> <p>10 A. Yes. It was 1997 or 1998.</p> <p>11 Q. No later than 1998; correct?</p> <p>12 A. Correct.</p> <p>13 Q. So just want to kind of orient you to the</p> <p>14 first page, which is IBM 2419.</p> <p>15 A. It's '98 because '97 is a different paper.</p> <p>16 Q. Well, if you turn the page, look at the</p> <p>17 footer on the right-hand side.</p> <p>18 Are you familiar that SPIE usually</p> <p>19 includes footers with the volume and the date at the</p> <p>20 bottom?</p> <p>21 A. Yeah.</p> <p>22 Q. And if you look at the footer kind of</p> <p>23 towards the right it says -786X-97-\$10 [sic]?</p> <p>24 A. Yeah.</p> <p>25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?</p> <p>2 A. Yep.</p> <p>3 Q. Okay. So let's -- I'm going to have you</p> <p>4 jump around, so I apologize in advance. Let's go to</p> <p>5 the -- kind of the back, IBM 2428.</p> <p>6 A. Okay.</p> <p>7 Q. Is that example of the stamps demo that</p> <p>8 was available on IBM's website?</p> <p>9 A. Yes.</p> <p>10 Q. All right. And if you look at the top in</p> <p>11 the location URL it has the almaden.ibm website</p> <p>12 address; correct?</p> <p>13 A. Correct.</p> <p>14 Q. All right. Let's flip forward to 2429.</p> <p>15 And is 2429 a screenshot of a trademark</p> <p>16 demo that was also available in the Almaden --</p> <p>17 excuse me -- almaden.ibm website?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And that demo looks like the</p> <p>20 trademark query is based on shape; is that right?</p> <p>21 A. It uses shape as one similarity feature.</p> <p>22 Q. Right. So the trademarks are converted to</p> <p>23 a binary image, like we talked before -- talked</p> <p>24 about before, and then they're -- the matching</p> <p>25 process is done based on those binary images?</p>
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the</p> <p>2 conference was in '98.</p> <p>3 Q. Submission was in '97. So the paper was</p> <p>4 published in '97 and then the conference you</p> <p>5 presented it at was in 1998?</p> <p>6 A. That's possible.</p> <p>7 Q. Do you recall presenting this paper at a</p> <p>8 conference in 1998?</p> <p>9 A. No, I don't.</p> <p>10 Q. So the first page refers to the Photonics</p> <p>11 West 1999 -- excuse me. Photonics West 1998</p> <p>12 Electronic Imaging Conference in San Jose.</p> <p>13 Do you recall attending that conference?</p> <p>14 A. It's likely I did, but I don't recall.</p> <p>15 Q. Okay. But you would agree with me this</p> <p>16 paper was made available at least as early as 1998;</p> <p>17 correct?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. So the first page, IBM 2419. Under</p> <p>20 "Introduction," at the time of this paper it says,</p> <p>21 last line on the first paragraph, "Several online</p> <p>22 demos of QBIC are available at</p> <p>23 <a href="http://wwwqbic.almaden.ibm.com">http://wwwqbic.almaden.ibm.com</a>."</p> <p>24 Do you see that?</p> <p>25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p>22 Q. Okay. So 39 would be the -- so the first</p> <p>23 image at the top left is a 39, the one next to it is</p> <p>24 a 46, so the 39 would be a closer match than the 46;</p> <p>25 correct?</p>

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		<p><i>Id.</i> at 174–182:</p> <p style="text-align: right;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p>	<p style="text-align: right;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. So the image itself is not put into a                  15 database. A handle is put in the database that                  16 points to the image?                  17 A. Correct.                  18 MR. HANSEN: Objection; lacks foundation.                  19 BY MR. EDWARDS:                  20 Q. And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p>
		<p style="text-align: right;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object?"                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p>	<p style="text-align: right;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. How is the -- how is the catalog different                  10 from the table?                  11 MR. HANSEN: Objection; lacks foundation.                  12 BY MR. EDWARDS:                  13 Q. That we talked about that has the handle                  14 that points to the image?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: The QBIC catalog is the file in                  17 the file system or in the database system that                  18 contains all the metadata and the handle points to                  19 all the metadata.                  20 BY MR. EDWARDS:                  21 Q. Okay. So there's a handle in the -- in                  22 the table --                  23 A. Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p>



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		<p style="text-align: right;">Page 178</p> <p>1 the image as well?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: It points to the file that's the</p> <p>4 QBIC catalog.</p> <p>5 BY MR. EDWARDS:</p> <p>6 Q. Can you walk us through that one more</p> <p>7 time? And just be a little bit louder, sorry.</p> <p>8 MR. HANSEN: Same objection.</p> <p>9 THE WITNESS: So the QBIC catalog is a set of</p> <p>10 files that hold data about visual features in the</p> <p>11 image.</p> <p>12 (Reporter seeks clarification.)</p> <p>13 THE WITNESS: Visual features. The image</p> <p>14 extender lets you search against that database,</p> <p>15 against that object.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. The image extender lets you search against</p> <p>18 that catalog, the name of that catalog?</p> <p>19 A. The catalog, yeah.</p> <p>20 Q. Okay. And it does so by using a pointer</p> <p>21 from the handle in the table?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:</p> <p>2 Q. So take a look at the bottom of IBM</p> <p>3 page 40 to the top of 41.</p> <p>4 So it says, "When you search for an image</p> <p>5 by content, your query identifies one or more</p> <p>6 features for the search (such as average color), a</p> <p>7 source for each feature (such as an example image),</p> <p>8 and a target set of cataloged images. The Image</p> <p>9 Extender computes the feature value of the source</p> <p>10 and compares it to the cataloged feature values for</p> <p>11 the target images. It then computes a score that</p> <p>12 indicates how similar the feature values of the</p> <p>13 target images are to the source. You can have the</p> <p>14 Image Extender return the images whose features are</p> <p>15 most similar to the source. The Image Extender will</p> <p>16 return the handle of each image and the image</p> <p>17 score."</p> <p>18 Did I read that correctly?</p> <p>19 A. Yes.</p> <p>20 Q. So if you were to use the image extender</p> <p>21 in the DB2 universal database when you search for an</p> <p>22 image by content using a query image, it will</p> <p>23 extract the features for whatever you want, compare</p> <p>24 that to the features of images in a database, return</p> <p>25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold</p> <p>2 data for the following image features: Average</p> <p>3 color, Histogram color, Positional color and</p> <p>4 Texture."</p> <p>5 Is that right?</p> <p>6 A. Yep.</p> <p>7 Q. Okay. We spoke about average color,</p> <p>8 histogram color and texture; correct?</p> <p>9 A. Right.</p> <p>10 Q. What is positional color?</p> <p>11 A. We talked about it briefly. It's color in</p> <p>12 particular locations in the image.</p> <p>13 Q. Ah. Understood.</p> <p>14 That is -- that is similar to L in the</p> <p>15 demo that we looked at, which is called color</p> <p>16 layout.</p> <p>17 A. Okay, yes.</p> <p>18 Q. Is that correct?</p> <p>19 A. I don't remember if it's called L. Sounds</p> <p>20 right.</p> <p>21 Q. If you look at --</p> <p>22 MR. EDWARDS: If you can show -- give him</p> <p>23 Exhibit 6.</p> <p>24 THE WITNESS: Oh, this L. Yes.</p> <p>25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?</p> <p>2 A. Correct.</p> <p>3 MR. HANSEN: Objection; lacks foundation, calls</p> <p>4 for speculation.</p> <p>5 MR. EDWARDS: You can put that enormous exhibit</p> <p>6 aside.</p> <p>7 THE WITNESS: Test 1, 2, 3.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. Go back to Exhibit 3, please. If you</p> <p>10 could turn to the page Bates-labeled IBM 894 with</p> <p>11 the architecture picture.</p> <p>12 A. Okay.</p> <p>13 Q. So I just -- I just want to kind of walk</p> <p>14 the -- through this architecture, Mr. Flickner. But</p> <p>15 as a high level, I just want to understand, is</p> <p>16 this -- is this a high-level architecture that would</p> <p>17 generally be used for any implementation of QBIC?</p> <p>18 A. Yes.</p> <p>19 Q. All right. So first step is you submit</p> <p>20 still images or r-frames for feature extraction; is</p> <p>21 that correct?</p> <p>22 A. Correct.</p> <p>23 Q. Okay. Features are extracted, such as</p> <p>24 color, texture, shape, sketch and text; correct?</p> <p>25 A. Location, yep.</p>

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			Page 182	
			1 Q. And location. Including the ones that I 2 listed; correct? 3 A. Yep. 4 Q. Okay. After feature extraction is done, 5 the images and those features for the database 6 images are stored in the database; correct? 7 A. Correct. 8 Q. And then once those are stored, a user can 9 query using some sort of a user interface; is that 10 right? 11 A. Correct. 12 Q. And the user can query based on color, 13 texture, shape, multi-object, sketch, location or 14 text; is that right? 15 A. Correct. 16 Q. Okay. Those features are then decomposed 17 and extracted from the query image and then a 18 matching engine is used to compare those similarly 19 extracted features from the stored images; is that 20 correct? 21 A. Correct. 22 Q. And then the best matches are returned in 23 similarity of order back to the user; is that right? 24 A. Correct. 25 Q. Okay. Thank you for that.	
		<i>Id.</i> at 190–191:		
			22 Q. So [as read], "Once the image catalogs are 23 created, you can use the Image Query component to 24 find image and business information. Business 25 information, such as character and numeric data, are	



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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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		<p><i>Id.</i> at 198 – 199:</p> <p>15 Q. Okay. And then if we can go to IBM 849. 16 There? 17 A. Yeah. 18 Q. Top of the page says, "Adding image search 19 to your Content Manager." 20 Do you see that? 21 A. Yeah. Yeah. 22 Q. And the first paragraph starts -- talks 23 about QBIC. 24 Do you see that? 25 A. Yeah.</p> <hr/> <p style="text-align: right;">Page 199</p> <p>1 Q. It says, "The image search server uses 2 IBM's QBIC (query by image content) technology to 3 help you search for objects by certain visual 4 properties, such as color and texture." 5 Did I read that correctly? 6 A. Yes. 7 Q. It says [as read], "The image search 8 server analyzes images and stores the image 9 information in a database. Then users can run image 10 queries, which use the visual properties of image, 11 to match colors, textures, and their positions 12 without describing them -- describing them in 13 words." 14 Did I read that correctly? 15 A. Yes. 16 Q. And that's consistent with the features 17 and functionalities that we have talked about in the 18 1993 SPIE and 1995 IEEE article; correct? 19 A. Correct.</p> <p><i>Id.</i> at 305:</p>
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		<p>7           So these articles describe various 8 features of various versions of QBIC; right? 9       A. Correct. 10       Q. Do they describe any features -- does the 11 demo you operated include any features that weren't 12 described in these articles? 13       A. That weren't described in the articles? 14 No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're 7 talking about, where you extract these characters 8 from the image, that is -- those run on both the 9 query image and the images that are stored in the 10 database; is that right? 11       A. Yeah. We call them features. 12       Q. Features. Okay. 13           So when you say "features," you're talking 14 about the features that we talked about before: 15 Color, texture, shape, sketch? 16       A. For example. 17       Q. Any other ones you can think of? 18       A. Nothing comes to mind. 19       Q. But when you refer to features they at 20 least include those four; is that correct? 21       A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>
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		<p>12 Q. And it indicates the demo does 13 content-based search based on color histogram, color 14 position and texture. 15 Do you see that? 16 A. Yep. 17 Q. That's a limited number of the features 18 that QBIC could extract; right? 19 A. Correct. 20 Q. Was there -- for those demo applications 21 that you -- that you all created, was there a 22 conscious effort to limit the number of 23 characteristics you put on the demo? 24 A. Probably limited by the size of the CD. 25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to 23 highlight the capabilities of QBIC to people 24 external to IBM; isn't that correct? 25 A. Correct.</p> <p><i>Id.</i> at 312 – 313:</p>
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		<p>21 Q. For every implementation of QBIC, if an 22 input image has an object and the object has colors, 23 the color histogram feature would match those stored 24 image that include objects with similar colors; 25 correct?</p> <hr/> <p>1 A. Correct.</p> <p><i>Id.</i> at 313-317:</p> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that 3 you co-authored. If your counsel can provide those 4 to you just so that you have them in front of you. 5 A. I have them here. 6 MR. STRAUSSMAN: Okay. 7 THE WITNESS: Okay. 8 BY MR. EDWARDS: 9 Q. And can you just confirm for me, 10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you 11 co-authored? 12 A. Yes. 13 Q. You would have included accurate 14 information in those -- in those papers at the time 15 that you authored them; is that correct? 16 MR. HANSEN: Objection; vague and ambiguous. 17 THE WITNESS: Yes. 18 BY MR. EDWARDS: 19 Q. And the information in those papers 20 accurately reflected the functionality of QBIC at 21 the time those articles were published; is that 22 correct? 23 A. Correct.</p>
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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultrimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>	
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		<i>Id.</i> at 317–322: 22 Q. Okay. So for every commercial 23 implementation of QBIC as of the IEEE 1995 article 24 in Exhibit 3, those implementation calculated 25 features of a query image and stored image; is that	
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		<p style="text-align: right;">Page 318</p> <p>1 correct?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: Correct.                  4 BY MR. EDWARDS:                  5 Q. And those calculations of features                  6 included color, shape and/or texture in all                  7 implementations that we looked at today, correct?                  8 MR. HANSEN: Same objections.                  9 THE WITNESS: I don't remember if all versions                  10 supported all features.                  11 BY MR. EDWARDS:                  12 Q. If the 1995 article references calculating                  13 color, shape and texture, you would agree with me                  14 that the commercial embodiments implementing QBIC at                  15 the time would have been able to calculate color,                  16 shape and texture as part of feature extraction;                  17 correct?                  18 MR. HANSEN: Objection; lacks foundation.                  19 THE WITNESS: I don't remember exactly which                  20 products incorporated any subsets of the features.                  21 BY MR. EDWARDS:                  22 Q. Do you recall that all the products used                  23 color?                  24 MR. HANSEN: Objection; lacks foundation.                  25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three                  2 methods: Image content, such as color, shape and                  3 texture."                  4 You see that?                  5 A. Yeah.                  6 Q. So Ultimedia Manager 1.1 was able to                  7 perform an image query using color, shape and                  8 texture, correct?                  9 MR. HANSEN: Objection; lacks foundation.                  10 THE WITNESS: And layout.                  11 BY MR. EDWARDS:                  12 Q. And layout. But also color, shape and                  13 texture, correct?                  14 A. Yes.                  15 MR. HANSEN: Same objection.                  16 BY MR. EDWARDS:                  17 Q. And then if you go to the last sentence it                  18 goes on -- and the bottom of the left column on that                  19 same page, going to the top of the right column, it                  20 says, "You can drag and drop visual samples into an                  21 image query."                  22 You see that?                  23 A. Yeah.                  24 Q. And that would include images, correct?                  25 A. Correct.</p>
		<p style="text-align: right;">Page 319</p> <p>1 color.                  2 BY MR. EDWARDS:                  3 Q. And color histograms specifically?                  4 MR. HANSEN: Same objection.                  5 (Reporter seeks clarification.)                  6 BY MR. EDWARDS:                  7 Q. Histograms specifically.                  8 (Reporter seeks clarification.)                  9 THE WITNESS: Most likely, yes.                  10 BY MR. EDWARDS:                  11 Q. Well, pick up Exhibit 12, please.                  12 And go to IBM 2264.                  13 A. Okay.                  14 Q. So the Ultimedia Manager 1.1 was able to                  15 perform an image query using color, shape and                  16 texture; correct?                  17 MR. HANSEN: Objection; lacks foundation.                  18 (Witness reviews document.)                  19 BY MR. EDWARDS:                  20 Q. Let me orient you a little more. If you                  21 go to the bottom of IBM 2264, where it says "Image                  22 Query."                  23 You see that?                  24 A. Yeah.                  25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.                  2 BY MR. EDWARDS:                  3 Q. Okay?                  4 A. Correct.                  5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.                  17 Q. And for every commercial embodiment of                  18 QBIC as of the 1995 IEEE article in Exhibit 3, those                  19 implementations calculated a distance metric as a                  20 measure of similarity for each feature between an                  21 input image and a stored image; correct?                  22 MR. HANSEN: Objection; lacks foundation.                  23 THE WITNESS: Correct.                  24 BY MR. EDWARDS:                  25 Q. Okay. And a distance measure value</p>

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		<p style="text-align: right;">Page 322</p> <ol style="list-style-type: none"><li>1 indicates how confident the system is that the</li><li>2 features of the stored image match the features of</li><li>3 the input image; correct?</li><li>4 A. Correct.</li></ol> <p>Flickner 8/29/23 Depo at 68-72:</p>
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		<p>22 Q. Okay. And in what form would those 23 results be displayed to me? For images would they 24 be displayed as a thumbnail? 25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those 2 be displayed to you? 3 A. It could be as a thumbnail or as a short 4 video clip or as a single representative frame. 5 Q. Okay. So they could be -- so for a video, 6 there's a video that matched the image query of an 7 r-frame, the results I could get back could include 8 three things. It could be a still image, it could 9 be a thumbnail, or it could be an r-frame 10 representation? 11 A. R-frame, I think, is representative frame. 12 So it was a key frame in that video sequence, 13 summary frame. 14 Q. Once I ran a query on an r-frame; right? 15 Well, let's stop there. 16 If I run a query on still images, 17 typically the results I would get back are 18 thumbnails that are most similar to the 19 characteristics which I queried from the query 20 image; right? 21 A. You could get thumbnails back. You could 22 also get the full-sized image back. 23 Q. Okay. 24 A. Thumbnail is a tool for helping you return 25 lots of results and quickly scan it.</p>	
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		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I          2 have to click on the thumbnail in order to bring up          3 the full-sized image?          4 A. You could.          5 Q. Otherwise I could automatically receive          6 the full-sized image as part of the result?          7 A. You could.          8 Q. Okay. So walk through that process if I'm          9 using an r-frame of a video. If I do a -- if I run          10 a query on an r-frame of a video as a -- an image          11 query, how could I get the results back?          12 MR. HANSEN: Objection; vague and ambiguous.          13 BY MR. EDWARDS:          14 Q. In what form would I get the results back?          15 MR. HANSEN: Same objection.          16 THE WITNESS: You could get back the still          17 r-frame, representative frame, you could get back          18 the thumbnail, or you could get back the entire          19 video clip that that r-frame represents, a few          20 frames.          21 BY MR. EDWARDS:          22 Q. If I received a thumbnail or the r-frame,          23 would there be some sort of link I could click on to          24 get the underlying full video?          25 MR. HANSEN: Objection; vague and ambiguous.</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic          2 units initially returned in a video query."          3 Meaning the r-frames?          4 A. Correct.          5 Q. "For example, in a query for shots that          6 are dominantly red, a set of r-frames will be          7 displayed. To see the actual video shot, the user          8 clicks on the displayed r-frame icon."          9 A. Yep.          10 Q. And that was one of the ways you were          11 describing that the results of a r-frame query would          12 be returned to the user?          13 A. Right.          14 Q. Do you know if that was the preferred way          15 that was used in demos in commercial applications?          16 MR. HANSEN: Objection; vague and ambiguous,          17 lacks foundation.          18 MR. STRAUSSMAN: You can answer.          19 THE WITNESS: I don't know.          20 BY MR. EDWARDS:          21 Q. But, Mr. Flickner, this -- generally this          22 article represents the status of the QBIC technology          23 as of the date of this publication, which is          24 September 1995; is that right?          25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.          2 THE WITNESS: As I recall -- I'm not sure          3 definitely, but, yes, this is -- you could do that.          4 BY MR. EDWARDS:          5 Q. So let's go to page IBM 898.          6 So if you'll take -- just read that          7 paragraph that starts with the header          8 "Representative Frame Generation."          9 MR. STRAUSSMAN: And if you need to read          10 anything else to put it in context, feel free to do          11 so.          12 THE WITNESS: Okay.          13 (Witness reviews document.)          14 THE WITNESS: So what was your question, again?          15 BY MR. EDWARDS:          16 Q. If you go to the sentence that says,          17 "First" -- it's the second sentence in that          18 paragraph. It says, "First, during database          19 population, r-frames are treated as still images."          20 See that?          21 A. Yeah.          22 Q. And that's what you told me earlier;          23 correct?          24 A. Yeah.          25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --          2 Q. Okay.          3 A. -- there's an editorial process.          4 Q. Say that last part?          5 A. There's an editorial process. You submit          6 it, they edit and make changes and eventually it          7 appears.          8 Q. Right. So what you're saying is there's          9 some lag between the time that you wrote the article          10 and the time it was published?          11 A. Yeah.          12 Q. So this article -- but this article          13 represents the state of the QBIC technology at least          14 as of September 1995?          15 A. Yeah. Yes.          16 Q. And then let's go to IBM 900.          17 And take your time to orient yourself on          18 that page, but what I really want to ask you about          19 is the last paragraph on the left-hand column going          20 up to the top of the right-hand column.          21 A. Yep.          22 Q. So it says this paper describes [as read],          23 "a prototype system that uses image and video          24 content as the basis for retrievals."          25 Is that right?</p>

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		<p><i>Id.</i> at 129 – 131:</p> <p>9 Q. Okay? And if you want to compare, or you 10 can take my word for it, the image in the top left 11 corner, the querying image, is the same one that was 12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I 15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full 22 resolution.</p> <p>23 Q. Okay. And was there a similar 24 functionality on the demo app on the -- on the 25 website in the '90s?</p>
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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p> <p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	
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		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links 2 to information about the image that was associated 3 with the image in the database? 4 A. Yes. 5 Q. And, again, that can be that -- whatever 6 information that the user inputted or was associated 7 with the image from the source? 8 A. Yes. 9 Q. Could the results also display a matching 10 score so the user could see how well the particular 11 result matched to the -- to the query image? 12 A. It could.</p> <p><i>Id.</i> at 165:</p>
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		1 A. I think that's correct.
		2 Q. Okay. And here we're showing the query
		3 image is a -- is a heart -- a heart pattern with
		4 Love's next to it. It's in the top part of the
		5 screenshot.
		6 A. Yep.
		7 Q. And the results are shown below that under
		8 "Shapes judged to be most similar"; is that right?
		9 A. Correct.
		10 Q. Okay. And the results also show
		11 underneath each one the trademark number followed by
		12 matching score after the colon.
		13 Do you see that?
		14 A. Yes.
		15 Q. And this is -- is this an example of what
		16 you told me before, that matching scores could be
		17 presented to the user?
		18 A. Yes.
		19 Q. And so is it the lower the score, the
		20 closer the match; is that correct?
		21 A. Typically, yes.
		 <i>Id.</i> at 180-181:



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		<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS: 2 Q. So take a look at the bottom of IBM 3 page 40 to the top of 41. 4 So it says, "When you search for an image 5 by content, your query identifies one or more 6 features for the search (such as average color), a 7 source for each feature (such as an example image), 8 and a target set of cataloged images. The Image 9 Extender computes the feature value of the source 10 and compares it to the cataloged feature values for 11 the target images. It then computes a score that 12 indicates how similar the feature values of the 13 target images are to the source. You can have the 14 Image Extender return the images whose features are 15 most similar to the source. The Image Extender will 16 return the handle of each image and the image 17 score." 18 Did I read that correctly? 19 A. Yes. 20 Q. So if you were to use the image extender 21 in the DB2 universal database when you search for an 22 image by content using a query image, it will 23 extract the features for whatever you want, compare 24 that to the features of images in a database, return 25 your results, which includes the score for the</p>	
		<p style="text-align: right;">Page 181</p> <p>1 match? 2 A. Correct.</p>	

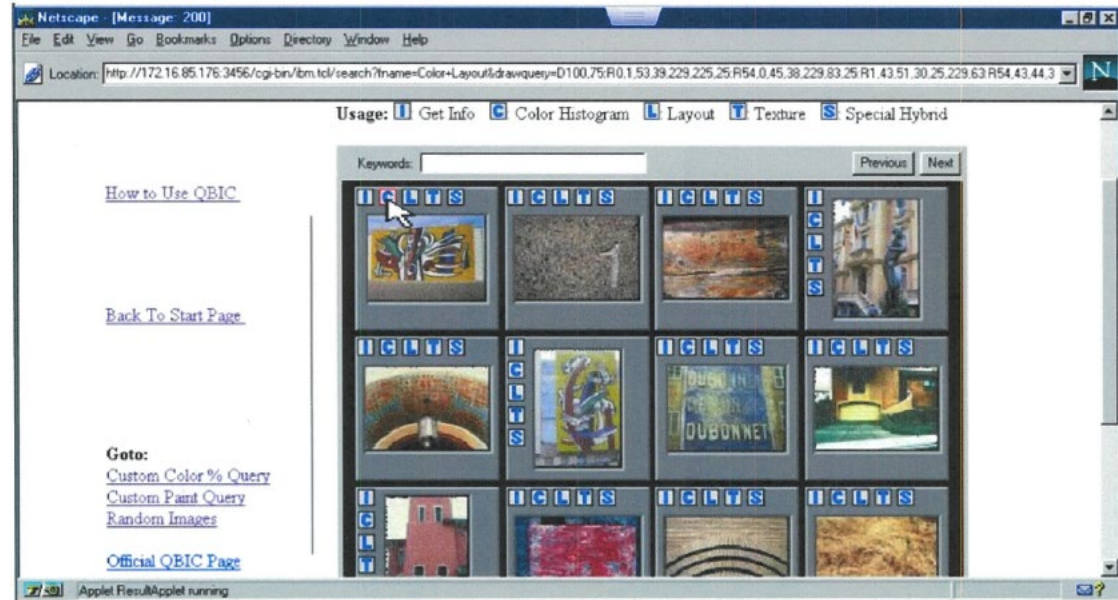
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*Id.* at 305:

- 7           So these articles describe various  
8 features of various versions of QBIC; right?  
9           A. Correct.  
10          Q. Do they describe any features -- does the  
11 demo you operated include any features that weren't  
12 described in these articles?  
13          A. That weren't described in the articles?  
14          No.

Flickner 8/29/23 Depo Ex. 7 at 1:



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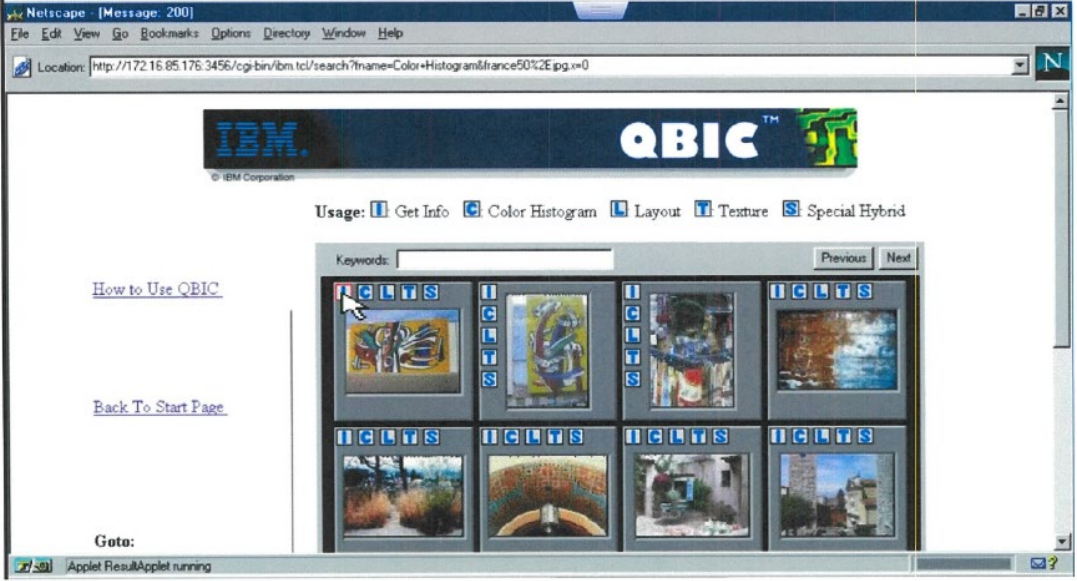
*Id.* at 2:



Flickner 8/29/23 Depo Ex. 8 at 1:

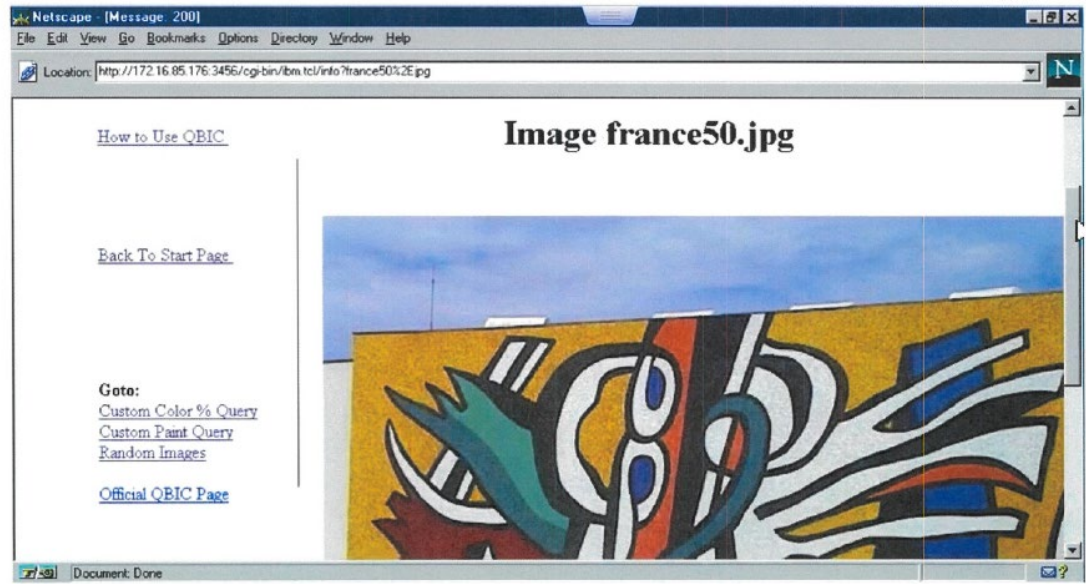
*Nantworks, LLC v. Bank of America Corporation*  
Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 7,899,252 based on the Query by Image and Video Content (“QBIC”) System

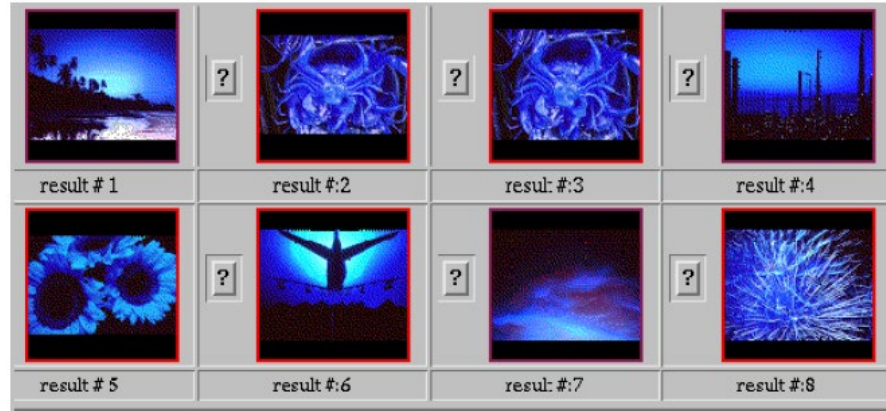
		 <p><i>Id.</i> at 2:</p>
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QBIC (Query by Image Content) (BOFA00001391–392) at 2



Result of QBIC Search



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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

**Exhibit E-31**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, CoolTown was made, known or used by others in the United States no later than July 10, 2000. *See generally* T. Kindberg et al., A Web-Based Nomadic Computing System; J. Barton et al., The Cooltown User Experience; cooltown developer’s network, coolbase overview; cooltown developer’s network, people, places, things: web presence for the real world. CoolTown is available as prior art at least under 35 U.S.C. § 102(a). On information and belief, HP was using CoolTown and made it available to the public in the United States by releasing the website on the Internet (and accessible to U.S. users) by at least March 2000, making the software available on the HP website by March 2000, and making available on the Internet (and accessible to U.S. users) the open source code, which reflects the functionality of CoolTown by at least March 2000. *See e.g.*, HP000043–044; HP000045–046; HP000060–061; *see also* <https://www.zdnet.com/article/hp-brings-open-source-to-cooltown/>. Therefore, HP Cooltown was at least known, used, and/or sold to the public by at least 2000. On information and belief, CoolTown is also available as prior art under 102(g). BofA is diligently investigating CoolTown and will supplement with additional information, if necessary.

As shown in the chart below, CoolTown anticipates asserted claims 18, 27, 29, and 31 of the ’252 Patent. To the extent CoolTown is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent CoolTown is found not to anticipate any asserted claims or claim elements of the ’252 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products

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infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.



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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

**1. Claim 18**

Element	'252 Claim Recitation	Exemplary Citations in Reference
[18Pre]	A method for retrieving information from image processing, the method comprising:	<p>CoolTown discloses a method for retrieving information from image processing, the method comprising:</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p style="padding-left: 40px;">The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1</p> <p><b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology, wireless networks and portable devices. This paper describes how CoolTown ties web resources to physical objects and places, and how users interact with resources using the information appliances they carry, from laptops to smart watches. Enabling the automatic discovery of URLs from our physical surroundings, and using localized web servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we leverage device connectivity to support communication services.</p> <p>Coolbase<sup>1</sup> Overview at 1</p>

<sup>1</sup> See <https://web.archive.org/web/20011030090650/http://cooltown.hp.com/dev/coolbase-overview.asp>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>coolbase overview</p> <p>The coolbase platform consists of several sub-projects which combine to form a coherent framework for bringing together all the elements necessary to build a cooltown service or application. These sub-projects include software for enabling smart, connected web devices; software for representing people, places and things and their contextual relationships; some supporting hardware and software elements; and sample applications that illustrate the use of these various elements.</p>
[18A]	<p>providing a mobile device having a camera the mobile device configured to capture an image and configured to transmit data relating to the image an image processing platform;</p>	<p>CoolTown discloses a mobile device having a camera, the mobile device configured to capture an image, and configured to transmit data relating to the image an image processing platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1  <b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology networks and portable devices. This paper describes how CoolTown ties web resources to physical places, and how users interact with resources using the information appliances they carry, from laptops to watches. Enabling the automatic discovery of URLs from our physical surroundings, and using servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure device connectivity to support communication services.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p>

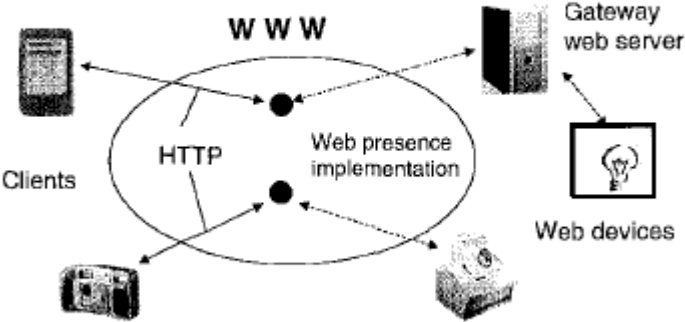
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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p>

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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p>

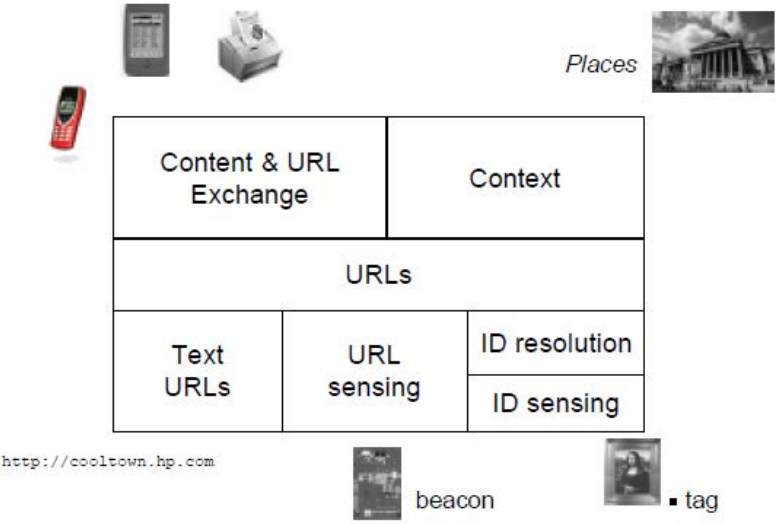
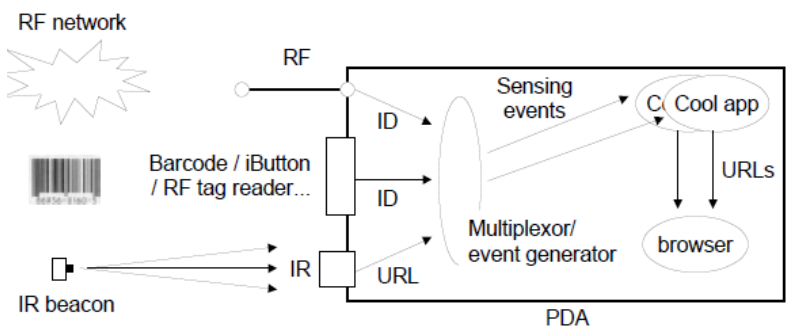
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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</b>                      The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the “web server” level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like a barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic users carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p>

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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

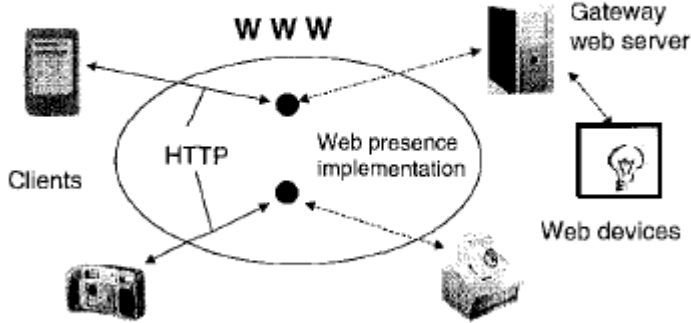


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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

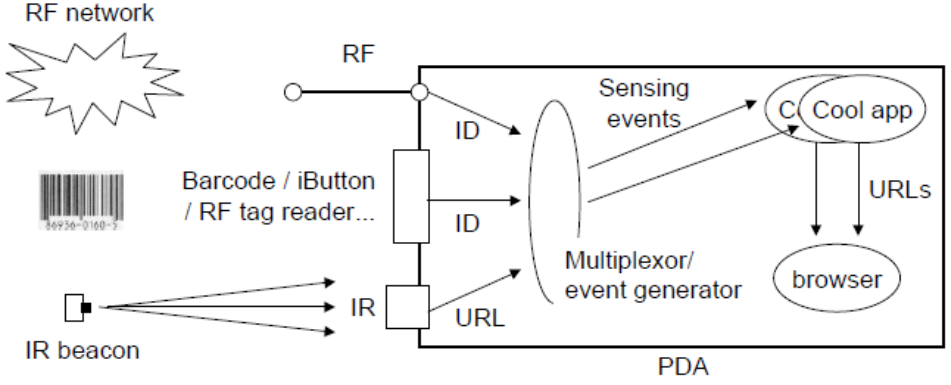
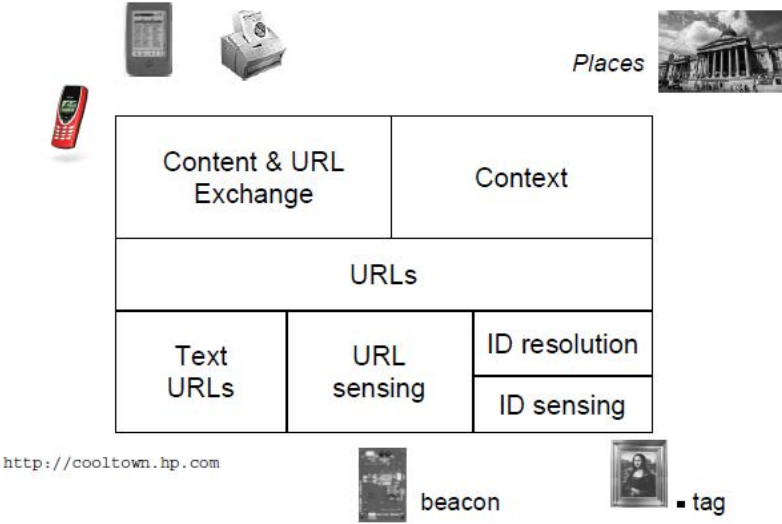
Element	'252 Claim Recitation	Exemplary Citations in Reference
[18B]	configuring the image processing platform to receive the data relating to the image and to conduct image processing, including:	<p>CoolTown discloses configuring the image processing platform to receive the data relating to the image and to conduct image processing.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p> <p style="padding-left: 40px;"><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p>



Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>  <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

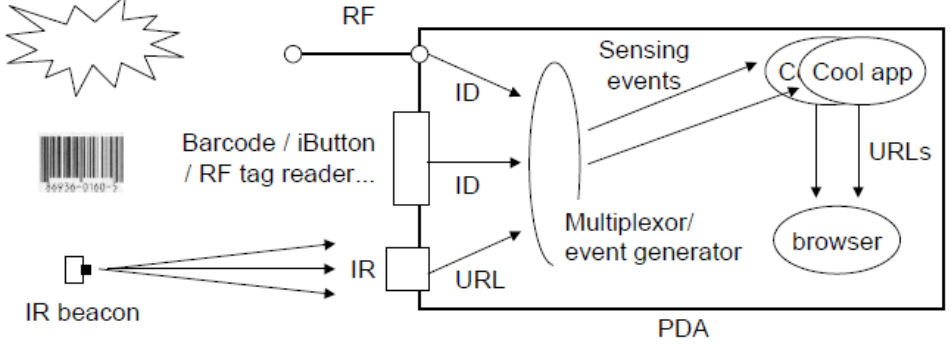
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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 5                      Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18B.i]	operating on the data relating to the image to determine if the image contains one or more recognizable symbols; and	<p>CoolTown discloses operating on the data relating to the image to determine if the image contains one or more recognizable symbols.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book’s ISBN barcode could lead to the local library’s entry for the book, if the resolver for the ISBN is the local</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless “beacons”. These beacons are small infrared transceivers located close to pictures or</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

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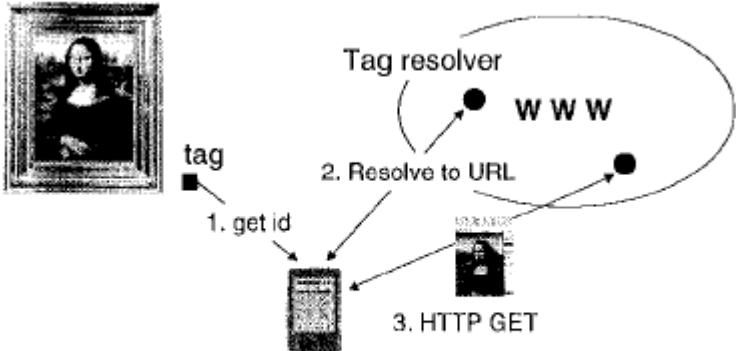
Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>



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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>The Cooltown User Experience (HP000088 – 093) at 4</p>



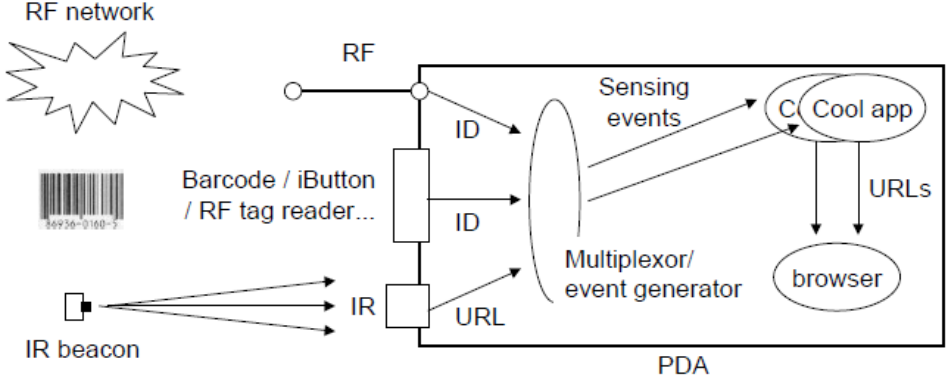
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>be direct: the URL for the web resource is emitted from the beacon. For barcodes or similar identifiers that are too compact to hold a URL, we add a“resolver” that turns sensed values into URLs. With a resolver in place, a wide variety of objects can be associated with web pages. Then the deployment of physical/virtual links should proceed much like web-page construction.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18B.ii]	decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type;	<p>CoolTown discloses decoding the recognizable symbols to extract symbol information by analyzing the recognizable symbols according to type.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b>  <b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b></p>

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		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power 'beacon' device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a 'glyph' [23] or digital watermark that is amenable to recognition software.</li> </ul>

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		<p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b>                      Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b>                      To get an idea of some of the issues in defining place contexts, imagine that Acme Software Inc. sets up a stand at the Wireless Web World exhibition (Figure 4). Acme has to define its own context within the exhibition, which it uses to provide information, printing, purchasing and other services to users who walk up to the stand. Visitors must be able to discover the Acme context when they walk up, distinguish it from that of neighboring exhibits, and, through their devices, these visitors must be able to browse and access the resources that Acme provides within that context. We are mainly interested here in resources that are based around the physical entities found at the exhibition stand. When the visitor reads a barcode attached, say, to a printer or a guest book on display, they are automatically shown the Acme web page offering them a service connected with it.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>

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		<p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

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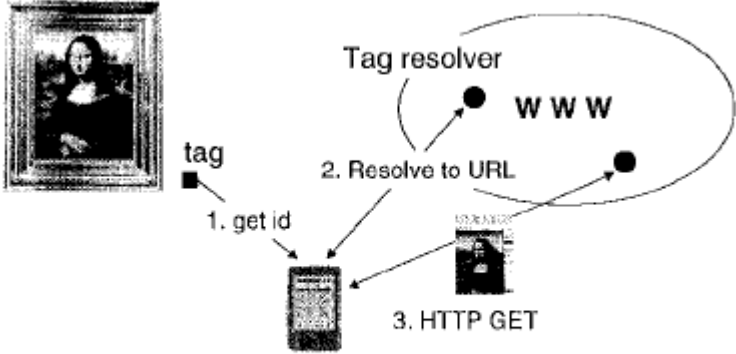
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>



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		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>The Cooltown User Experience (HP000088 – 093) at 4</p>

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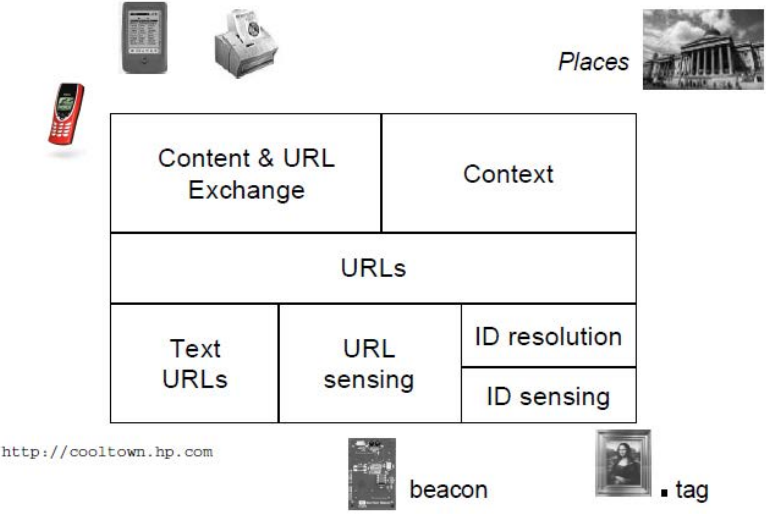
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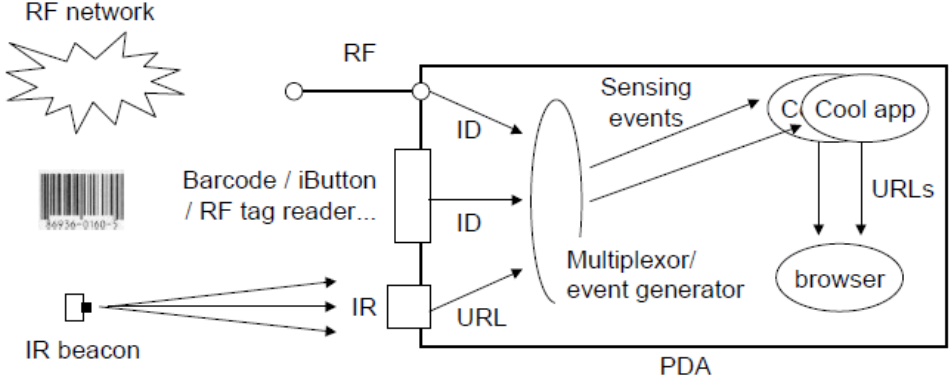
Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>be direct: the URL for the web resource is emitted from the beacon. For barcodes or similar identifiers that are too compact to hold a URL, we add a “resolver” that turns sensed values into URLs. With a resolver in place, a wide variety of objects can be associated with web pages. Then the deployment of physical/virtual links should proceed much like web-page construction.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[18C]	providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information; and	<p>CoolTown discloses providing access to a distal server configured to use a database to identify pertinent information associated with the recognizable symbols based on the symbol information.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>



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		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p> <p>The critical element of the system is the movement of URLs acting as Internet pointers. Components in the lower parts of the diagram provide addresses used in the upper layers. Keyboards and beacons provide URLs directly; tags on objects in the physical world are “resolved” to produce URLs. This layer is discussed in Section 3. The resolution of identifiers into URLs is context dependent and some of the URLs sensed in the environment lead to web server</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b></p>

Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4–5</b></p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local library. It could lead to a catalog entry if resolved with the user's favorite bookseller's resolver. Or it could lead to the publisher's description of the book if resolved at the publisher's resolver.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p> <p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place's context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

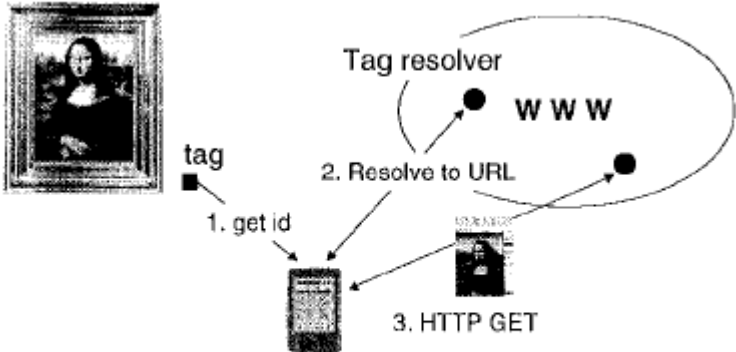
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting's tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p>

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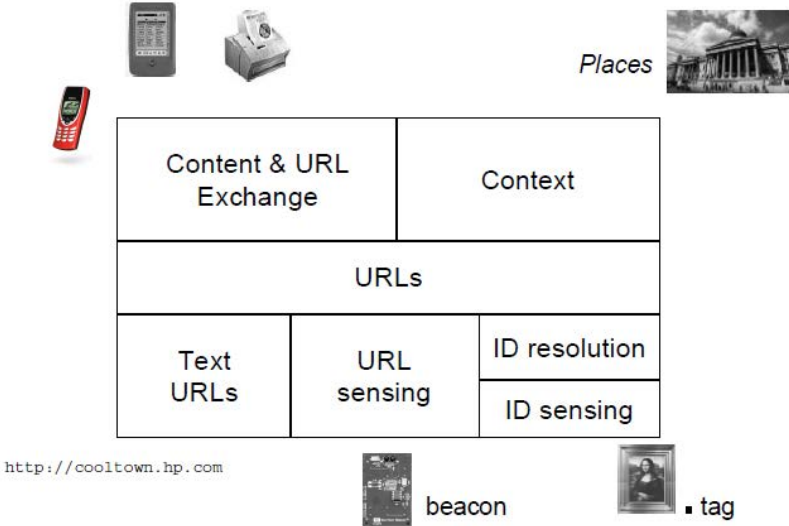
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Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>The Cooltown User Experience (HP000088 – 093) at 4</p> <p>be direct: the URL for the web resource is emitted from the beacon. For barcodes or similar identifiers that are too compact to hold a URL, we add a"resolver" that turns sensed values into URLs. With a resolver in place, a wide variety of objects can be associated with web pages. Then the deployment of physical/virtual links should proceed much like web-page construction.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

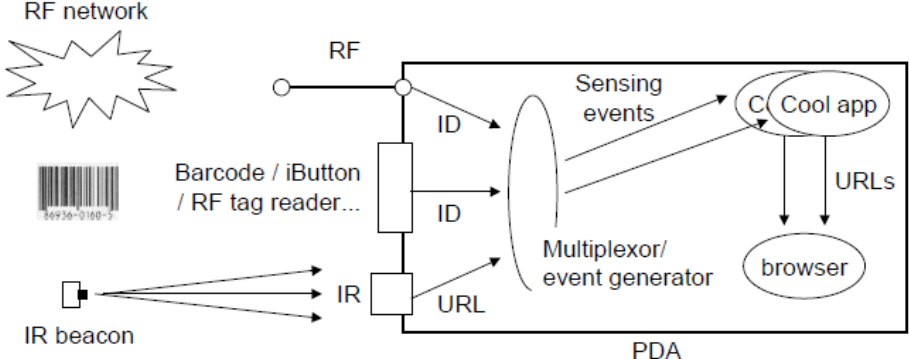


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Element	'252 Claim Recitation	Exemplary Citations in Reference
[18D]	allowing the mobile device to receive the pertinent information over a network.	<p>CoolTown discloses allowing the mobile device to receive the pertinent information over a network.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>  <p>The diagram illustrates the component relationships in the CoolTown system. It features a central flow from sources to content and context. The sources include Text URLs, URL sensing, ID resolution, and ID sensing. These sources feed into a central 'URLs' block, which then feeds into 'Content &amp; URL Exchange' and 'Context' blocks. External elements include a mobile phone, a printer, a 'Places' image, a 'beacon' image, and a 'tag' image. A URL is also shown: <a href="http://cooltown.hp.com">http://cooltown.hp.com</a>.</p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p> <p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p>

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		<p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 5</p> <p><b>2.4 The Common User Experience in Cooltown.</b></p> <p>The three examples above explore various aspects of web presence but they also show a common theme. The typical user experience we seek with web presence is that of collecting links to points of web presence as they are encountered them in the physical world. One could even think of the physical world as a web page, with links at certain physical points. Of course the links are URLs presented on the user’s client device and the result of clicking on such a link will be a real web page, delivered to the user’s screen. The user can then travel through the virtual space of the web page with normal Web techniques or the user can travel through the physical space to find a different point of web presence. The user understands URLs as pointers to meta-information about objects at the same level that users of Web browsers now understand URLs as bookmarks for Web content. While this physical/virtual browsing is a typical scenario, we imagine other usage scenarios for web present things, in the same way that the Web supports many usage scenarios in addition to Web browsing.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 9</p>

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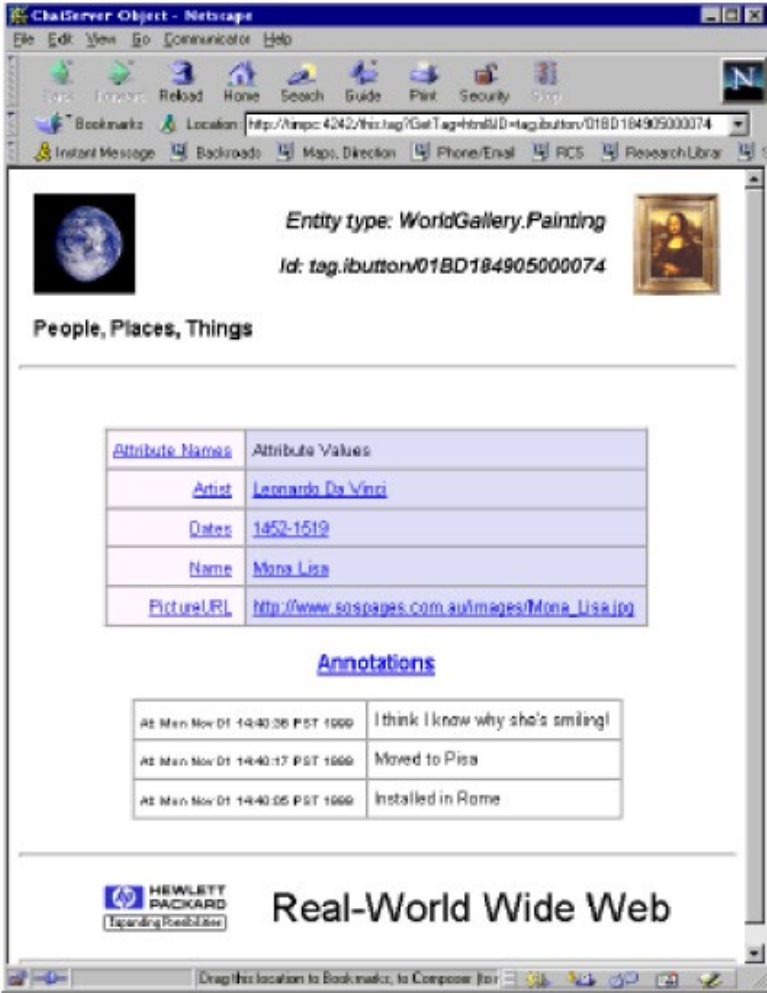
Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p>The screenshot shows a Netscape browser window displaying a web page for the Mona Lisa. The page features a globe icon on the left and a small image of the Mona Lisa on the right. The text 'Entity type: WorldGallery.Painting' and 'Id: tag.ibutton01BD18490500074' is displayed. Below this is a section titled 'People, Places, Things'. A table lists attributes and values: Artist (Leonardo Da Vinci), Dates (1452-1519), Name (Mona Lisa), and PictureURL (http://www.sospages.com.au/images/Mona_Lisa.jpg). An 'Annotations' section contains three entries: 'I think I know why she's smiling!', 'Moved to Pisa', and 'Installed in Rome'. At the bottom, the Hewlett-Packard logo is visible along with the text 'Real-World Wide Web'.</p>

Figure 5. A Web presence for *Mona Lisa*.

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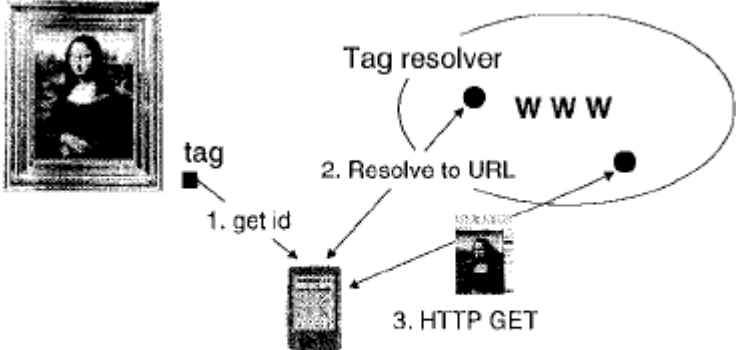
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Invalidity Chart for U.S. Patent 7,899,252 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'252 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'252 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting's tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

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		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 26**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
26	<p>The method of claim 18, wherein the data relating to the image comprises the image.</p>	<p>CoolTown discloses the method of claim 18, wherein the data relating to the image comprises the image.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 3</p>

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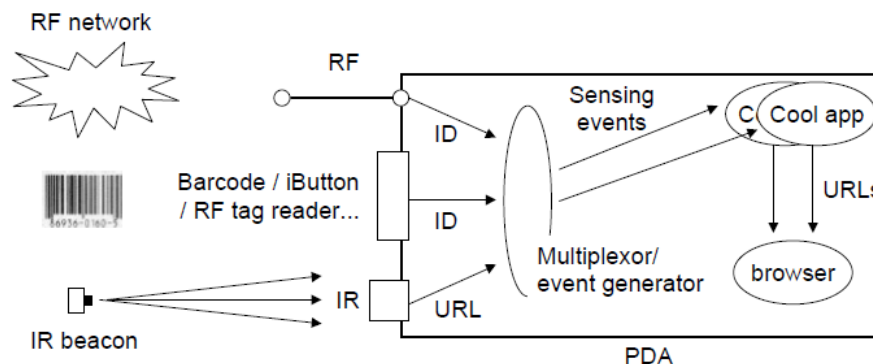


Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.

#### A Web-Based Nomadic Computing System (HP000074 – 87) at 4

Some options for sensing include:

- *IR & RF.* The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.
- *Barcodes.* Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.
- *Electronic tags.* A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.
- *Optical recognition.* The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.

In *direct sensing*, the beacon or tag directly presents the URL of a web resource. In *indirect sensing*, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a *resolver*, a service that returns a URL when given an identifier.

Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local

#### A Web-Based Nomadic Computing System (HP000074 – 87) at 8



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		<p><b>Direct content post</b></p> <p>Pushing (or ‘posting’) content works between a source of content and a sink for content. Consider a nomadic user entering a conference room with a camera, photographing the content on a white board, then printing the image on the room’s printer. The camera is the source for the image content; the printer is its sink. We could view this interaction as “printing from the camera”. However, imagine the same user with the same camera and image, but interacting with the room’s electronic projector. Or, perhaps the room is equipped with an electronic picture frame and the user wishes it to display the image. Or, the image is on the user’s PDA instead of the camera, but is still sent to the same sink devices. In a pervasive computing environment, we need all combinations that users imagine should work to work. All of these scenarios can be handled similarly: the image just needs to be transferred from source device, the camera or PDA, to a sink device, the printer, projector, or picture frame.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless “beacons”. These beacons are small infrared transceivers located close to pictures or</p>
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		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025-34) (HP000025-34) at 23</p>
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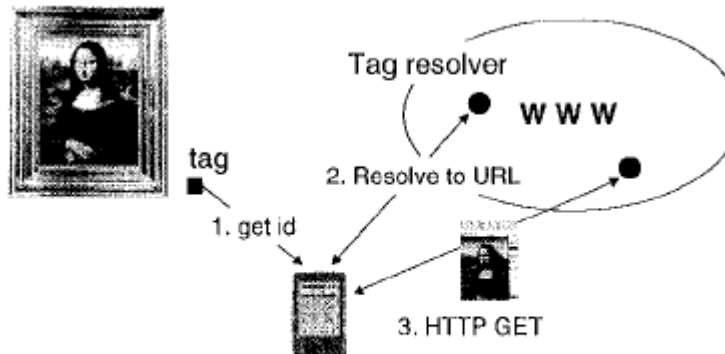
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		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>
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**Figure 4. Indirect sensing: the web presence for a painting.**

Barcodes can be used instead of an electronic tag.

Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting's tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.

We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a *resolver*. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.

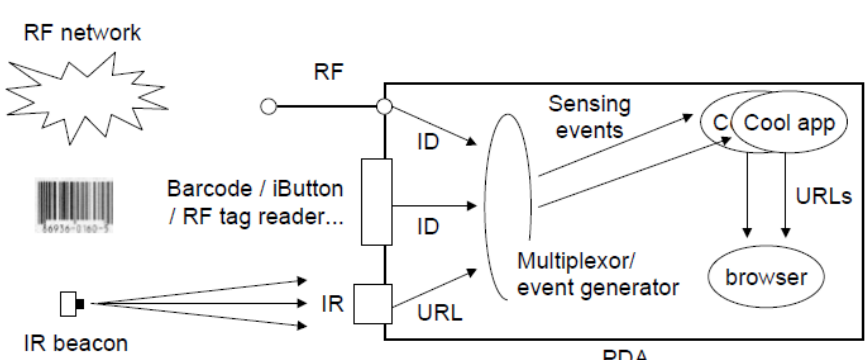
To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not

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		<p>anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 27**

Claim	'252 Claim Recitation	Exemplary Citations in Reference
27	<p>The method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p>	<p>CoolTown discloses the method of claim 26, wherein image processing further comprises compressing the image to form the data relating to the image.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 3</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p>A Web-Based Nomadic Computing System at 4</p>

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		<p>Some options for sensing include:</p> <ul style="list-style-type: none"><li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li><li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li><li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li><li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li></ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 8</b></p> <p>To accomplish direct content transfer we need only have a simple push interaction: the content source opens a connection to the sink and writes the content (See Figure 5a). The only agreement we need between sources and sinks is the format of the data. Many imaging devices support JPEG format: it serves as the common format for images today. Since devices may use other common formats and since formats do evolve, effective interaction requires some introductory content preceding the data that identifies its format. The format of this introductory or</p> <p><b>Direct content post</b></p> <p>Pushing (or ‘posting’) content works between a source of content and a sink for content. Consider a nomadic user entering a conference room with a camera, photographing the content on a white board, then printing the image on the room's printer. The camera is the source for the image content; the printer is its sink. We could view this interaction as “printing from the camera”. However, imagine the same user with the same camera and image, but interacting with the room's electronic projector. Or, perhaps the room is equipped with an electronic picture frame and the user wishes it to display the image. Or, the image is on the user's PDA instead of the camera, but is still sent to the same sink devices. In a pervasive computing environment, we need all combinations that users imagine should work to work. All of these scenarios can be handled similarly: the image just needs to be transferred from source device, the camera or PDA, to a sink device, the printer, projector, or picture frame.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not</p>
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		<p>anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 29**

<b>Claim</b>	<b>'252 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
29	<p>The method of claim 18, wherein image processing further includes converting at least a portion of the data relating to the image into a grayscale image.</p>	<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**5. Claim 31**

<b>Claim</b>	<b>'252 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
31	<p>The method of claim 18, further comprising the distal server</p>	<p>CoolTown discloses the method of claim 18, further comprising the distal server using database to identify the pertinent information based on image characteristics</p>

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using database to identify the pertinent information based on image characteristics of the image derived by the image processing platform based on the data relating to the image.

of the image derived by the image processing platform based on the data relating to the image.

A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2

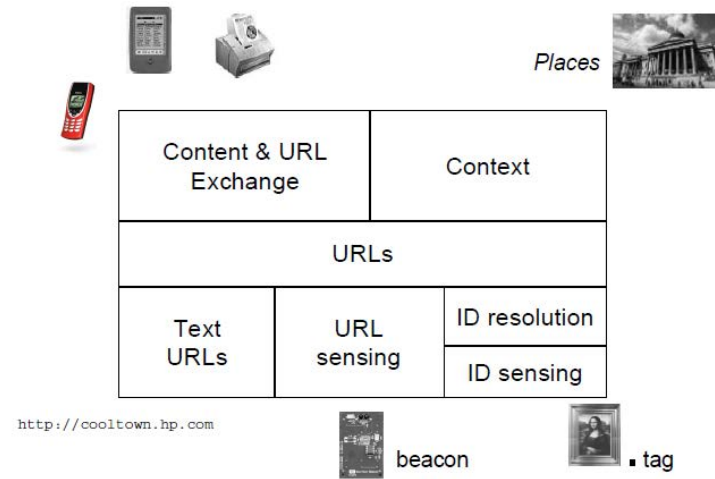


Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.

A Web-Based Nomadic Computing System (HP000074 – 87) at 4



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		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book’s ISBN barcode could lead to the local library’s entry for the book, if the resolver for the ISBN is the local</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user’s choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b>  <b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p><b>A Web-Based Nomadic Computing System (HP000074–87) at 6</b></p>
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		<p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The ‘local resolver’ that we described in the previous section is an example of a resource that can be looked up automatically from the place’s context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"><li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li><li>• It acts as a resolver for each place, for looking up resources from their identifier.</li></ul> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 8</p> <p><b>Indirect Sensing</b></p> <p>In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s Web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding Web page.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>
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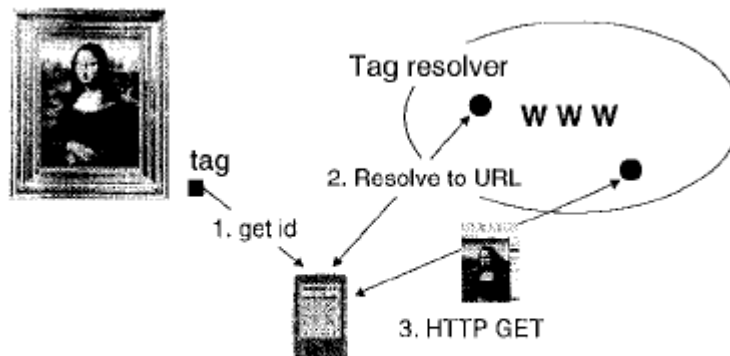
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		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>
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**Figure 4. Indirect sensing: the web presence for a painting.**

Barcodes can be used instead of an electronic tag.

Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting's tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.

We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a *resolver*. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.

To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not

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		<p>anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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### **Exhibit F-1**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Ogasawara was filed on March 30, 1999, claiming the priority date of December 14, 1998. Ogasawara published at least as of May 30, 2002 and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, CoolTown anticipates asserted claims 1, 4, and 5 of the ’278 Patent. To the extent CoolTown is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent CoolTown is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	<p>Ogasawara discloses a computer-assisted method.</p> <p>Ogasawara at Abstract</p> <ul style="list-style-type: none"> <li>• “An electronic shopping system facilitates purchase transactions via a wireless videophone. A purchase transaction program is downloaded from the seller's server to a purchaser's wireless videophone via a program loader contained within the purchaser's wireless videophone. The purchase transaction program is stored in a program memory and is used by the purchaser to facilitate the selection of items to be purchased, as well as payment therefor.”</li> </ul> <p>Ogasawara at 1:16–21</p> <ul style="list-style-type: none"> <li>• “The present invention relates generally to electronic shopping systems and, more particularly to an electronic shopping system which utilizes a program downloadable wireless video phone as a purpose-type dedicated terminal which enables a shopper to capture, recognize and decode captured images.”</li> </ul>
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>Ogasawara discloses receiving, via a mobile device, an image comprising a representation of at least a portion of a document.</p> <p>See Ogasawara at Figs. 1 and 11</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 1</b></p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><i>FIG. 11</i></p> <p>Ogasawara at 5:40–47</p> <ul style="list-style-type: none"> <li>• “A catalog 21 of the items which can be purchased contains a bar code 22 for each such item, and preferably also contains descriptive text 13 and a picture 15 of each item. The use of such a catalog 21 or the like facilitates the purchasing of products via the electronic shopping system of the present invention when the purchaser is not in the store where the items are sold. Typically, each item 33 also has a bar code 31 applied thereto.”</li> </ul> <p>Ogasawara at 7:26–33</p> <ul style="list-style-type: none"> <li>• “When the wireless telephone 18 is used to make purchases within a store, bar codes on merchandise or bar codes on the store shelf where the product is displayed, upon the product to be purchased or within a catalog, may be scanned to facilitate selection of desired items to be purchased. When the</li> </ul>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>wireless telephone 18 is used to make purchases while away from the store, then a catalog 21 or any other source of bar codes may be utilized.”</p> <p>Ogasawara at 16:7–13</p> <ul style="list-style-type: none"> <li>• “In addition, the digital camera <b>236</b> includes processing circuitry which translates the visual image acquired by the camera's lens into digital signals suitable for processing by the microprocessor <b>238</b> into a form which can be broadcast transmitted (i.e., JPEG encoded, gif encoded, and the like) by the functional electronic section <b>240</b>.”</li> </ul> <p>Ogasawara at 19:46–65</p> <ul style="list-style-type: none"> <li>• “In accordance with practice of principles of the invention, videographic image data is received by the system’s digital camera <b>236</b> and provided to the system's microprocessor <b>238</b> where the received videographic information is processed by an application program previously downloaded to the wireless videophone and stored as a loaded program 306. Following processing, the videographic image data is encoded by the channel encoded circuitry 324 for modulation and transmission to a store server. Optionally, if character or pattern recognition software has not been downloaded into the system, videographic image data is received by the microprocessor <b>238</b> and passed directly to the channel encoder circuitry <b>324</b> for modulation and broadcast by he [sic] system.</li> </ul> <p>During receipt of videographic image data, once the digital videographic data has been demodulated and equalized by the demodulator and equalizer circuitry <b>348</b> and 346 respectively, the videographic image information is decoded by channel decoder circuitry <b>344</b> and directed to the microprocessor <b>238</b> for display on the graphic display screen <b>242</b>.”</p> <p>Ogasawara at 21:54 – 65</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “In addition to its use as a simple, efficient electronic shopping system, the wireless videophone of the present invention is not limited to use in retail transactions. Because its program download capability is not application specific, it will be understood that any application program of an appropriate size is able to be downloaded and executed by the wireless videophone of the invention. The program loader capability in combination with the system's digital video camera and graphics display screen allows the system to be eminently suitable for catalog shopping application, in which items are selected for purchase by merely scanning a printed bar code in proximity to an item on the catalog page.”</li> </ul> <p>Ogasawara at claim 24</p> <ul style="list-style-type: none"> <li>• “24. The program downloadable wireless videophone according to claim 23, wherein a bar code identifies particular ones of a plurality of items, the items defining an application selected from the group consisting of an electronic shopping system merchandise ordering display, a bar code telephone directory, a printed bar code identified merchandise catalog, and a product affixed identification label.”</li> </ul> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		address similar known problems, according to known methods which would yield predictable results.
[1B]	determining that symbolic content is on the at least the portion of the document based on the image;	<p>Ogasawara discloses determining that symbolic content is on the at least the portion of the document based on the image.</p> <p>Ogasawara at 3:13–17</p> <ul style="list-style-type: none"> <li>• “An integral digital camera is used to scan the images of bar codes of purchased items, and pattern recognition software resident either in the videophone or in the server, translates the bar code image data into an alpha-numeric product identification.”</li> </ul> <p>Ogasawara at 18:11–22</p> <ul style="list-style-type: none"> <li>• “For those purchasers who are equipped with a wireless videophone in accordance with the present invention, a tailored purchase transaction program is provided which accommodates the enhanced functional capabilities of the device. In particular, since the wireless videophone <b>218</b> is provided with a digital camera <b>236</b> in place of a bar code scanner, the tailored purchase transaction program might additionally include character recognition and/or pattern recognition, as well as bar code decode, software which would allow the wireless videophone to function in a manner similar to the wireless telephone and bar code scanner embodiment described above.”</li> </ul> <p>Ogasawara at 6:46–50</p> <ul style="list-style-type: none"> <li>• “When the store server <b>10</b> or remote server <b>26</b> receives bar code data from the customer's wireless telephone <b>18</b>, then the store server <b>10</b> or remote server <b>26</b> searches a database and obtains a description and price for the item scanned.”</li> </ul> <p>Ogasawara at 18:23–58</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “It should also be understood that the character recognition, pattern recognition and/or bar code decode routines need not be directly downloaded by the program loader firmware memory of the wireless videophone in order that the system have this particular capability. The wireless videophone is perfectly capable of capturing digital videographic information, such as a bar code pattern or a graphics image pattern, and transferring this information directly to the store's server through the functional electronics section. Once this information is received by the server, a character recognition and/or pattern recognition application routine can be invoked within the server in order to either decode the bar code videographic data or to perform pattern recognition functions on a icon-like patter captured by the digital video camera.</li> </ul> <p>A server personal shopping application 254 is also resident in the server system 210 and might be characterized as a program for facilitating operation of the server in order to perform electronic shopping. The server personal shopping application 254 facilitates the downloading of the purchase transaction program and/or any appropriate character or pattern recognition routines to the wireless videophone 218 after the wireless videophone has established a connection with the server as discussed above. Server personal shopping application 254 also facilitates the reception and processing-of product selections made by a purchaser utilizing the wireless videophone as discussed previously as well as optionally facilitating the reception and decoding of bar codes, character or pattern information by an optional character and/or pattern recognition software routine. The server personal shopping application 254 is also adapted to receive and store payment information, such as credit card account numbers, expiration dates, and the like and is also capable of facilitating reading and updating of information on a purchaser's IC card via the IC card reader/writer 227, if utilized.”</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Ogasawara at 20:41–67</p> <ul style="list-style-type: none"> <li>“With particular reference to FIG. 13, once the purchase transaction program has been downloaded, a purchaser may use the wireless videophone, in particular the digital camera, to select various items which the consumer desires to purchase. Such selection is made by capturing an image of an item's UPC bar code data, or the like, within the image field of the digital camera. While the consumer is scanning a particular bar code with the digital camera, the image seen by the camera is displayed on the system's graphic display screen so that the consumer can visually verify that the entire image has been captured. If character and/or pattern recognition software was downloaded to the system as part of the program, the customer need only inform the system that the image is ready for processing by pressing a pre-defined key on the system's keyboard. Those skilled in the art will appreciate that various other codes, indicia, text, icons, and the like may be scanned and recognized by modern character and pattern recognition application routines. Thus, product selection need not be made in accordance with a UPC bar code but might be made with reference to a selection of product specific icons, each of which represent a particular product or service offered for purchase. For example, when grocery shopping, product specific icons might represent the stylistic outlines of a loaf of bread, carton of milk, a bunch of broccoli, and the like, allowing a consumer to quickly and efficiently select items for purchase without recourse to the complications of reading bar codes.”</li> </ul> <p>Ogasawara at 21:15–24.</p> <ul style="list-style-type: none"> <li>“In the case of FIG. 13, if the bar code read key has been depressed the program captures the bar code image taken by the digital camera. Once the bar code image has been captured, the program decodes the bar code image data to its corresponding numeric bar code data, by operating on the bar code image with pattern recognition software. Once the bar code has been</li> </ul>

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		<p>decoded to its numeric values, the bar code data is transmitted to the store's server through the wireless telephone function of the system.”</p> <p>Ogasawara at 21:54 – 65</p> <ul style="list-style-type: none"> <li>• “In addition to its use as a simple, efficient electronic shopping system, the wireless videophone of the present invention is not limited to use in retail transactions. Because its program download capability is not application specific, it will be understood that any application program of an appropriate size is able to be downloaded and executed by the wireless videophone of the invention. The program loader capability in combination with the system's digital video camera and graphics display screen allows the system to be eminently suitable for catalog shopping application, in which items are selected for purchase by merely scanning a printed bar code in proximity to an item on the catalog page.”</li> </ul> <p>Ogasawara at 22:41 – 23:10</p> <ul style="list-style-type: none"> <li>• “Notwithstanding the foregoing, it will also be understood that the merchandise item information need not be displayed in bar code form for the invention to perform as intended. Indeed, merchandise item information may be presented in alpha-numeric form (i.e., an item name) or as a numeric code. In either case, character recognition software allows the wireless videophone to identify the item in a seamless fashion. Character recognition software supports identifying a product based on a numeric or alpha-numeric code, while pattern recognition software supports recognition of product characteristics based on bar code data.</li> </ul> <p>As was described above, pattern and/or character recognition can be accomplished by software downloaded to the wireless videophone, or, alternatively, by transmitting the videographic image of the numeric, alpha-numeric or bar code identifier to a server for such recognition processing.</p>

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		<p>Processing results are then transmitted back to the wireless videophone for display to the customer.</p> <p>It will be understood that the system of the present invention allows bar code and/or alpha-numeric information to be captured from almost any form of display means by merely placing the information within the visual image field of the system's digital camera. If the system's downloaded program includes pattern and/or character recognition routines, recognition data processing is performed within the video phone. Where the downloaded program does not include recognition software, the program transmits the videographic image to a server and a recognition processing software resident in the server processes the data and returns recognized merchandise information to the graphics display screen of the videophone. In its simplest form, the downloaded program might transmit videographic image data to a store server which, in turn, displays the information to a store clerk. The store clerk would then manually identify the merchandise associated with the transmitted data (bar code and/or alpha-numeric) and return identified merchandise information to the consumer's videophone graphics display screen.”</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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[1C]	extracting symbol information based on the symbolic content according to symbol type;	<p>Ogasawara discloses extracting symbol information based on the symbolic content according to symbol type.</p> <p><i>See</i> [1B] above.</p> <p><i>See also:</i>                      Ogasawara at Abstract</p> <ul style="list-style-type: none"> <li>• “An electronic shopping system facilitates purchase transactions via a wireless videophone. A purchase transaction program is downloaded from the seller's server to a purchaser's wireless videophone via a program loader contained within the purchaser's wireless videophone. The purchase transaction program is stored in a program memory and is used by the purchaser to facilitate the selection of items to be purchased, as well as payment therefor. An integral digital camera is attached to the wireless telephone to facilitate the selection of items to be purchased and is controlled via the downloaded purchase transaction program to function as a bar code or product icon image capture device. Character or pattern recognition software translates the bar or icon code image into an appropriate item identifier.”</li> </ul> <p>Ogasawara at 22:46–51.</p> <ul style="list-style-type: none"> <li>• “In either case, character recognition software allows the wireless videophone to identify the item in a seamless fashion. Character recognition software supports identifying a product based on a numeric or alpha-numeric code, while pattern recognition software supports recognition of product characteristics based on bar code data.”</li> </ul> <p>Ogasawara at claims 13 – 16</p> <ul style="list-style-type: none"> <li>• “13. The electronic shopping system according to claim 12, wherein the item indicia is a bar code, the pattern recognition software translating the bar code data into a numerical product identification.</li> </ul>



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		<p>14. The electronic shopping system according to claim 12, wherein the item indicia is a product specific pattern shape, the pattern recognition software translating the pattern shape data into a numerical product identification.</p> <p>15. The electronic shopping system according to claim 5, the server configured to host a pattern recognition software program receiving the visual image data associated with the item indicia, the pattern recognition software program further recognizing the item indicia and translating the item indicia into a corresponding desired product identification.</p> <p>16. The electronic shopping system according to claim 15, wherein the item indicia is a bar code, the pattern recognition program translating the bar code data into a numerical product identification.</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	determining a validity of the document based at least in part on the image and the symbol information; and	<p>Ogasawara discloses determining a validity of the document based at least in part on the image and the symbol information.</p> <p>Ogasawara at 3:13–17</p>

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		<ul style="list-style-type: none"> <li>• “An integral digital camera is used to scan the images of bar codes of purchased items, and pattern recognition software resident either in the videophone or in the server, translates the bar code image data into an alpha-numeric product identification.”</li> </ul> <p>Ogasawara at 5:40–47</p> <ul style="list-style-type: none"> <li>• “A catalog 21 of the items which can be purchased contains a bar code 22 for each such item, and preferably also contains descriptive text 13 and a picture 15 of each item. The use of such a catalog 21 or the like facilitates the purchasing of products via the electronic shopping system of the present invention when the purchaser is not in the store where the items are sold. Typically, each item 33 also has a bar code 31 applied thereto.”</li> </ul> <p>Ogasawara at 6:46–50</p> <ul style="list-style-type: none"> <li>• “When the store server <b>10</b> or remote server <b>26</b> receives bar code data from the customer's wireless telephone <b>18</b>, then the store server <b>10</b> or remote server <b>26</b> searches a database and obtains a description and price for the item scanned.”</li> </ul> <p>Ogasawara at 7:26–33</p> <ul style="list-style-type: none"> <li>• “When the wireless telephone 18 is used to make purchases within a store, bar codes on merchandise or bar codes on the store shelf where the product is displayed, upon the product to be purchased or within a catalog, may be scanned to facilitate selection of desired items to be purchased. When the wireless telephone 18 is used to make purchases while away from the store, then a catalog 21 or any other source of bar codes may be utilized.”</li> </ul> <p>Ogasawara at 18:11–22</p> <ul style="list-style-type: none"> <li>• “For those purchasers who are equipped with a wireless videophone in accordance with the present invention, a tailored purchase transaction</li> </ul>

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		<p>program is provided which accommodates the enhanced functional capabilities of the device. In particular, since the wireless videophone <b>218</b> is provided with a digital camera <b>236</b> in place of a bar code scanner, the tailored purchase transaction program might additionally include character recognition and/or pattern recognition, as well as bar code decode, software which would allow the wireless videophone to function in a manner similar to the wireless telephone and bar code scanner embodiment described above.”</p> <p>Ogasawara at 18:23–58</p> <ul style="list-style-type: none"> <li>• “It should also be understood that the character recognition, pattern recognition and/or bar code decode routines need not be directly downloaded by the program loader firmware memory of the wireless videophone in order that the system have this particular capability. The wireless videophone is perfectly capable of capturing digital videographic information, such as a bar code pattern or a graphics image pattern, and transferring this information directly to the store's server through the functional electronics section. Once this information is received by the server, a character recognition and/or pattern recognition application routine can be invoked within the server in order to either decode the bar code videographic data or to perform pattern recognition functions on a icon-like patter captured by the digital video camera.</li> </ul> <p>A server personal shopping application 254 is also resident in the server system 210 and might be characterized as a program for facilitating operation of the server in order to perform electronic shopping. The server personal shopping application 254 facilitates the downloading of the purchase transaction program and/or any appropriate character or pattern recognition routines to the wireless videophone 218 after the wireless videophone has established a connection with the server as discussed above. Server personal shopping application 254 also facilitates the reception and</p>

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		<p>processing-of product selections made by a purchaser utilizing the wireless videophone as discussed previously as well as optionally facilitating the reception and decoding of bar codes, character or pattern information by an optional character and/or pattern recognition software routine. The server personal shopping application 254 is also adapted to receive and store payment information, such as credit card account numbers, expiration dates, and the like and is also capable of facilitating reading and updating of information on a purchaser's IC card via the IC card reader/writer 227, if utilized.”</p> <p>Ogasawara at 20:41–21:8</p> <ul style="list-style-type: none"> <li>• “With particular reference to FIG. 13, once the purchase transaction program has been downloaded, a purchaser may use the wireless videophone, in particular the digital camera, to select various items which the consumer desires to purchase. Such selection is made by capturing an image of an item's UPC bar code data, or the like, within the image field of the digital camera. . . . If character and/or pattern recognition software was downloaded to the system as part of the program, the customer need only inform the system that the image is ready for processing by pressing a pre-defined key on the system's keyboard. Those skilled in the art will appreciate that various other codes, indicia, text, icons, and the like may be scanned and recognized by modern character and pattern recognition application routines. Thus, product selection need not be made in accordance with a UPC bar code but might be made with reference to a selection of product specific icons, each of which represent a particular product or service offered for purchase. For example, when grocery shopping, product specific icons might represent the stylistic outlines of a loaf of bread, carton of milk, a bunch of broccoli, and the like, allowing a consumer to quickly and efficiently select items for purchase without recourse to the complications of reading bar codes.</li> </ul>

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		<p>However, no matter the form of the indicia captured by the digital video camera, the system operates in identical manner for each indicia and is governed solely by operation of the downloaded program which is coded to recognize either characters or patterns as appropriate to the application. However, in the following, the types of videographic images captured by the video camera will all be subsumed under the generic term ‘bar code’ image data.”</p> <p>Ogasawara at 21:24–35</p> <ul style="list-style-type: none"> <li>• “Once in the server, the numeric bar code data is associated to a corresponding product which can be retrieved from a Price Look Up (PLU) table or file. An “item selection complete” response is then issued by the server and received by the customer's wireless videophone through its telephone function and the response is displayed to the customer on the system's integral graphics display screen. The response might include the numeric bar code data of the items selected for purchase as well as the item name, item price, and the like, in order that the consumer may confirm that this is, indeed, the item that they selected.”</li> </ul> <p>Ogasawara at 21:54 – 65</p> <ul style="list-style-type: none"> <li>• “In addition to its use as a simple, efficient electronic shopping system, the wireless videophone of the present invention is not limited to use in retail transactions. Because its program download capability is not application specific, it will be understood that any application program of an appropriate size is able to be downloaded and executed by the wireless videophone of the invention. The program loader capability in combination with the system's digital video camera and graphics display screen allows the system to be eminently suitable for catalog shopping application, in which items are selected for purchase by merely scanning a printed bar code in proximity to an item on the catalog page.”</li> </ul>

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		<p>Ogasawara at claim 24</p> <ul style="list-style-type: none"> <li>“24. The program downloadable wireless videophone according to claim 23, wherein a bar code identifies particular ones of a plurality of items, the items defining an application selected from the group consisting of an electronic shopping system merchandise ordering display, a bar code telephone directory, a printed bar code identified merchandise catalog, and a product affixed identification label.”</li> </ul> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	recognizing the document as a first target object based at least in part on	<p>Ogasawara discloses this limitation.</p> <p>Ogasawara at 6:46–50</p> <ul style="list-style-type: none"> <li>“When the store server <b>10</b> or remote server <b>26</b> receives bar code data from the customer's wireless telephone <b>18</b>, then the store server <b>10</b> or remote server <b>26</b> searches a database and obtains a description and price for the item scanned.”</li> </ul> <p>Ogasawara at 18:11–22</p>

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		<ul style="list-style-type: none"> <li>• “For those purchasers who are equipped with a wireless videophone in accordance with the present invention, a tailored purchase transaction program is provided which accommodates the enhanced functional capabilities of the device. In particular, since the wireless videophone <b>218</b> is provided with a digital camera <b>236</b> in place of a bar code scanner, the tailored purchase transaction program might additionally include character recognition and/or pattern recognition, as well as bar code decode, software which would allow the wireless videophone to function in a manner similar to the wireless telephone and bar code scanner embodiment described above.”</li> </ul> <p>Ogasawara at 18:23–58</p> <ul style="list-style-type: none"> <li>• “It should also be understood that the character recognition, pattern recognition and/or bar code decode routines need not be directly downloaded by the program loader firmware memory of the wireless videophone in order that the system have this particular capability. The wireless videophone is perfectly capable of capturing digital videographic information, such as a bar code pattern or a graphics image pattern, and transferring this information directly to the store's server through the functional electronics section. Once this information is received by the server, a character recognition and/or pattern recognition application routine can be invoked within the server in order to either decode the bar code videographic data or to perform pattern recognition functions on a icon-like patter captured by the digital video camera.</li> </ul> <p>A server personal shopping application 254 is also resident in the server system 210 and might be characterized as a program for facilitating operation of the server in order to perform electronic shopping. The server personal shopping application 254 facilitates the downloading of the purchase transaction program and/or any appropriate character or pattern</p>

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		<p>recognition routines to the wireless videophone 218 after the wireless videophone has established a connection with the server as discussed above. Server personal shopping application 254 also facilitates the reception and processing-of product selections made by a purchaser utilizing the wireless videophone as discussed previously as well as optionally facilitating the reception and decoding of bar codes, character or pattern information by an optional character and/or pattern recognition software routine. The server personal shopping application 254 is also adapted to receive and store payment information, such as credit card account numbers, expiration dates, and the like and is also capable of facilitating reading and updating of information on a purchaser's IC card via the IC card reader/writer 227, if utilized.”</p> <p>Ogasawara at 20:41–21:8</p> <ul style="list-style-type: none"> <li>• “With particular reference to FIG. 13, once the purchase transaction program has been downloaded, a purchaser may use the wireless videophone, in particular the digital camera, to select various items which the consumer desires to purchase. Such selection is made by capturing an image of an item's UPC bar code data, or the like, within the image field of the digital camera. . . . If character and/or pattern recognition software was downloaded to the system as part of the program, the customer need only inform the system that the image is ready for processing by pressing a pre-defined key on the system's keyboard. Those skilled in the art will appreciate that various other codes, indicia, text, icons, and the like may be scanned and recognized by modern character and pattern recognition application routines. Thus, product selection need not be made in accordance with a UPC bar code but might be made with reference to a selection of product specific icons, each of which represent a particular product or service offered for purchase. For example, when grocery shopping, product specific icons might represent the stylistic outlines of a loaf of bread, carton of milk, a bunch of broccoli, and the like, allowing a</li> </ul>



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		<p>consumer to quickly and efficiently select items for purchase without recourse to the complications of reading bar codes.</p> <p>However, no matter the form of the indicia captured by the digital video camera, the system operates in identical manner for each indicia and is governed solely by operation of the downloaded program which is coded to recognize either characters or patterns as appropriate to the application. However, in the following, the types of videographic images captured by the video camera will all be subsumed under the generic term ‘bar code’ image data.”</p> <p>Ogasawara at 22:40–51</p> <ul style="list-style-type: none"> <li>• “Notwithstanding the foregoing, it will also be understood that the merchandise item information need not be displayed in bar code form for the invention to perform as intended. Indeed, merchandise item information may be presented in alpha-numeric form (i.e., an item name) or as a numeric code. In either case, character recognition software allows the wireless videophone to identify the item in a seamless fashion. Character recognition software supports identifying a product based on a numeric or alpha-numeric code, while pattern recognition software supports recognition of product characteristics based on bar code data.”</li> </ul> <p>Ogasawara at 23:11–31</p> <ul style="list-style-type: none"> <li>• “Advanced pattern recognition software is able to enhance the performance of the wireless videophone, in accord with the invention, by offering the capability to capture merchandise information from items that are not identified by either a bar code or an alpha-numeric label. Advanced pattern recognition software allows a consumer to capture a videographic image of an apple, for example, and to have the apple be recognized as such by the pattern recognition software. This capability is useful for any merchandise</li> </ul>

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		<p>item having a distinct or identifiable shape or other visually identifiable characteristic. Such pattern recognition is accomplished within the wireless videophone, by specialized downloaded software. Alternatively, a visual image of the merchandise item is transmitted to a server, wherein pattern recognition software makes the requisite merchandise item identification.”</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.i]	the image,	<p>Ogasawara discloses this limitation.</p> <p><i>See</i> limitation [1E] above.</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these</p>

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		<p>references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.ii]	<p>the symbol information,</p>	<p>Ogasawara discloses this limitation.</p> <p><i>See</i> limitation [1E] above.</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.iii]	<p>and a query of a database storing target object information associated with a plurality of target objects including the first target object;</p>	<p>Ogasawara discloses this limitation.</p> <p><i>See</i> limitation [1E] above.</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success</p>

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 U.S. Patent No. 6,512,919 to Ogasawara (“Ogasawara”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1F]	receiving, via an address, first target object information associated with the first target object,	Ogasawara discloses receiving, via an address, first target object information associated with the first target object.  See limitation [1A] above.  Ogasawara at 6:42–50 <ul style="list-style-type: none"> <li>• “The store server <b>10</b> or remote server <b>26</b> personal shopping application facilitates purchase transactions. Each message coming from a wireless telephone <b>18</b> is associated with the customer's telephone number, the customer ID, or some other unique identification. When the store server <b>10</b> or remote server <b>26</b> receives bar code data from the customer's wireless telephone <b>18</b>, then the store server <b>10</b> or remote server <b>26</b> searches a database and obtains a description and price for the item scanned. The item description and price is then transmitted to the customer's wireless telephone 18 and is preferably displayed upon the display 42 thereo”</li> </ul> Ogasawara at 7:35 – 42 <ul style="list-style-type: none"> <li>• “As each bar code is read, the purchase transaction program sends bar code data, such as SKU (Stock Keeping Unit) code or the Universal Product Code represented thereby, to the server and the server then preferably responds by sending a description and price for the product back to the wireless telephone 18, where the information is preferably shown upon the display 42 thereof. Also, the total price of items selected for purchase is preferably displayed.”</li> </ul> Ogasawara at 14:23 – 43 <ul style="list-style-type: none"> <li>• “According to the preferred embodiment of the present invention, after each</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>product is selected, a description of the product and the price thereof is shown in the display 42 of the wireless telephone 18. This information may comprise part of the purchase transaction program, or alternatively may be communicated from the server 10, 26.</p> <p>According to the preferred embodiment of the present invention, the purchaser is given an opportunity to either confirm a purchase or to delete the item from the purchase list after each selection is made. The purchaser is preferably also given a choice to confirm or delete each purchase selection once all purchase selections have been made, prior to paying for the purchases.</p> <p>According to the preferred embodiment of the present invention, the purchaser indicates that all desired purchases have been made by pressing a predetermined key of the keypad 44. The wireless telephone 18 then responds by displaying the total price of all purchases and also preferably provides an opportunity to delete purchases from the list as discussed above.”</p> <p>Ogasawara at 21:24–35</p> <ul style="list-style-type: none"> <li>• “Once in the server, the numeric bar code data is associated to a corresponding product which can be retrieved from a Price Look Up (PLU) table or file. An “item selection complete” response is then issued by the server and received by the customer's wireless videophone through its telephone function and the response is displayed to the customer on the system's integral graphics display screen. The response might include the numeric bar code data of the items selected for purchase as well as the item name, item price, and the like, in order that the consumer may confirm that this is, indeed, the item that they selected.”</li> </ul> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F.i]	<p>wherein the first target object information comprises a response regarding the validity of the document.</p>	<p>Ogasawara discloses the first target object information comprises a response regarding the validity of the document</p> <p><i>See</i> limitations [1E] and [1F] above.</p> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 3 (Non-asserted)**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
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3	The method of claim 1, wherein the symbolic content comprises a unique code.	<p>Ogasawara discloses the method of claim 1, wherein the symbolic content comprises a unique code.</p> <p>Ogasawara at 21:24–35</p> <ul style="list-style-type: none"><li>• “Once in the server, the numeric bar code data is associated to a corresponding product which can be retrieved from a Price Look Up (PLU) table or file. An “item selection complete” response is then issued by the server and received by the customer's wireless videophone through its telephone function and the response is displayed to the customer on the system's integral graphics display screen. The response might include the numeric bar code data of the items selected for purchase as well as the item name, item price, and the like, in order that the consumer may confirm that this is, indeed, the item that they selected.”</li></ul> <p>Ogasawara at 22:44–51</p> <ul style="list-style-type: none"><li>• “Indeed, merchandise item information may be presented in alpha-numeric form (i.e., an item name) or as a numeric code. In either case, character recognition software allows the wireless videophone to identify the item in a seamless fashion. Character recognition software supports identifying a product based on a numeric or alpha-numeric code, while pattern recognition software supports recognition of product characteristics based on bar code data.”</li></ul> <p>Ogasawara at 22:59–63</p> <ul style="list-style-type: none"><li>• “It will be understood that the system of the present invention allows bar code and/or alpha-numeric information to be captured from almost any form of display means by merely placing the information within the visual image field of the system's digital camera.”</li></ul> <p>Ogasawara at 20:41–58</p>
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		<ul style="list-style-type: none"> <li>• “With particular reference to FIG. 13, once the purchase transaction program has been downloaded, a purchaser may use the wireless videophone, in particular the digital camera, to select various items which the consumer desires to purchase. Such selection is made by capturing an image of an item's UPC bar code data, or the like, within the image field of the digital camera. While the consumer is scanning a particular bar code with the digital camera, the image seen by the camera is displayed on the system's graphic display screen so that the consumer can visually verify that the entire image has been captured. If character and/or pattern recognition software was downloaded to the system as part of the program, the customer need only inform the system that the image is ready for processing by pressing a pre-defined key on the system's keyboard. Those skilled in the art will appreciate that various other codes, indicia, text, icons, and the like may be scanned and recognized by modern character and pattern recognition application routines.”</li> </ul> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 4**

Claim	'004 Claim Recitation	Exemplary Citations in Reference
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4	The method of claim 3, wherein the image includes a representation of the code.	<p>Ogasawara discloses the method of claim 3, wherein the image includes a representation of the code.</p> <p>Ogasawara at 20:41–21:8</p> <ul style="list-style-type: none"><li>• “With particular reference to FIG. 13, once the purchase transaction program has been downloaded, a purchaser may use the wireless videophone, in particular the digital camera, to select various items which the consumer desires to purchase. Such selection is made by capturing an image of an item's UPC bar code data, or the like, within the image field of the digital camera. . . . If character and/or pattern recognition software was downloaded to the system as part of the program, the customer need only inform the system that the image is ready for processing by pressing a pre-defined key on the system's keyboard. Those skilled in the art will appreciate that various other codes, indicia, text, icons, and the like may be scanned and recognized by modern character and pattern recognition application routines. Thus, product selection need not be made in accordance with a UPC bar code but might be made with reference to a selection of product specific icons, each of which represent a particular product or service offered for purchase. For example, when grocery shopping, product specific icons might represent the stylistic outlines of a loaf of bread, carton of milk, a bunch of broccoli, and the like, allowing a consumer to quickly and efficiently select items for purchase without recourse to the complications of reading bar codes.</li></ul> <p>However, no matter the form of the indicia captured by the digital video camera, the system operates in identical manner for each indicia and is governed solely by operation of the downloaded program which is coded to recognize either characters or patterns as appropriate to the application. However, in the following, the types of videographic images captured by the video camera will all be subsumed under the generic term ‘bar code’ image data.”</p>
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		<p>Ogasawara at 21:24–35</p> <ul style="list-style-type: none"><li>• “Once in the server, the numeric bar code data is associated to a corresponding product which can be retrieved from a Price Look Up (PLU) table or file. An “item selection complete” response is then issued by the server and received by the customer's wireless videophone through its telephone function and the response is displayed to the customer on the system's integral graphics display screen. The response might include the numeric bar code data of the items selected for purchase as well as the item name, item price, and the like, in order that the consumer may confirm that this is, indeed, the item that they selected.”</li></ul> <p>Ogasawara at 22:44–51</p> <ul style="list-style-type: none"><li>• “Indeed, merchandise item information may be presented in alpha-numeric form (i.e., an item name) or as a numeric code. In either case, character recognition software allows the wireless videophone to identify the item in a seamless fashion. Character recognition software supports identifying a product based on a numeric or alpha-numeric code, while pattern recognition software supports recognition of product characteristics based on bar code data.”</li></ul> <p>Ogasawara at 22:59–63</p> <ul style="list-style-type: none"><li>• “It will be understood that the system of the present invention allows bar code and/or alpha-numeric information to be captured from almost any form of display means by merely placing the information within the visual image field of the system's digital camera.”</li></ul> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover</p>
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		<p>pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 5**

<b>Claim</b>	<b>'004 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
5	<p>The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.</p>	<p>Ogasawara discloses the method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.</p> <p>Ogasawara at 7:34–41</p> <ul style="list-style-type: none"> <li>• “As each bar code is read, the purchase transaction program sends bar code data, such as SKU (Stock Keeping Unit) code or the Universal Product Code represented thereby, to the server and the server then preferably responds by sending a description and price for the product back to the wireless telephone <b>18</b>, where the information is preferably shown upon the display <b>42</b> thereof. Also, the total price of items selected for purchase is preferably displayed.”</li> </ul> <p>Ogasawara at 21:24–35</p> <ul style="list-style-type: none"> <li>• “Once in the server, the numeric bar code data is associated to a corresponding product which can be retrieved from a Price Look Up (PLU) table or file. An “item selection complete” response is then issued by the server and received by the customer's wireless videophone through its telephone function and the response is displayed to the customer on the system's integral graphics display screen. The response might include</li> </ul>

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		<p>the numeric bar code data of the items selected for purchase as well as the item name, item price, and the like, in order that the consumer may confirm that this is, indeed, the item that they selected.”</p> <p>Ogasawara at 23:12–31</p> <ul style="list-style-type: none"><li>• “Advanced pattern recognition software is able to enhance the performance of the wireless videophone, in accord with the invention, by offering the capability to capture merchandise information from items that are not identified by either a bar code or an alpha-numeric label. Advanced pattern recognition software allows a consumer to capture a videographic image of an apple, for example, and to have the apple be recognized as such by the pattern recognition software. This capability is useful for any merchandise item having a distinct or identifiable shape or other visually identifiable characteristic. Such pattern recognition is accomplished within the wireless videophone, by specialized downloaded software. Alternatively, a visual image of the merchandise item is transmitted to a server, wherein pattern recognition software makes the requisite merchandise item identification. Here too, the system allows for the videographic image of an item to be transmitted to a server, which displays the item to a store clerk for manual recognition and identification. Merchandise information is then returned to the customer for display by the wireless videophone.”</li></ul> <p>To the extent it is found that Ogasawara does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ogasawara does not anticipate this claim, Ogasawara renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ogasawara with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including</p>
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		because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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U.S. Patent No.6,036,086 to Sizer (“Sizer”)

### **Exhibit F-5**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

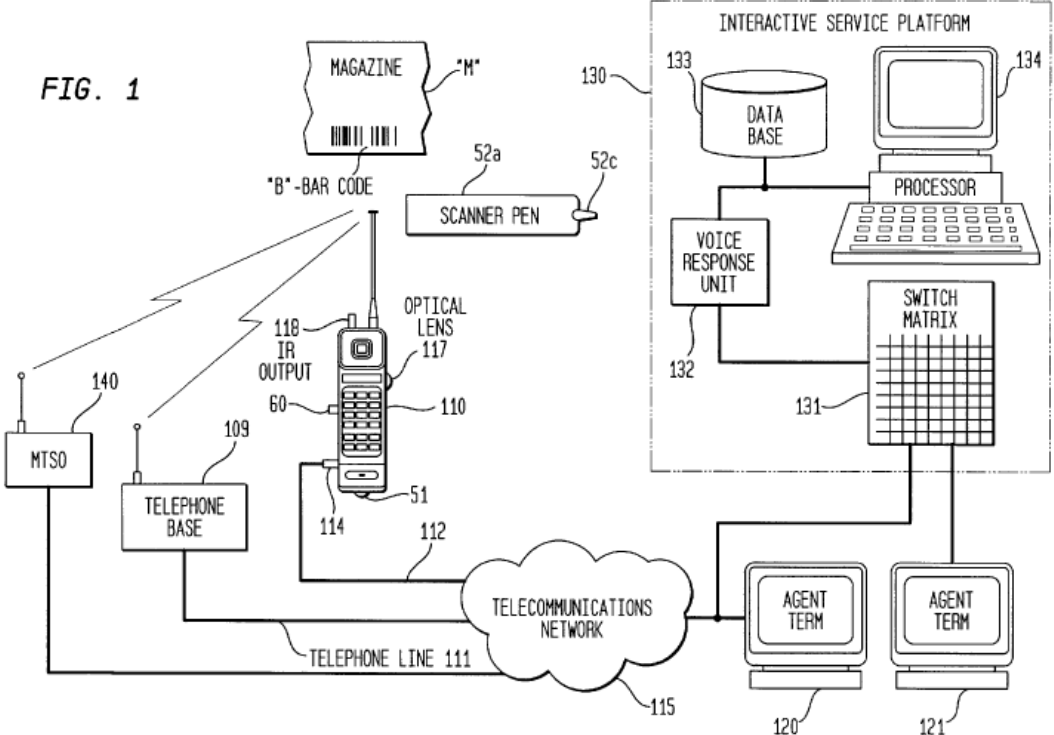
On information and belief, the application that matured into Sizer was filed on March 28, 1997. Sizer published at least as of March 14, 2000, and is available as prior art at least under 35 U.S.C. § 102 (a), (b), (e).

As shown in the chart below, Sizer anticipates asserted claims 1, 4, 5 of the ’278 Patent. To the extent Sizer is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Sizer is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	<p>Sizer discloses a computer assisted method.</p> <p>Sizer at FIG. 1</p>  <p>Sizer 3:31-33</p> <ul style="list-style-type: none"> <li>“Referring now to FIGS. 1 and 5, there is illustrated at 50 a scanner unit (FIG. 5) that is part of portable capture device 110 (FIG. 1).”</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>Sizer discloses receiving, via a mobile device, an image comprising a representation of at least a portion of a document.</p> <p>Sizer at FIG. 1</p> <p>Sizer 3:31-33</p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “Referring now to FIGS. 1 and 5, there is illustrated at 50 a scanner unit (FIG. 5) that is part of portable capture device 110 (FIG. 1).”</li> </ul> <p>Sizer at 4:11-23</p> <ul style="list-style-type: none"> <li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li> </ul> <p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.                      On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p> <p>Sizer 12:34-35</p> <p>“It is further to be noted that the present invention can be used in the context of automobiles and mobile telephones.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	determining that symbolic content is on the at least the portion of the document based on the image;	<p>Sizer discloses determining that symbolic content is on the at least the portion of the document based on the image.</p> <p>Sizer at 4:11-23</p> <ul style="list-style-type: none"> <li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</p> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final</p>

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		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	<p>extracting symbol information based on the symbolic content according to symbol type;</p>	<p>Sizer discloses extracting symbol information based on the symbolic content according to symbol type.</p> <p>Sizer at 4:11-23</p> <ul style="list-style-type: none"> <li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li> </ul> <p>Sizer at 9:33-53</p> <p>“For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60</p>

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		<p>bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	determining a validity of the document based at least in part on the image and the symbol information; and	<p>Sizer discloses determining a validity of the document based at least in part on the image and the symbol information.</p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is</li> </ul>

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		<p>completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</p> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	recognizing the document as a first target object based at least in part on	<p>Sizer discloses this limitation.</p> <p>Sizer at 4:11-23</p>

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		<ul style="list-style-type: none"> <li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li> </ul> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between</li> </ul>

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		<p>three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>Sizer at 11:11-15</p> <ul style="list-style-type: none"> <li>• In accordance with one optional arrangement of the present invention, when data is captured and stored in step 507, they newly collected data is compared with previously stored data. When a match is found, any duplicate data is dropped. In addition, the information in various fields is examined, to assure that the data captured is in the appropriate format. If an error is detected in any data, the information may be deleted, and "new" data collected. This is accomplished by repeating capture step 507 several times</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the</p>



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		<p>knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.i]	the image,	<p>Sizer discloses this limitation.</p> <p>Sizer at 4:11-23</p> <ul style="list-style-type: none"> <li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li> </ul> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul>

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		<p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</li> </ul> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at 11:11-15</p> <ul style="list-style-type: none"> <li>In accordance with one optional arrangement of the present invention, when data is captured and stored in step 507, they newly collected data is compared with previously stored data. When a match is found, any duplicate data is dropped. In addition, the information in various fields is examined, to assure that the data captured is in the appropriate format. If an error is detected in any data, the information may be deleted, and "new" data collected. This is accomplished by repeating capture step 507 several times</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.ii]	the symbol information,	<p>Sizer discloses this limitation.</p> <p>Sizer 2:57-59</p> <ul style="list-style-type: none"> <li>The marks to be scanned can include a conventional style bar code, alphanumeric characters, or Xerox glyphs on the surface of the object.</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at 4:11-23</p> <ul style="list-style-type: none"> <li>“The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li> </ul> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.iii]	<p>and a query of a database storing target object information associated with a plurality of target objects including the first target object;</p>	<p>Sizer discloses this limitation.</p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</li> </ul> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate</p>

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		<p>this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	<p>receiving, via an address, first target object information associated with the first target object,</p>	<p>Sizer discloses receiving, via an address, first target object information associated with the first target object.</p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</li> </ul> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating</p>

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		<p>to a travel reservation.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F.i]	<p>wherein the first target object information comprises a response regarding the validity of the document.</p>	<p>Sizer discloses the first target object information comprises a response regarding the validity of the document.</p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</li> </ul> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either</p>

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		<p>for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 3 (Non-asserted)**

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3	The method of claim 1, wherein the symbolic content comprises a unique code.	<p>Sizer discloses the method of claim 1, wherein the symbolic content comprises a unique code.</p> <p>Sizer 2:57-59</p> <ul style="list-style-type: none"> <li>• The marks to be scanned can include a conventional style bar code, alphanumeric characters, or Xerox glyphs on the surface of the object.</li> </ul>



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		<p>Sizer at 4:11-23</p> <ul style="list-style-type: none"><li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li></ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"><li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other</li></ul>
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		<p>billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 4**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
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Invalidity Chart for U.S. Patent 9,031,278 based on  
U.S. Patent No.6,036,086 to Sizer (“Sizer”)

4	The method of claim 3, wherein the image includes a representation of the code.	<p>Sizer discloses the method of claim 3, wherein the image includes a representation of the code.</p> <p>Sizer 2:57-59</p> <ul style="list-style-type: none"><li>• The marks to be scanned can include a conventional style bar code, alphanumeric characters, or Xerox glyphs on the surface of the object.</li></ul> <p>Sizer at 4:11-23</p> <ul style="list-style-type: none"><li>• “The scanner unit 50 of the present invention can be used in combination with marks that represents a unique code for transaction data. A standard bar code format could be used, which has encoded therein an 800 number to be called and other necessary information for completing a transaction. Xerox glyphs also could be appropriate because the glyphs can encode a large amount of data in a short space. FIG. 1 illustrates an object "M" in the form of a Magazine page having a bar code "B" adjacent an advertisement so that information can be gathered concerning the advertisement for initiating a transaction. Additionally, alphanumeric characters could be scanned, which specify a unique identifier for various advertisements.”</li></ul> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"><li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li></ul>
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		<p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 5**

<b>Claim</b>	<b>'278 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
5	<p>The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.</p>	<p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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### **Exhibit F-6**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Preliminary Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

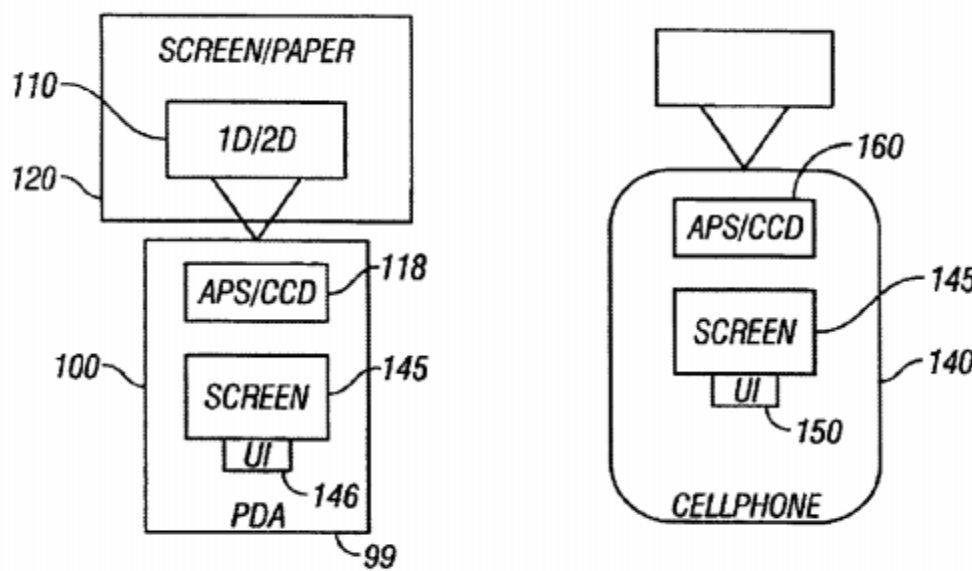
On information and belief, the application that matured into Harris was filed on July 18, 2000. Harris published at least as of December 23, 2003, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Harris anticipates asserted claims 1, 3, 4, 5 of the ’278 Patent. To the extent Harris is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Harris is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions, for the reasons identified in the cover pleading. These Preliminary Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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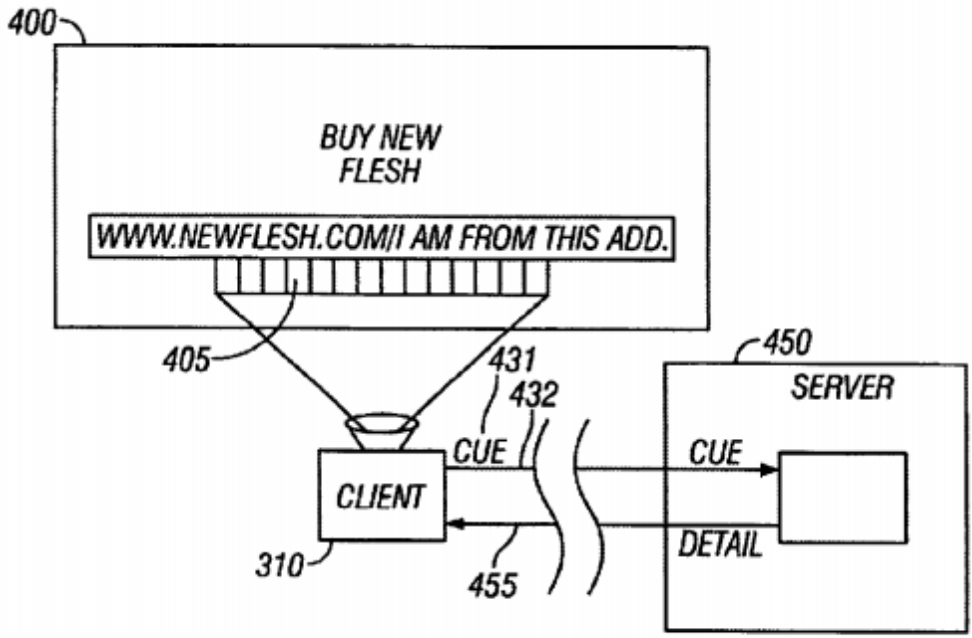
**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	Harris discloses a computer-assisted method.
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>Harris discloses receiving, via a mobile device, an image comprising a representation of at least a portion of a document.</p> <p>Harris at FIG. 1A and FIG. 1B</p>  <p><b>FIG. 1A</b></p> <p><b>FIG. 1B</b></p> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One</li> </ul>

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		<p>embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using <b>a personal digital assistant 100</b> as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99.</p> <p>FIG. 1B shows the client being <b>a cellular telephone</b> which also may include a screen 145 and user interface 150. The cellular telephone can be associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>

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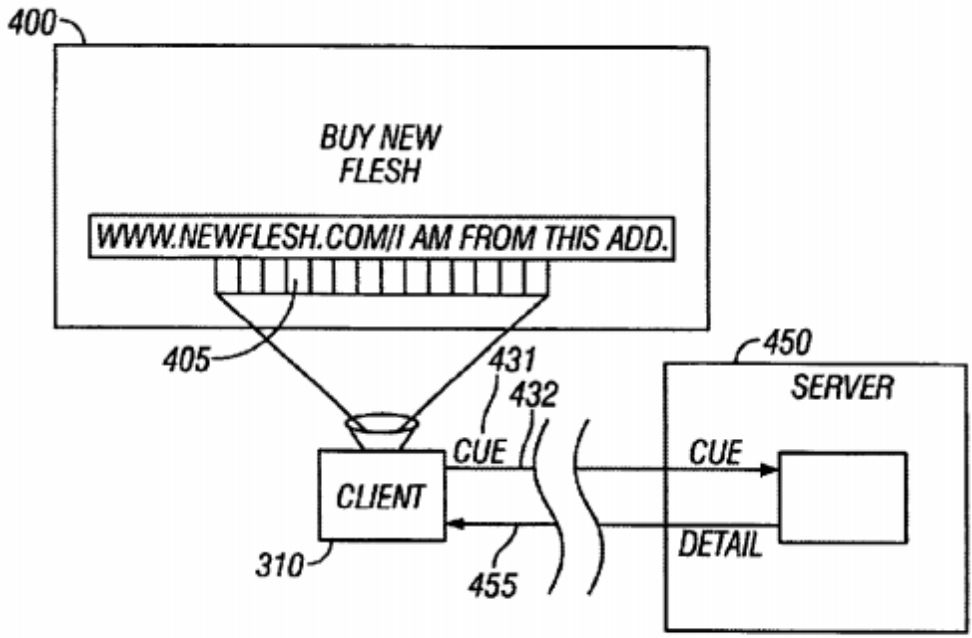
Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4: 9-15</p> <ul style="list-style-type: none"> <li>“Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here an advertisement. The advertisement can be a print advertisement, a television advertisement, or an Internet advertisement for example.”</li> </ul> <p>Harris at 4:15-30</p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	determining that symbolic content is on the at least the portion of the document based on the image;	Harris discloses determining that symbolic content is on the at least the portion of the document based on the image.  Harris at FIG. 4

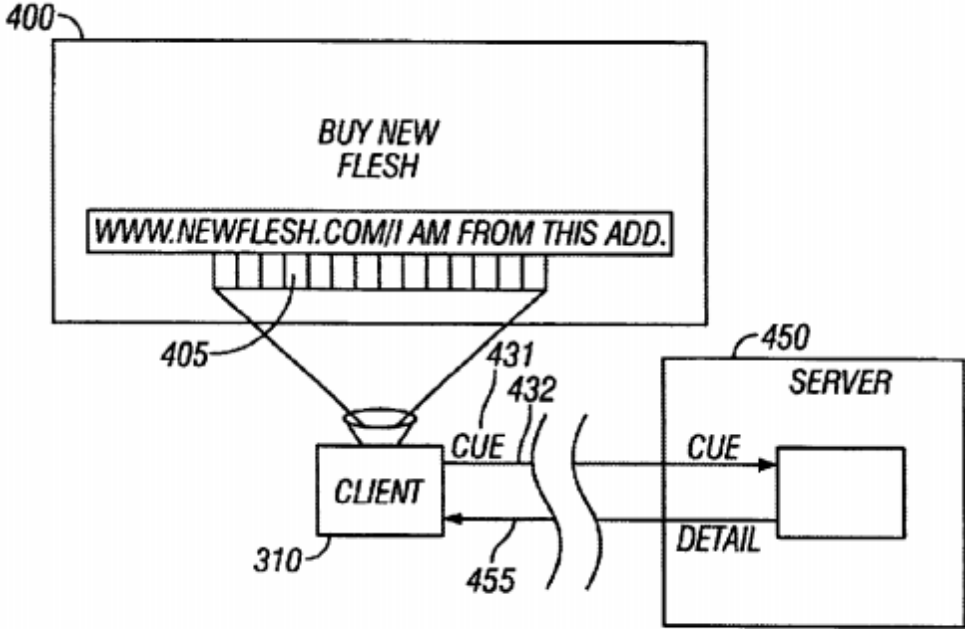
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4: 9-15</p> <ul style="list-style-type: none"> <li>“Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here an advertisement. The advertisement can be a print advertisement, a television advertisement, or an Internet advertisement for example.”</li> </ul> <p>Harris at 4:15-30</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	extracting symbol information based on the symbolic content according to symbol type;	Harris discloses extracting symbol information based on the symbolic content according to symbol type.  Harris at FIG. 4

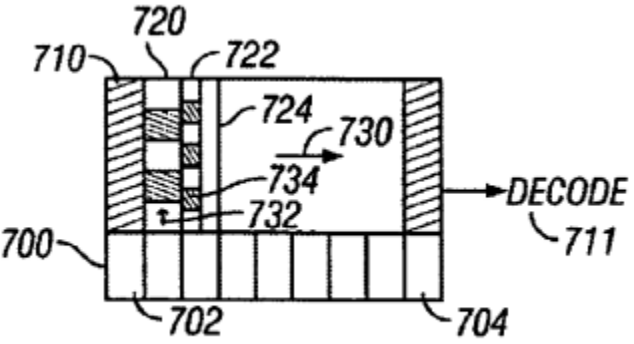
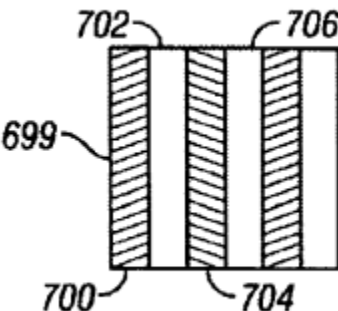
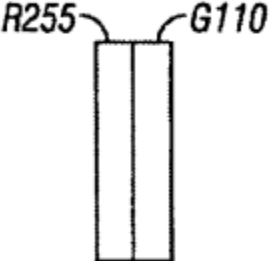
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4: 9-15</p> <ul style="list-style-type: none"> <li>“Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here an advertisement. The advertisement can be a print advertisement, a television advertisement, or an Internet advertisement for example.”</li> </ul> <p>Harris at 4:15-30</p>

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		<ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	determining a validity of the document based at least in part on the image and the symbol information; and	<p>Harris discloses determining a validity of the document based at least in part on the image and the symbol information.</p> <p>Harris at FIG. 7</p>

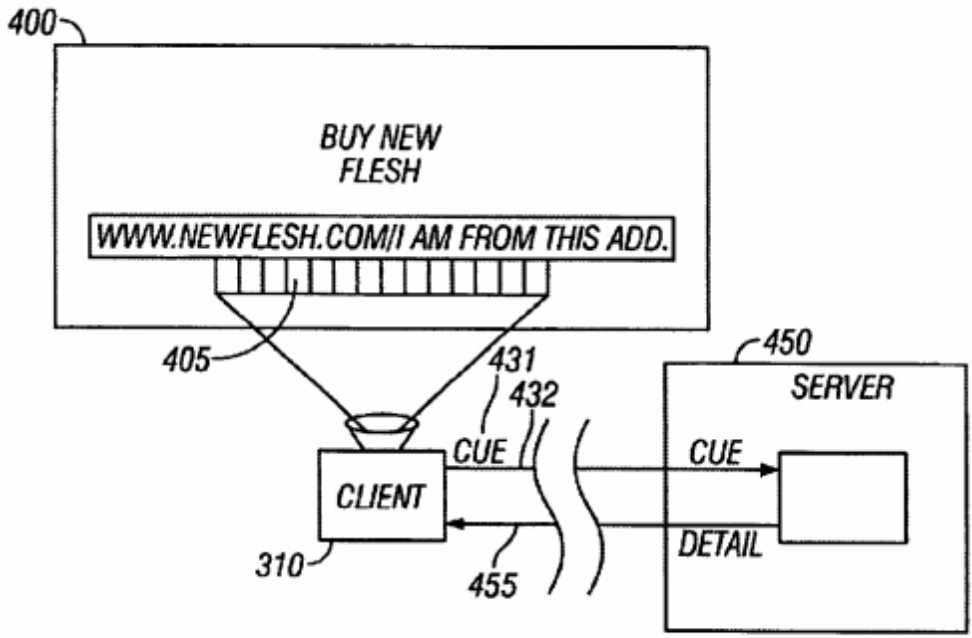
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		   <p><b>FIG. 7A</b></p> <p><b>FIG. 7B</b></p> <p><b>FIG. 7C</b></p> <p>Harris at 5:56-62</p> <ul style="list-style-type: none"> <li>• “The present system teaches, in FIG. 7A, a special bar code which includes increased capacity bar code information, as well as backwards compatibility with previous bar code scanners. The code shown in FIG. 7A includes two parts. A first part 710 is found as legal when scanned for</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>linear codes. A second part 710 registers as invalid /illegal when scanned in this way.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	recognizing the document as a first target object based at least in part on	<p>Harris discloses this limitation.</p> <p>Harris at FIG. 4</p>

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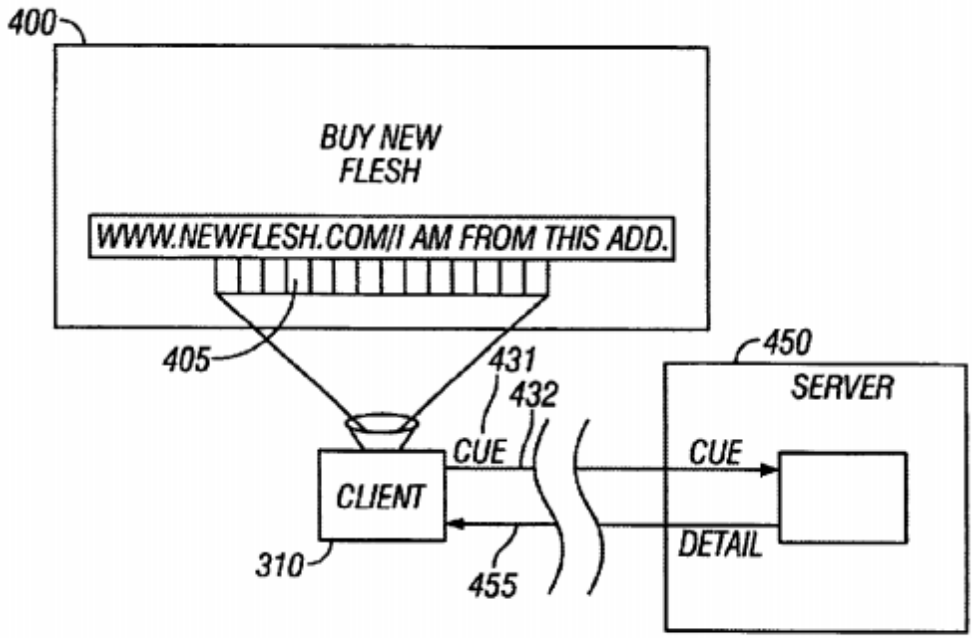
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		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to <b>the server 450</b>, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the</p>



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		limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1E.i]	the image,	Harris discloses this limitation.  Harris at FIG. 4

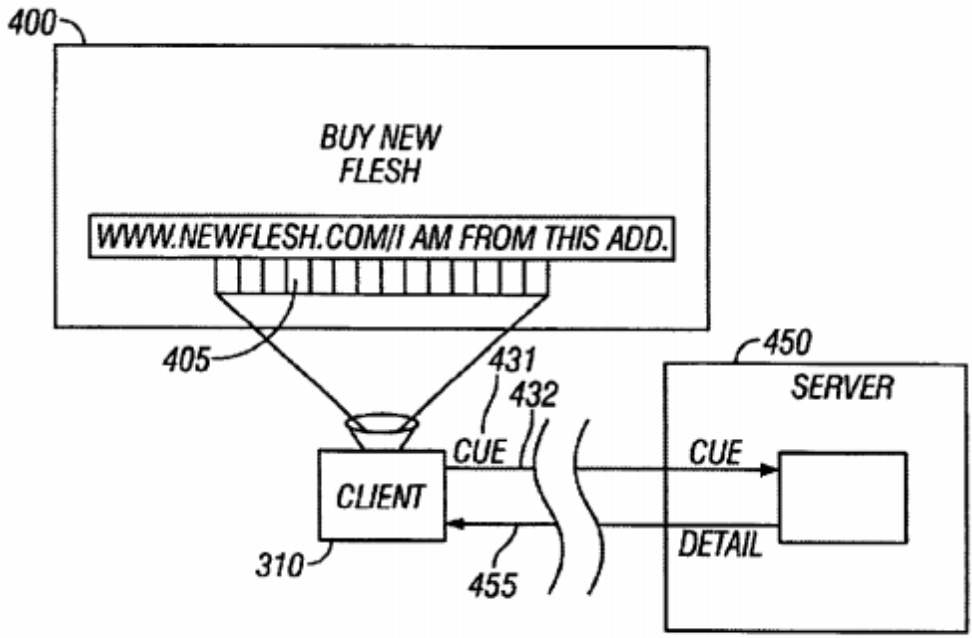
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to <b>the server 450</b>, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the</p>

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[1E.ii]	the symbol information,	Harris discloses this limitation.  Harris at FIG. 4

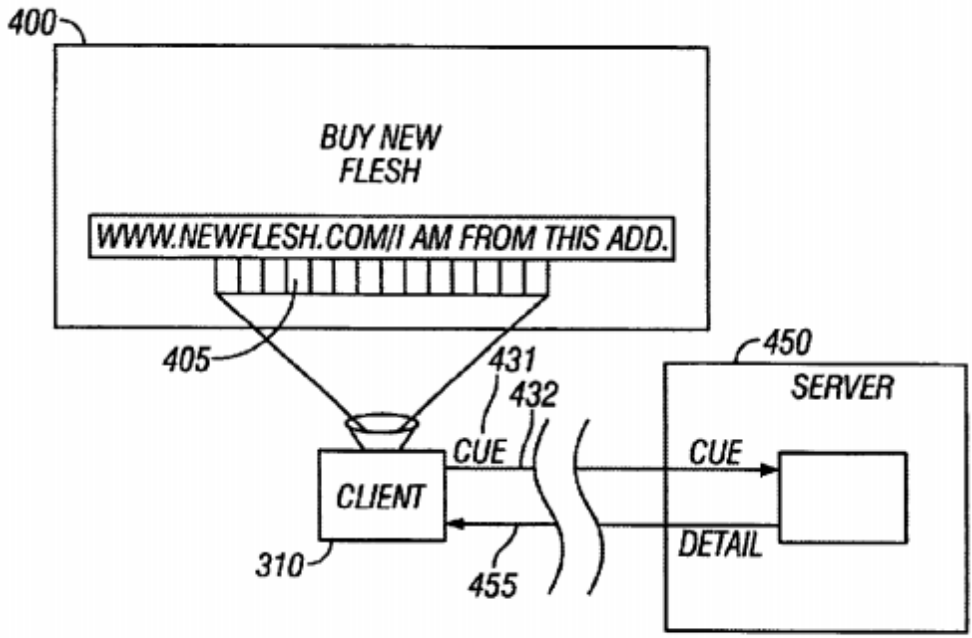
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[1E.iii]	and a query of a database storing target object information associated with a plurality of target objects including the first target object;	Harris discloses this limitation.  Harris at FIG. 4

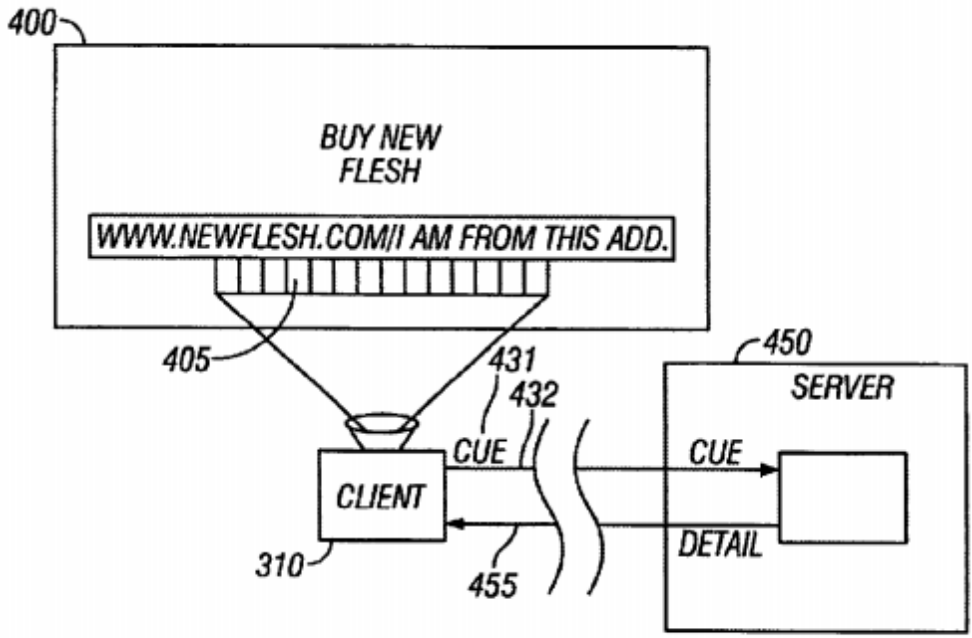
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 U.S. Patent No. 6,666,337 to Harris (“Harris”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to <b>the server 450</b>, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>Harris at 4:55-58</p>

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 U.S. Patent No. 6,666,337 to Harris (“Harris”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “During hot sync, the database returns the full text of the detailed information, e.g., “visit the website at <a href="http://www.pdascan.com/~more">http://www.pdascan.com/~more</a> to get a free gift.” Any desired length or size of information can be returned.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	receiving, via an address, first target object information associated with the first target object,	<p>Harris discloses receiving, via an address, first target object information associated with the first target object.</p> <p>Harris at FIG. 4</p>

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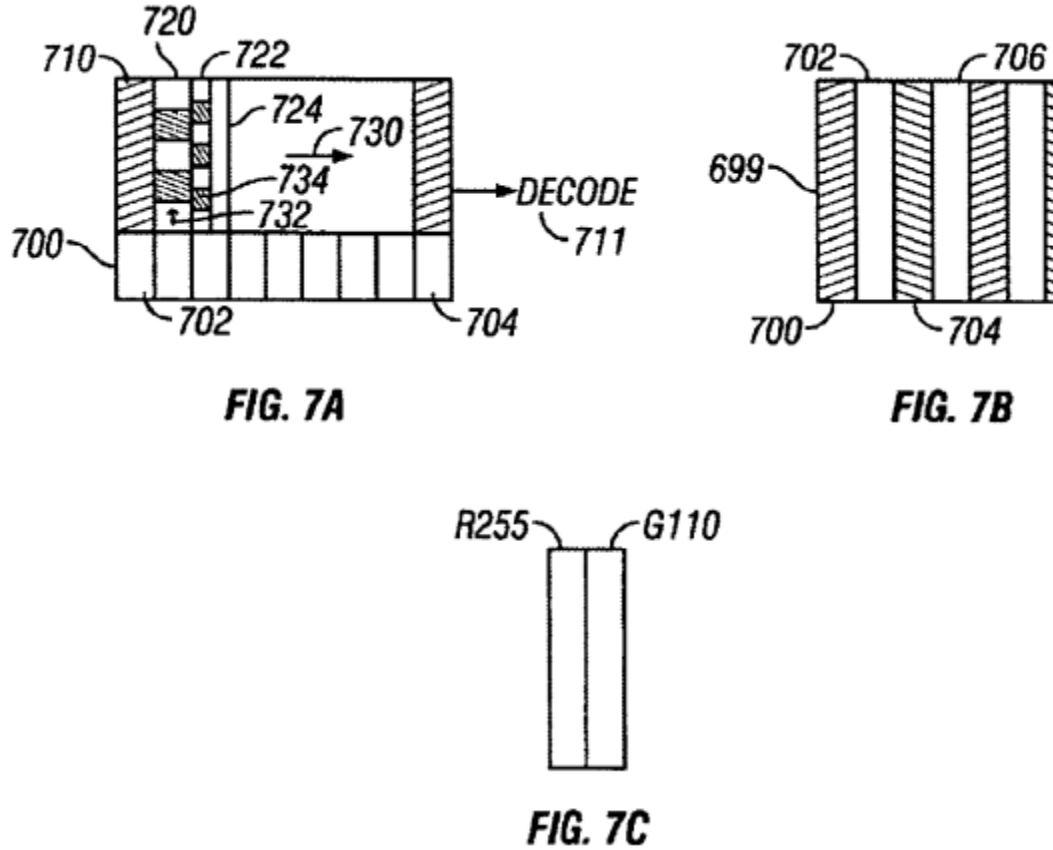
Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to <b>the server 450</b>, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>Harris at 4:55-58</p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “During hot sync, the database returns the full text of the detailed information, e.g., “visit the website at <a href="http://www.pdascan.com/~more">http://www.pdascan.com/~more</a> to get a free gift.” Any desired length or size of information can be returned.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F.i]	wherein the first target object information comprises a response regarding the validity of the document.	<p>Harris discloses the first target object information comprises a response regarding the validity of the document.</p> <p>Harris at FIG. 7</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Harris at 5:56-62</p> <ul style="list-style-type: none"> <li>• “The present system teaches, in FIG. 7A, a special bar code which includes increased capacity bar code information, as well as backwards compatibility with previous bar code scanners. The code shown in FIG. 7A includes two parts. A first part 710 is found as legal when scanned for</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>linear codes. A second part 710 registers as invalid /illegal when scanned in this way.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

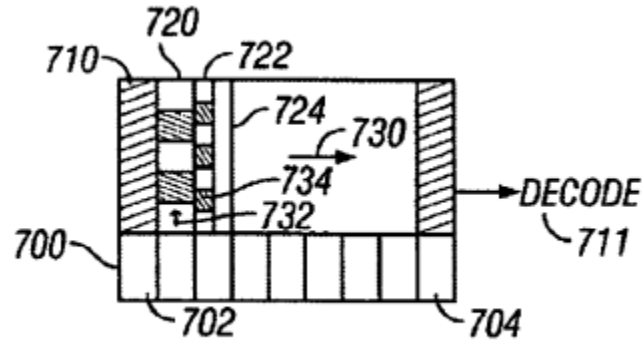
**2. Claim 3 (Non-asserted)**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
3	<p>The method of claim 1, wherein the symbolic content comprises a unique code.</p>	<p>Harris discloses the method of claim 1, wherein the symbolic content comprises a unique code.</p> <p>Harris at 4: 9-15</p> <ul style="list-style-type: none"> <li>• “Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here an advertisement. The advertisement can be a print advertisement, a television advertisement, or an Internet advertisement for example.”</li> </ul> <p>Harris at 4:15-30</p>

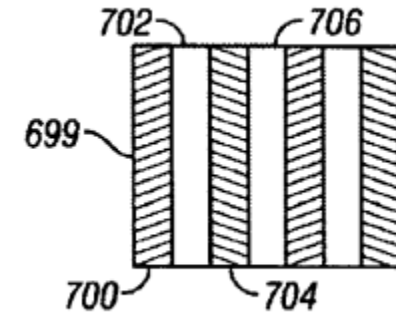
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		<ul style="list-style-type: none"><li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement. In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</li></ul> <p>Harris at FIG. 7</p>
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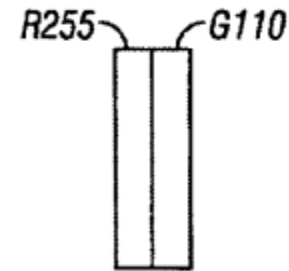
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**FIG. 7A**



**FIG. 7B**



**FIG. 7C**

Harris at 6:36-54

- “In the context of this system, the linear bar code information can represent an address for look up code of the type described above with reference to FIG. 4. The enhanced or non-linear information 710 can represent the total information. A person with a sufficiently advanced bar code scanner can read the entire information. A person with only a linear bar code scanner, however, may scan only the information 700, and then updates the information via a hot sync.

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		<p>An additional way of using this information, for example for scanning products, is also contemplated. Scan part 700 may include a Universal Product Code or UPC. Scanning part 710 may include additional information about the product, such as a description, or picture. The picture of the product may be displayed to the sales clerk, so that the sales clerk can verify that the product being purchased is actually the product that the user is presenting. Both parts of the bar code may represent information about the product. The part 700 represents basic information and the part 710 represents advanced information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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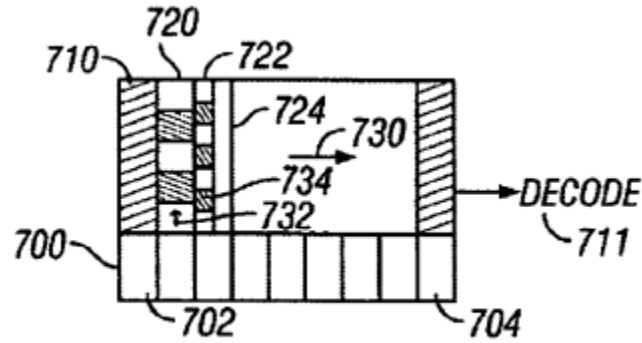
**3. Claim 4**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
4	The method of claim 3, wherein the image includes a representation of the code.	Harris discloses the method of claim 3, wherein the image includes a representation of the code.  Harris at 4: 9-15 <ul style="list-style-type: none"> <li>• “Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here</li> </ul>

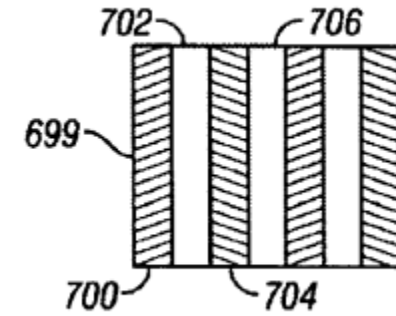
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		<p>an advertisement. The advertisement can be a print advertisement, a television advertisement, or an Internet advertisement for example.”</p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"><li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.</li></ul> <p>In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>Harris at FIG. 7</p>
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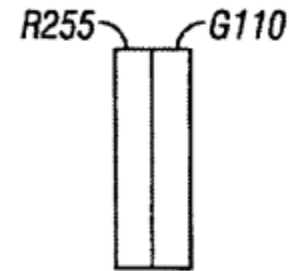
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**FIG. 7A**



**FIG. 7B**



**FIG. 7C**

Harris at 6:36-54

- “In the context of this system, the linear bar code information can represent an address for look up code of the type described above with reference to FIG. 4. The enhanced or non-linear information 710 can represent the total information. A person with a sufficiently advanced bar code scanner can read the entire information. A person with only a linear bar code scanner, however, may scan only the information 700, and then updates the information via a hot sync.



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		<p>An additional way of using this information, for example for scanning products, is also contemplated. Scan part 700 may include a Universal Product Code or UPC. Scanning part 710 may include additional information about the product, such as a description, or picture. The picture of the product may be displayed to the sales clerk, so that the sales clerk can verify that the product being purchased is actually the product that the user is presenting. Both parts of the bar code may represent information about the product. The part 700 represents basic information and the part 710 represents advanced information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 5**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
5	The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.	<p>Harris discloses the method of claim 4, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with</p>

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		<p>the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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Invalidity Chart for U.S. Patent 9,031,278 based on  
U.S. Patent No. 6,722,569 to Ehrhart et al. (“Ehrhart”)

### **Exhibit F-11**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Ehrhart was filed on July 13, 2001, claiming the priority date of July 13, 2001. Ehrhart published at least as of April 20, 2004, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Ehrhart anticipates asserted claims 1, 3, 4, 5 of the ’278 Patent. To the extent Ehrhart is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Ehrhart is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	<p>Ehrhart discloses a computer-assisted method.</p> <p>“The present invention relates to an optical reader that includes a color imaging assembly that generates color imaging data. An image analysis circuit determines if the acquired image should be characterized as a color photograph or as including a graphical symbol. A processing circuit processes the imaging data based on the image analysis circuit's determination of whether the image is a graphical symbol or a color photograph. The present invention allows a user to acquire and process both color images and graphical symbols, such as bar codes, text, OCR symbols or signatures. The optical reader of the present invention is also configured to associate an acquired image with at least one other acquired image.” Ehrhart at Abstract.</p> <p>“In another aspect, the present invention includes a method for acquiring an image of an object with an optical reader.” Ehrhart at 2:62-64.</p>
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>Ehrhart discloses receiving, via a mobile device, an image comprising a representation of at least a portion of a document.</p> <p><i>Id.</i> at [1Pre].</p> <p>“The optical reader of the present invention automatically, or through manual Selection, determines whether a captured image is a color photographic image or, a color image that includes a graphical Symbol. Subsequently, the optical reader of the present invention processes the acquired imaging data in accordance with that determination. The optical reader of the present invention is operative to acquire and associate a plurality of acquired images.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>One aspect of the present invention is an optical reader. The optical reader includes a color imaging assembly for acquiring an image of an object, the color imaging assembly generating imaging data corresponding to the image. An image analysis circuit is coupled to the color imaging assembly.</p> <p>The image analysis circuit being configured to determine if the color imaging data includes at least one graphical Symbol. The image is classified as a graphical Symbol, or the image is classified as a color photograph if the color imaging data does not include at least one graphical Symbol. A processing circuit is coupled to the image analysis circuit. The processing circuit is operative to process the imaging data based on the determination.</p> <p>In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for converting the image of the object into color digital data corresponding to the image.” Ehrhart at 1:57-2:16.</p> <p>“In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for capturing the image as color imaging data. A classification circuit is coupled to the color imaging assembly, the classification circuit being configured to process at least a portion of the color imaging data to thereby Select one of a plurality of classifications, whereby the image is classified as a color photographic image, or as an image that includes at least one graphical Symbol. An automatic mode Selector is coupled to the classification circuit, the automatic mode Selector being configured to Select an optical reader mode in accordance with the Selected classification. A processor is coupled to the classification circuit, the processor being programmed to process the color imaging data in accordance with the optical reader mode Selected by the automatic mode Selector.” Ehrhart at 2:26-42.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14, alphanumeric key pad 16, and display 60. In one embodiment, function keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG. 1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100. Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>determining that symbolic content is on the at least the portion of the document based on the image;</p>	<p>Ehrhart discloses determining that symbolic content is on the at least the portion of the document based on the image.</p> <p><i>Id.</i> at [1Pre-A].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover</p>

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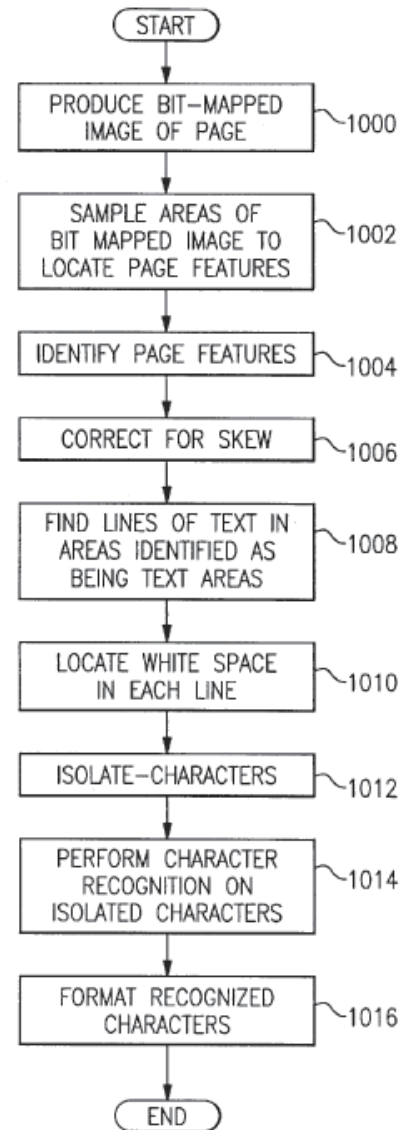
Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	<p>extracting symbol information based on the symbolic content according to symbol type;</p>	<p>Ehrhart discloses extracting symbol information based on the symbolic content according to symbol type.</p> <p>“In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In Step 1014, a character recognition algorithm is used in an attempt to recognize each individual character.” Ehrhart at 12:55-66.</p> <p>“As embodied herein and depicted in FIG. 13, an example of image association in accordance with the present invention is disclosed. One of ordinary skill in the art will recognize that associated images 1300 can be disposed on paper, displayed electronically on display 60, or displayed electronically using other electronic means, such as a computer monitor. In this example, the first image captured is color photograph 1302 which shows a damaged parcel. The second image captured is bar code 1304 affixed to the side of the damaged parcel. Processor 40 decodes bar code 1304 and associates decoded bar code data 1306 with color photograph 1302. In this example, the user elected to associate a third image, signature 1308. Thus, personnel viewing record 1300 may reasonably conclude that a damaged parcel was delivered to Company XYZ, and that the person signing for the parcel delivery was someone named John W. Smith.” Ehrhart at 13:27-43.</p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p>

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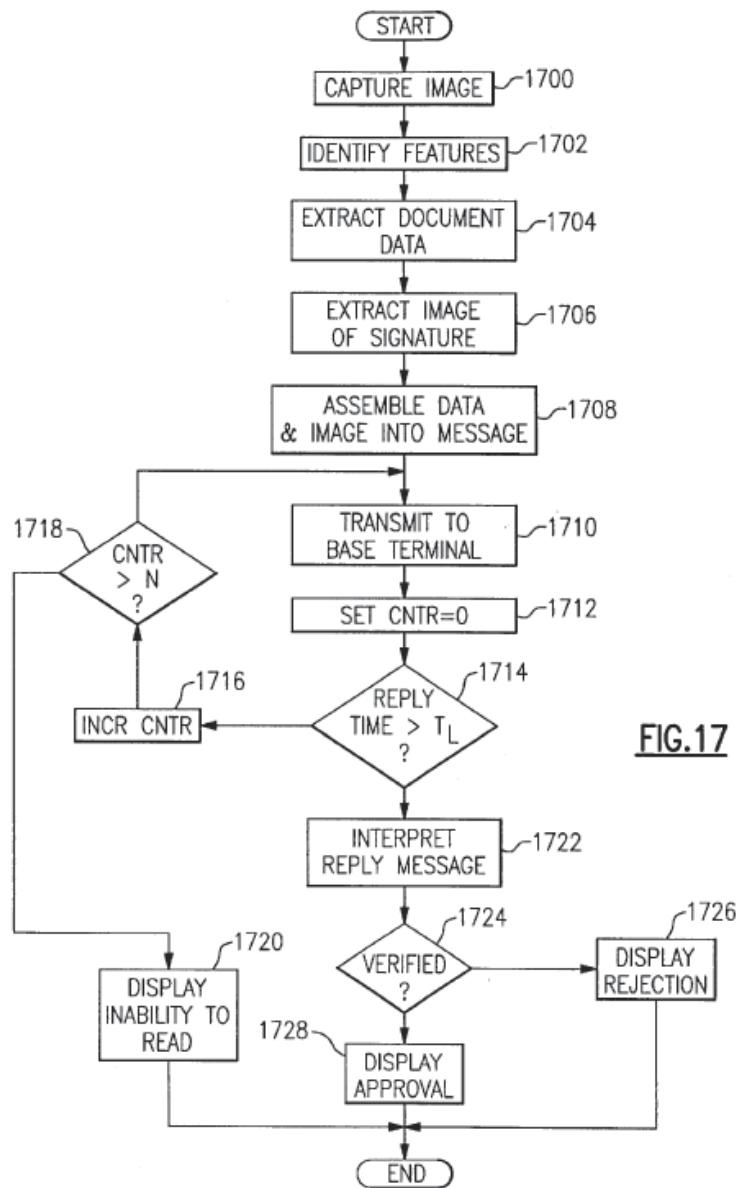


**FIG. 10**

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		Ehrhart at Fig. 10.

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**FIG. 17**

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>determining a validity of the document based at least in part on the image and the symbol information; and</p>	<p>Ehrhart discloses determining a validity of the document based at least in part on the image and the symbol information.</p> <p><i>Id.</i> at [1Pre-C].</p> <p>“The user may also click on OCR/Text icon 660. Clicking icon 660 provides the user with a check validation mode, a text scanning mode, or a bi-tonal image capture mode. The check validation mode is performed in conjunction with network services.” Ehrhart at 8:58-62.</p> <p>“In steps 1712 and 1714, processor 40 initializes a counter and begins waiting for a reply from the host computer. In steps 1714-1718, if the reply is not received within time limit TL, the counter CNTR is incremented and the message is re-transmitted. After several attempts, if CNTR&gt;N (N being an integer), processor 40 outputs a fault message. If the reply message is received within time limit TL, processor interprets</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>the reply in step 1722. If the extracted data and the signature match information stored in the database accessible by the host computer, an approval message is displayed. If the extracted data and the signature do not match information stored in the database accessible by the host computer, a disapproval message is displayed. The dynamic signature verification embodiment is similar to the static embodiment described immediately above. In the dynamic version, the user provides his signature using stylus 18 and signature block 62, as shown in FIG. 1C. Signature block 62 provides processor 40 with the dynamic parameters recorded during signature. The dynamic parameters are transmitted to a host processor, as described above.” Ehrhart at 15:31-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	recognizing the document as a first target object based at least in part on	<p>Ehrhart discloses this limitation.</p> <p><i>Id.</i> at [1Pre-D].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination</p>

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		<p>of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>“In the embodiment depicted in FIG. 2, ASIC 44 is implemented using a programmable logic array (PLA) device. In a similar embodiment, ASIC 44 is implemented using a field programmable gate array (FPGA) device. ASIC 44 is tasked with controlling the image acquisition process, and the storage of image data. As part of the image acquisition process, ASIC 44 performs various timing and control functions including control of light source 24, control of color imager 34, and control of external interface 56. It will be apparent to those of ordinary skill in the pertinent art that modifications and variations can be made to processor 40 of the present invention depending on the cost, availability, and performance of off-the-shelf microprocessors, and the type of color imager used. In one embodiment, microprocessor 42 and ASIC 44 are replaced by a single microprocessor 40. In one embodiment, microprocessor 40 is implemented using a single RISC processor. In yet another embodiment, microprocessor 40 is implemented using a RISC and DSP hybrid processor.” Ehrhart at 7:32-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.i]	the image,	<p>Ehrhart discloses this limitation.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p> <p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a signature, the user is asked</p>



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		<p>in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.” Ehrhart at 10:5-20.</p> <p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.ii]	the symbol information,	<p>Ehrhart discloses this limitation.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.iii]	and a query of a database storing target object information associated with a plurality of target objects including the first target object;	<p>Ehrhart discloses this limitation.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p> <p>“In one embodiment, this mode includes a Signature verification program wherein the user may select between a Static verification or a dynamic verification. In the Static mode, the user captures the image of a Signature. The captured image is compared with a reference image Stored in a remote database. In the dynamic mode, optical reader 10 uses the Stylus and Signature block to capture the Signature. In this mode, Signature block 62 measures unique dynamic parameters, Such as applied pressure, direction and timing of movements, or a combination of these parameters. One of ordinary skill in the art will recognize that this list is not meant to be all-inclusive, but rather, is a representative example. The captured dynamic parameters are compared with a reference data Stored in a remote database.” Ehrhart at 8:64-9:10.</p> <p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.” Ehrhart at 10:5-20.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	receiving, via an address, first target object information associated with the first target object,	<p>Ehrhart discloses receiving, via an address, first target object information associated with the first target object.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the</p>

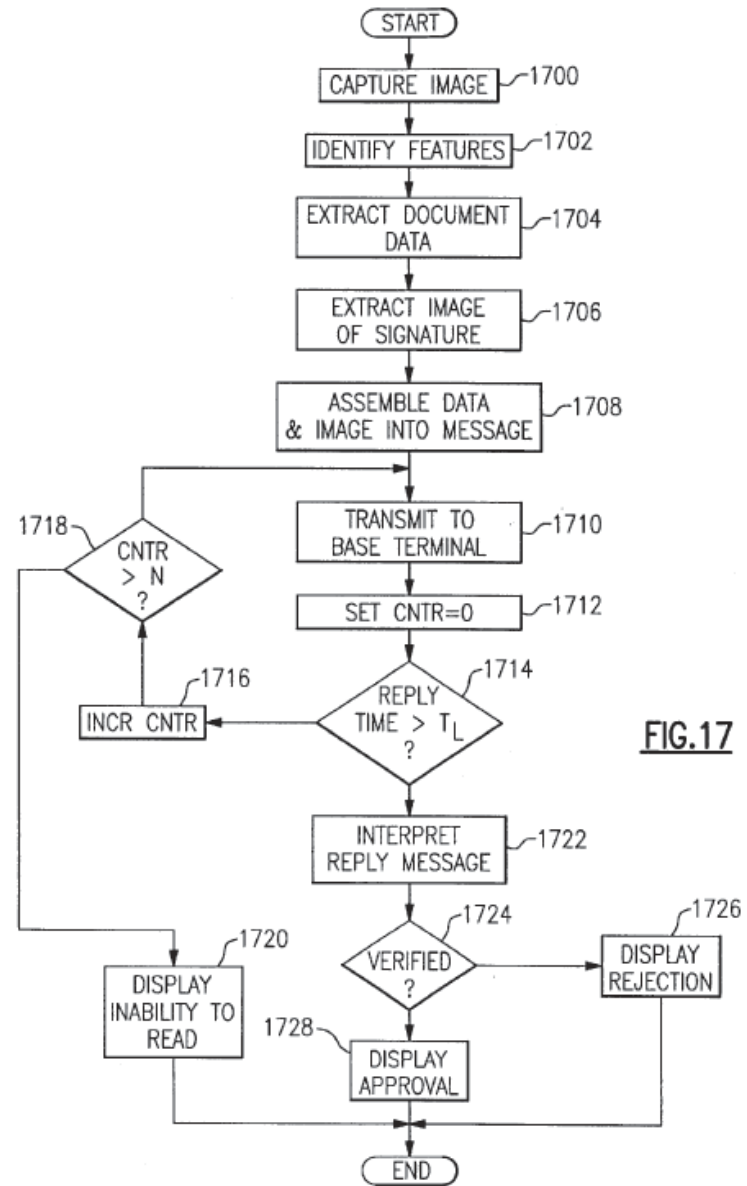
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F.i]	wherein the first target object information comprises a response regarding the validity of the document.	<p>Ehrhart discloses the first target object information comprises a response regarding the validity of the document.</p> <p><i>Id.</i> at [1Pre-F].</p> <p>“The user may also click on OCR/Text icon 660. Clicking icon 660 provides the user with a check validation mode, a text scanning mode, or a bi-tonal image capture mode. The check validation mode is performed in conjunction with network services.” Ehrhart at 8:58-62.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 3**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
3	<p>The method of claim 1, wherein the symbolic content comprises a unique code.</p>	<p>Ehrhart discloses the method of claim 1, wherein the symbolic content comprises a unique code.</p> <p><i>Id.</i> at [1].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text,</p>



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		<p>OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 4**

<b>Claim</b>	<b>'278 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
4	The method of claim 3, wherein the image includes a representation of the code.	<p>Ehrhart discloses the method of claim 3, wherein the image includes a representation of the code.</p> <p><i>Id.</i> at [3].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical</p>

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		<p>symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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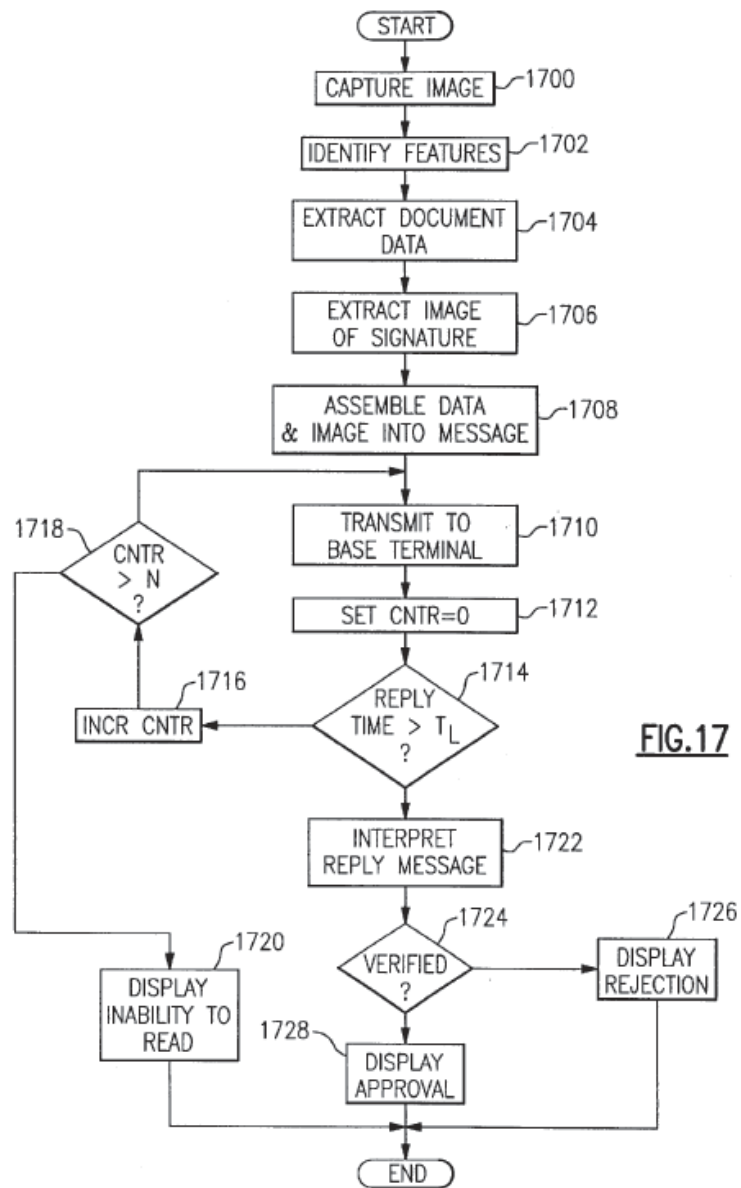
**4. Claim 5**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
5	The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message	Ehrhart discloses the method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.

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	<p>indicating the absence of a match within a specified tolerance.</p>	<p>“The user may also click on OCR/Text icon 660. Clicking icon 660 provides the user with a check validation mode, a text scanning mode, or a bi-tonal image capture mode. The check validation mode is performed in conjunction with network services.” Ehrhart at 8:58-62.</p> <p>“In steps 1712 and 1714, processor 40 initializes a counter and begins waiting for a reply from the host computer. In steps 1714-1718, if the reply is not received within time limit TL, the counter CNTR is incremented and the message is re-transmitted. After several attempts, if CNTR&gt;N (N being an integer), processor 40 outputs a fault message. If the reply message is received within time limit TL, processor interprets the reply in step 1722. If the extracted data and the signature match information stored in the database accessible by the host computer, an approval message is displayed. If the extracted data and the signature do not match information stored in the database accessible by the host computer, a disapproval message is displayed. The dynamic signature verification embodiment is similar to the static embodiment described immediately above. In the dynamic version, the user provides his signature using stylus 18 and signature block 62, as shown in FIG. 1C. Signature block 62 provides processor 40 with the dynamic parameters recorded during signature. The dynamic parameters are transmitted to a host processor, as described above.” Ehrhart at 15:31-50.</p>
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**FIG.17**

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		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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Invalidity Chart for U.S. Patent 9,031,278 based on U.S. Patent No. 6,097,834 to Krouse (“Krouse”)

### **Exhibit F-18**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Krouse was filed on June 13, 1997, claiming the priority date of June 13, 1997. Krouse published at least as of August 1, 2000, and is available as prior art at least under 35 U.S.C. § 102(a).

As shown in the chart below, Krouse anticipates asserted claims 1, 4, 5 of the ’278 Patent. To the extent Krouse is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Krouse is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	<p>Krouse discloses a computer-assisted method.</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li> </ul>
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>Krouse discloses receiving, via a mobile device, an image comprising a representation of at least a portion of a document.</p> <p><i>Id.</i> at [1Pre].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial</li> </ul>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>transaction.</p> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 4:13–57</p> <ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents</p>

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		<p>having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 6:4–14</p> <ul style="list-style-type: none"> <li>• “Each of the terminals 18, 20, 22 includes an optical scanner 34 for scanning negotiable instrument documents, (exemplified by check 110 shown in FIG. 6) tendered at point of sale in payment for goods or services</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>provided by the merchant or retailer associated with that point of sale, to generate respective computer-readable scanned images of the documents. Preferably, scanner 34 comprises a conventional monotonal image scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor 40 to scan one or both sides of a document 110 placed in the scanner 34.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	determining that symbolic content is on the at least the portion of the document based on the image;	<p>Krouse discloses determining that symbolic content is on the at least the portion of the document based on the image.</p> <p><i>Id.</i> at [1Pre-A].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition</li> </ul>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114, 116, 118</b> of printed digits separated by special control characters. Fields <b>114, 116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document</p>

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		<p><b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</li> </ul> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	extracting symbol information based on the symbolic content according to symbol type;	<p>Krouse discloses extracting symbol information based on the symbolic content according to symbol type.</p> <p><i>Id.</i> at [1Pre-B].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention</li> </ul>

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		<p>includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114, 116, 118</b> of printed digits separated by special control characters. Fields <b>114, 116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein,</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	determining a validity of the document based at least in part on the image and the symbol information; and	<p>Krouse discloses determining a validity of the document based at least in part on the image and the symbol information.</p> <p><i>Id.</i> at [1Pre-C].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method</li> </ul>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 3:49–57</p> <ul style="list-style-type: none"> <li>• “This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.”</li> </ul> <p>Krouse at 8:1–12</p> <ul style="list-style-type: none"> <li>• “A second copy of the numeric data is also transmitted from the processor <b>40</b> to the authorization record generator <b>38</b>, which also retrieves from the</li> </ul>

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		<p>storage system <b>42</b> the payee and payment amount data associated with this transaction and transmits same to the generator <b>38</b>. Processor <b>40</b> also supplies to the generator 38 from the storage system <b>42</b> data indicative of the initiation of the current transaction. Preferably, each of the terminals <b>18, 20, 22</b> of the system <b>10</b> is associated with a unique station/terminal identification code or number which is stored in the terminal's respective storage system <b>42</b>. This terminal identification number is also supplied to the generator <b>38</b> from the system <b>42</b>.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	recognizing the document as a first target object based at least in part on	<p>Krouse discloses this limitation.</p> <p><i>Id.</i> at [1Pre-D].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing</li> </ul>

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		<p>information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</li> </ul>

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Invalidity Chart for U.S. Patent 9,031,278 based on U.S. Patent No. 6,097,834 to Krouse (“Krouse”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 4:13–57</p> <ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document</p>

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		<p>matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been</p>

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		<p>motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.i]	the image,	<p>Krouse discloses this limitation.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>Krouse at 1:6–26</p> <ul style="list-style-type: none"> <li>• “The present invention relates generally to financial transaction processing systems and methods, and more specifically, to such systems and methods wherein at least one document containing financial transaction-related information is optically scanned to generate at least one computer-readable image from which the information may be extracted for use in processing the transaction. Particular utility for the present invention is found in the area of processing electronic financial transactions (e.g., electronic funds transfer (EFT) and Automatic Clearing House (ACH) transactions), although other utilities are also contemplated for the present invention, including other financial transaction processing and accounting applications.”</li> </ul> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the</li> </ul>

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		<p>transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</p> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 4:13–57</p> <ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul>

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		<p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the</p>



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		<p>respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114, 116, 118</b> of printed digits separated by special control characters. Fields <b>114, 116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p>

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		<p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.ii]	the symbol information,	<p>Krouse discloses this limitation.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line</p>

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		<p><b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.iii]	and a query of a database storing target object information associated with a plurality of target objects including the first target object;	<p>Krouse discloses this limitation.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method</li> </ul>

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		<p>according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 4:13–57</p> <ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document</p>

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		<p>matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 14:64–15:67</p> <ul style="list-style-type: none"> <li>• “Processor <b>220</b> compares the recognition characteristics of the particular document <b>400</b> being processed with the sets of reference recognition characteristics stored in the archive <b>228</b>. More specifically, the vertex coordinates and dimensions of the imaginary rectangles generated by the generator <b>204</b> from the scanned image of the document <b>400</b> are compared</li> </ul>

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		<p>with respective reference recognition characteristics (i.e., vertex coordinates and dimensions of imaginary rectangles) generated by the process used to generate the recognition characteristics from the scanned image of document <b>400</b>, to determine whether a match exists between the recognition characteristics from the scanned image of document <b>400</b> and any one of the sets of reference recognition characteristics stored in the database archive system <b>228</b>. Preferably, this is accomplished by first comparing the recognition characteristics from the scanned image of document <b>400</b> to the sets of reference characteristics, and unless the respective dimensions of at least three of the imaginary rectangles from the scanned image of document <b>400</b> match to within a predetermined error tolerance (e.g., 2 percent) of corresponding respective vertices and dimensions in a respective set of reference recognition characteristics stored in the system <b>228</b>, processor <b>220</b> signals that the format of the scanned document <b>400</b> does not match any of the formats of the reference documents from which the reference recognition characteristics stored in the database archive <b>228</b> were generated. If such a "no match" condition is determined by the processor <b>220</b> to exist, the bill document <b>400</b> may be sent to the reference characterization generator station to permit the human operator to determine whether to input the reference characteristics and other bill document identification information (i.e., the other types of information stored in association with each set of reference recognition characteristics previously stored in the database archive <b>228</b>) manually for storage in the archive system <b>228</b> as a new set of reference recognition characteristics to permit other bills having the same format as document <b>400</b> to be processable by terminal <b>202</b> in the future, or to process the bill payment transaction as a "one-of-a-kind" transaction (i.e., without storing such recognition characteristics and information in the database archive <b>228</b> for future use by the processor <b>220</b>). Otherwise, if the predetermined match error tolerance conditions are found to exist, processor <b>220</b> selects those sets of reference recognition characteristics that are found to satisfy such</p>

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		<p>conditions, and calculates the displacement differences that exist between each of the imaginary rectangles of the scanned image of the document <b>400</b> and those described in these selected sets of reference recognition characteristics (i.e., the displacements that must be applied to the imaginary rectangles of the scanned image of document <b>400</b> to accomplish a "best fit" match of same with the corresponding imaginary rectangles described in these selected sets of reference recognition characteristics). Such "best fit" match conditions are determined to exist for given corresponding rectangles of the recognition characteristics of the scanned image of the document <b>400</b> and a given respective set of reference recognition characteristics, when the absolute pixel displacement differences between the respective abscissa and ordinate coordinates of the vertices of the rectangles are within 40 pixels and 60 pixels of each other, respectively, and the respective lengths and widths of the rectangles are within 20 pixels and 2 pixels of each other, respectively. Once these absolute displacement differences have been calculated by the processor <b>220</b>, processor <b>220</b> "scores" the degree of best fit match condition that exists between the imaginary rectangles of the scanned image of the document <b>400</b> and those described in the aforesaid selected sets of reference recognition characteristics, whereby to determine which one of the aforesaid selected sets of reference recognition characteristics best matches the recognition characteristics of the scanned document <b>400</b>."</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA's Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the</p>

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		reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1F]	receiving, via an address, first target object information associated with the first target object,	Krouse discloses receiving, via an address, first target object information associated with the first target object.  <i>Id.</i> at [1Pre-E].  Krouse at Abstract <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li> </ul> Krouse at 3:43–4:12 <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable</li> </ul>



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		<p>scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</p> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 4:13–57</p>

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		<ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different</p>

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		<p>respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F.i]	<p>wherein the first target object information comprises a response regarding the validity of the document.</p>	<p>Krouse discloses the first target object information comprises a response regarding the validity of the document.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual</li> </ul>

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		<p>data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 3:49–57</p> <ul style="list-style-type: none"> <li>• “This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.”</li> </ul> <p>Krouse at 8:1–12</p> <ul style="list-style-type: none"> <li>• “A second copy of the numeric data is also transmitted from the processor <b>40</b> to the authorization record generator <b>38</b>, which also retrieves from the storage system <b>42</b> the payee and payment amount data associated with this transaction and transmits same to the generator <b>38</b>. Processor <b>40</b> also</li> </ul>

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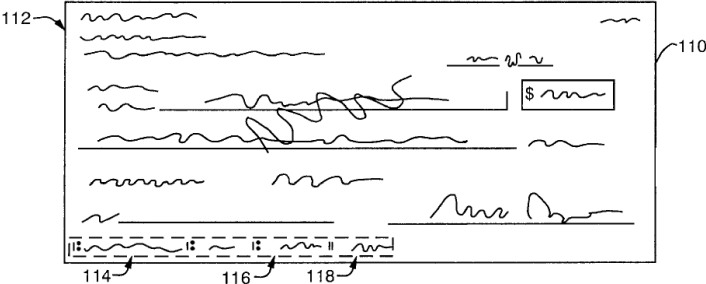
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		<p>supplies to the generator 38 from the storage system 42 data indicative of the initiation of the current transaction. Preferably, each of the terminals 18, 20, 22 of the system 10 is associated with a unique station/terminal identification code or number which is stored in the terminal's respective storage system 42. This terminal identification number is also supplied to the generator 38 from the system 42.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check 110 is Magnetic Ink Character Recognizable (MICR) line 94, which is positioned at the bottom of the check 110 and in check 110, includes three fields 114, 116, 118 of printed digits separated by special control characters. Fields 114, 116 contain the financial institution transaction routing number and account number on which the check 110 is drawn, and field 118 contains the check number of the check 110. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line 94, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System 10 may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown). Based upon the standardized location, size, style, etc. of the MICR line 94 in document 110 and the fields 114, 116, 118 contained therein, recognizer 32 utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner 34 from scanning the MICR line portion 94 of the document 110, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields 114, 116, 118) in MICR line 94. This numeric data is then transmitted to the processor 40, which transmits a copy of the numeric data to the storage system 42 where it is stored in association with the scanned image data and the payee and payment amount data previously stored</li> </ul>

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		<p>therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

2. Claim 3

Claim	'278 Claim Recitation	Exemplary Citations in Reference
3	The method of claim 1, wherein the symbolic content comprises a unique code.	<p>Krouse discloses the method of claim 1, wherein the symbolic content comprises a unique code.</p> <p><i>Id.</i> at [1].</p> <p>Krouse at Fig. 6</p>  <p style="text-align: center;">FIG. 6</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not</li> </ul>

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		<p>shown).</p> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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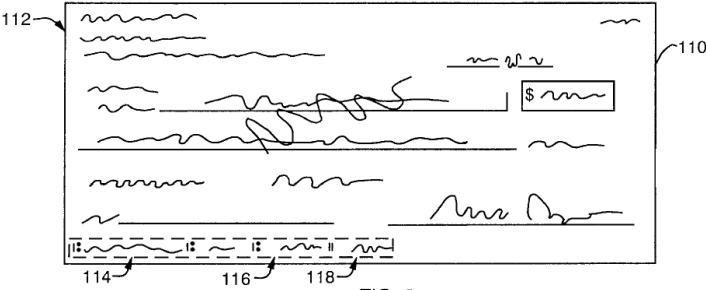
**3. Claim 4**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
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4	The method of claim 3, wherein the image includes a representation of the code.	<p>Krouse discloses the method of claim 3, wherein the image includes a representation of the code.</p> <p><i>Id.</i> at [3].</p> <p>Krouse at Fig. 6</p>  <p>FIG. 6</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"><li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li></ul> <p>Based upon the standardized location, size, style, etc. of the MICR line</p>
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		<p><b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 5**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
5	The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message	Krouse discloses the method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.

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	<p>indicating the absence of a match within a specified tolerance.</p>	<p><i>Id.</i> at [3].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"><li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li></ul> <p>Krouse at 4:13–57</p> <ul style="list-style-type: none"><li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li></ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for</p>
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		<p>generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p>
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		<p>Krouse at 14:64–15:67</p> <ul style="list-style-type: none"><li>• “Processor <b>220</b> compares the recognition characteristics of the particular document <b>400</b> being processed with the sets of reference recognition characteristics stored in the archive <b>228</b>. More specifically, the vertex coordinates and dimensions of the imaginary rectangles generated by the generator <b>204</b> from the scanned image of the document <b>400</b> are compared with respective reference recognition characteristics (i.e., vertex coordinates and dimensions of imaginary rectangles) generated by the process used to generate the recognition characteristics from the scanned image of document <b>400</b>, to determine whether a match exists between the recognition characteristics from the scanned image of document <b>400</b> and any one of the sets of reference recognition characteristics stored in the database archive system <b>228</b>. Preferably, this is accomplished by first comparing the recognition characteristics from the scanned image of document <b>400</b> to the sets of reference characteristics, and unless the respective dimensions of at least three of the imaginary rectangles from the scanned image of document <b>400</b> match to within a predetermined error tolerance (e.g., 2 percent) of corresponding respective vertices and dimensions in a respective set of reference recognition characteristics stored in the system <b>228</b>, processor <b>220</b> signals that the format of the scanned document <b>400</b> does not match any of the formats of the reference documents from which the reference recognition characteristics stored in the database archive <b>228</b> were generated. If such a "no match" condition is determined by the processor <b>220</b> to exist, the bill document <b>400</b> may be sent to the reference characterization generator station to permit the human operator to determine whether to input the reference characteristics and other bill document identification information (i.e., the other types of information stored in association with each set of reference recognition characteristics previously stored in the database archive <b>228</b>) manually for storage in the archive system <b>228</b> as a new set of reference recognition characteristics to permit other bills having the same format as document <b>400</b> to be processable by terminal <b>202</b> in the future, or to</li></ul>
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		<p>process the bill payment transaction as a "one-of-a-kind" transaction (i.e., without storing such recognition characteristics and information in the database archive <b>228</b> for future use by the processor <b>220</b>). Otherwise, if the predetermined match error tolerance conditions are found to exist, processor <b>220</b> selects those sets of reference recognition characteristics that are found to satisfy such conditions, and calculates the displacement differences that exist between each of the imaginary rectangles of the scanned image of the document <b>400</b> and those described in these selected sets of reference recognition characteristics (i.e., the displacements that must be applied to the imaginary rectangles of the scanned image of document <b>400</b> to accomplish a "best fit" match of same with the corresponding imaginary rectangles described in these selected sets of reference recognition characteristics). Such "best fit" match conditions are determined to exist for given corresponding rectangles of the recognition characteristics of the scanned image of the document <b>400</b> and a given respective set of reference recognition characteristics, when the absolute pixel displacement differences between the respective abscissa and ordinate coordinates of the vertices of the rectangles are within 40 pixels and 60 pixels of each other, respectively, and the respective lengths and widths of the rectangles are within 20 pixels and 2 pixels of each other, respectively. Once these absolute displacement differences have been calculated by the processor <b>220</b>, processor <b>220</b> "scores" the degree of best fit match condition that exists between the imaginary rectangles of the scanned image of the document <b>400</b> and those described in the aforesaid selected sets of reference recognition characteristics, whereby to determine which one of the aforesaid selected sets of reference recognition characteristics best matches the recognition characteristics of the scanned document <b>400</b>."</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with</p>
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		<p>the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

### Exhibit F-23

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. A statement of reasons and good cause for each supplement in this chart is identified in the cover pleading.

QBIC was known or used by others in the United States and publicly used or on sale in the United States by November 5, 2000. *See generally* W. Niblack et al., *The QBIC Project: Querying Images By Content Using Color, Texture, and Shape*, SPIE Vol. 1908 (1993), pp. 173–187 (IBM0002390–404); M. Flickner et al., *Query by Image and Video Content: The QBIC System (“QBIC”)*, IEEE Sept. 1995, pp. 23–32 (IBM0000893–902); W. Niblack et al., *Updates to the QBIC System*, SPIE Vol. 3312 (1997), pp. 150–161 (IBM 0002419–430); and *Query By Image Content QBIC Demonstration Program*, IBM Research, Sept. 1998 (IBM000747). QBIC is available as prior art at least under 35 U.S.C. § 102(a), (b), and (g), having been known or used by others in the United States and publicly used or on sale in the United States by at least 1995 and certainly by November 5, 2000, including, for example, at <http://libra.uc.davis.edu> through the Art History Department at U.C. Davis; at [www.thinker.org/imagebase/indox-2 .htm3](http://www.thinker.org/imagebase/indox-2.htm3) through the Fine Arts Museum of San Francisco; through demos at <http://www.qbic.almaden.ibm.com>; and through IBM’s commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. *See generally* Deposition of IBM Corporate Representative Myron Flickner, *Nantworks, LLC and Nant Holdings IP, LLC v. Bank of America Corporation and Bank of America, N.A.*, 2:20-cv-07872-GW-PVC (C.D.C.A. 2020) (“Flickner 8/29/23 Depo”) at e.g., 32–33, 39–40, 44, 62–63, 66–67, 72–74, 103–107, 110–112, 127, 163–174, 183–189, 191–195, 215, 219–220, 241, 307–309, 311–317, Exs. 3–13; *see also* Deposition of IBM Corporate Representative Myron Flickner, *Network-1 Technologies, Inc., v. Google LLC and Youtube LLC*, 1:14-cv-09558-PGG (S.D.N.Y. 2019) (“Flickner Depo”), including, e.g., at 13, 14, 15–18, 29–30, 34, 36, 37, 43–46, 48, 58, 60, 61–62, 67–69, 72, 74–76, 84–86, 88–89, 98–100, 102, 106, 113, 125, 135, 152–154, 160–161, 170–172, 180–181, 194, 198–201, 203–205, 215–216, 220–221, and Exs. 1–16.

As shown in the chart below, QBIC anticipates asserted claims 1, 4, and 5 of the ’278 Patent. The disclosures/exemplary citations for each element incorporate the disclosures/exemplary citations of the proceeding limitations. To the extent QBIC is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent QBIC is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cited references and/or in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe



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the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid. The following chart incorporates by reference the analysis from Exhibit F-21 for each limitation.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	<p>QBIC discloses a computer-assisted method.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) 2390</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images' content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>QBIC Demo (IBM000747)</p>  <p>QBIC Demo (IBM000747)</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner Depo at 13</p> <p>11           And what does QBIC stand for?</p> <p>12           A. Query by image content.</p> <p>Flickner Depo at 84</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. What was the Web version of QBIC                  2 implemented by UC Davis?                  3 A. I'm sorry?                  4 Q. What was the Web version of QBIC                  5 discussed on this page?                  6 A. It was a version that used Web                  7 front-end -- Web front-end for the -- the display                  8 and query.                  9 Q. Sorry. Could you repeat that. I                  10 didn't --                  11 A. It was a version of QBIC that used the                  12 Web front-end for doing the visual query.                  13 Q. Did you ever visit that Web interface?                  14 A. It was on that site that's men- --                  15 mentioned there.                  16 Q. Is that site the one you're referring                  17 to --                  18 A. wwwqbic.almaden.ibm.com                  19 Q. Is that the same URL that the stamps demo                  20 was hosted on?                  21 A. Yes.</p> <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>

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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system?</p> <p>14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query.</p> <p>17 Q. And where would the images being searched 18 come from?</p> <p>19 A. The file system on the -- on the 20 computer.</p> <p>21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah.</p> <p>2 Q. And how many images could the user 3 search?</p> <p>4 A. I don't remember specific numbers. 5 Whatever the file system supports.</p> <p>6 Q. Was there any cap on the amount of images 7 that the user could search?</p> <p>8 A. I don't know.</p> <p>9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image?</p> <p>12 A. I think so.</p>
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		<p>10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right? 1 A. Right.</p> <p>Flickner 8/29/23 Depo at 31</p>

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		<p>3 Q. And you're getting the images -- where are                      4 the -- where are the source of the images?                      5 A. At the time we were looking at generic                      6 image sources. So we were using things like what                      7 was now called Getty, I think, so it's a standard                      8 image repository.                      9 This is -- this is pre-image search in                      10 Google, for example, so we didn't have a Google to                      11 go find a bunch of images. We had to use data                      12 warehouses or places that archived a lot of images.                      13 And this is before film was popular. So we were                      14 moving to the digital domain, so we wanted the                      15 images to be digitized so the computer could process                      16 them.</p> <p><i>Id.</i> at 42</p> <p>4 Q. So let's just start at a high level. Tell                      5 me generally what is QBIC?                      6 A. QBIC was a technology -- stands for query                      7 by image content. It was a way of extracting                      8 features of various types, putting those features in                      9 a database and then searching the database to get                      10 images that looked visually similar or semantically                      11 similar.                      12 Q. And when you say "semantically similar,"                      13 what do you mean?                      14 A. You could query based on semantics. You                      15 could ask for what does a microphone look like and                      16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206</p>



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		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.</p> <p>The QBIC system was implemented in IBM commercial products, including in</p>


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		IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. <i>See, e.g.</i> , Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>QBIC discloses receiving an image comprising a representation of at least a portion of a document.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396                      4.2. <b>Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of (<i>R, G, B</i>) sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <i>n</i>th best match (<i>n</i> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p>IBM0002390 at 2391-92:</p>

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		<p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                  “We have developed the QBIC (Query by Image Content) system to explore</p>

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		<p>content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as</p>

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		<p>color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>Flickner Depo at 88</p> <p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.</p> <p>Flickner Depo at 89-90</p>

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		<p>11 Q. Was that used to the QBIC system publicly                      12 available anywhere?</p> <p>13 A. You mean was the Fine Arts demo                      14 available?</p> <p>15 Q. Yes.</p> <p>16 A. I think it was on our site, but I can't                      17 remember for...</p> <p>18 Q. How did their system work to identify art                      19 prints?</p> <p>20 A. Art what?</p> <p>21 Q. How would one identify an art print using                      22 their system?</p> <p>2 THE DEPONENT: Well, you had a picture --                      3 you could take a picture of a painting and then you                      4 could use that as a query content. And you could,                      5 for example, determine its -- its heritage or its                      6 lineage.</p> <p>7 Q. (By Mr. Dang) So you could identify                      8 image about -- or you could identify information                      9 about the painting using the system?</p> <p>10 A. Right.</p> <p>Flickner Depo at 39-40</p> <p>17 Q. Okay. So you would take -- you would use                      18 a histogram methodology to extract key frames from                      19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with                      22 those key frames?</p>

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		<p>1 A. You just populate image database using                  2 those images.</p> <p>3 Q. Okay. Could you take as -- as you did in                  4 the query by image search system, could you just                  5 search a video using this system?</p> <p>6 A. You could search for a key frame and that                  7 could point you to a video.</p> <p>8 Q. As an input into the system, could you                  9 search -- could you input a whole video and then                  10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which                  15 it did so, as you mentioned, was -- would it                  16 extract key frames from the video, extract features                  17 from those key frames, and then search those                  18 features; is that right?</p> <p>19 A. Correct.</p> <p>Flickner Depo at 54-55</p>

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		<p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <hr/> <p style="text-align: right;">Page 54</p> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.</p> <p><b>Flickner Depo at 62-63</b></p> <p>21 Q. So would the user themselves supply the                      22 images?</p> <hr/> <p style="text-align: right;">Page 62</p> <p>1 A. They could, yeah.</p>



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		<p>Flickner 8/29/23 Depo at 53</p> <p>4 Q. So if you look at -- under 2.1 Database 5 Population, it says, "The first step in population 6 is to simply load the images into the system." 7 Is that right? 8 A. Yep. 9 Q. And the next sentence says then you can 0 also add the image to the database, preparing a 1 reduced thumbnail and adding any available text 2 information to the database. 3 A. Yep. 4 Q. Is that correct? 5 A. Yep.</p> <p><i>Id.</i> at 60–61</p>

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		<p>13 Q. Okay. Did you do that type of                      14 segmentation to differentiate foreground objects                      15 from the background in this database population                      16 step?                      17 A. We did research prototypes of it. I don't                      18 know what all went out.                      19 Q. You don't know whether those made it into                      20 a commercial product?                      21 A. I would say they probably didn't.                      22 Q. Okay. Were they in the -- were they used                      23 in the -- in demo applications that you referred to?                      24 A. They might have been.                      25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                      2 with those objects? Were they stored, for example,                      3 as a separate image or were they somehow linked to                      4 or associated with the image from which they were                      5 extracted?                      6 A. Typically they were linked.                      7 Q. They were linked to the source image?                      8 A. Yeah.</p> <p><i>Id.</i> at 32–33</p>

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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah.</p> <p><i>Id.</i> at 74–75</p> <p style="text-align: right;">P</p>

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			<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202</p>

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		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300</p> <p>6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312</p>

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		<p style="text-align: right;">Page 312</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p> <p><i>See also</i> Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover</p>

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		<p>pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>determining that symbolic content is on the at least the portion of the document based on the image;</p>	<p>QBIC discloses determining that symbolic content is on the at least the portion of the document based on the image.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p><b>“DATABASE POPULATION</b></p> <p>In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like ‘baby on beach,’ can be associated with an outlined object or with the scene as a whole.</p> <p><b>Object-outlining tools</b></p> <p>Ideally, object identification would be automatic, but this is generally difficult. The alternative—manual identification—is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to</p>



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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

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		<p>developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised segmentation methods along with a foreground/background model to identify objects in a restricted class of images. The images, typical of museums and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.</p> <p>We also provide semiautomatic tools for identifying objects. One is an enhanced flood-fill technique. Flood-fill methods, found in most photo-editing programs, start from a single object pixel and repeatedly add adjacent pixels whose values are within some given threshold of the original pixel. Selecting the threshold, which must change from image to image and object to object, is tedious. We automatically calculate a dynamic threshold by having the user click on background as well as object points. For reasonably uniform objects that are distinct from the background, this operation allows fast object identification without manually adjusting a threshold. The example in Figure 3 shows an object, a fox, identified by using only a few clicks.</p> <p>We designed another outlining tool to help users track object edges. This tool takes a user-drawn curve and automatically aligns it with nearby image edges. Based on the ‘snakes’ concept developed in recent computer vision research, the tool finds the curve that maximizes the image gradient magnitude along the curve.</p> <p>The spline snake formulation we use allows for smooth solutions to the resulting nonlinear minimization problem. The computation is done at interactive speeds so that, as the user draws a curve, it is ‘rubber-banded’ to lie along object boundaries. . . .</p> <p><b>Video data</b></p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an</p>

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		<p>r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content. You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b></p> <p>The sum of the color values for all pixels in an image divided by the number of</p>

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		<p>pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b>                      Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b>                      The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b>                      Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p>

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		<p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):                      “Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>IBM0002390 at 2391-92:</p>

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		<p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p>

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		<p>QBIC Demo (IBM000747)</p>  <p>Flickner Depo at 162 3           What -- what -- what features did you use 4           in the trademark demo? 5           A. I don't remember all of them. Texture. 6           We had some shape stuff and layout stuff. The -- 7           the trademark also had text search. So it had 8           keyword text search.</p> <p>Flickner Depo at 50</p>

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		<p>7 Q. And so if I clicked on this T, and it                      8 used the texture features, what would -- what would                      9 the system do?                      10 A. It would return the list of stamps based                      11 on similarity and texture.                      12 Q. And how would it decide which stamps were                      13 the most similar to that query image?                      14 A. It would use those texture features to                      15 compute it, and then it -- I think it was using L                      16 to distance.</p> <p>Flickner Depo at 22-25</p>

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		<p>1 Q. Okay. And what would you do with the                  2 image after you hit and extracted the color                  3 histogram from it?                  4 A. Nothing.                  5 Q. Would those features be stored in any                  6 database or --                  7 A. Yes.                  8 Q. Okay. And let's do -- what about                  9 texture, could you extract texture features from an                  10 image?                  11 A. We did.                  12 Q. And how would you do that?                  13 A. I don't remember exact features we were                  14 using. There were -- we published some papers on                  15 them.                  16 Q. Okay. Was there any reasoning behind                  17 picking the features that you chose?                  18 A. Yes.                  19 Q. And what was that reasoning?                  20 A. We wanted to make it so that the results                  21 were perceptually good.                  22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red                  2 color in it or some sort red color histogram; is                  3 that right?                  4 A. Well, you -- you take specific -- you                  5 search for a red color. You'd compute the                  6 histogram and then basically match the histogram,                  7 which would give you images that had more colors in                  8 the reds. This is not -- it's not a unique thing.                  9 Q. Were you always searching for a                  10 particular feature, or could you just search some                  11 sort of example image?                  12 A. We could search an example image.                  13 Q. And how would that process work?                  14 A. Just extract the features from it.                  15 Q. So let's break that down.                  16 So you would submit an example image to                  17 the -- to the system, right?                  18 A. Uh-huh.                  19 Q. And then how do the -- how -- how does                  20 the system select which features to extract?                  21 A. It would compute them all, typically, or                  22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that                  2 this is a better match, that the ordering was                  3 reasonable and...                  4 Q. So by that, do you mean that people would                  5 view the results returned as the closest or close                  6 matches to your -- to your image?                  7 A. It was -- it would satisfy their query.                  8 Q. Okay. So -- so you would have this set                  9 of features in your database.                  10 How would you search for those features?                  11 A. Typically, we -- initially, we did linear                  12 scan where you just actually evaluate the -- the                  13 distance metric against all the features.                  14 Q. So in linear scan, you would compare some                  15 sort of search term against all the features in the                  16 database?                  17 A. Well, it depends on which features you're                  18 using. You didn't have to use all the features.                  19 You could use just color features or just texture                  20 features or just...                  21 Q. So to make sure I'm understanding this                  22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>



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		<p>Flickner Depo at 36</p> <p>10 Q. So underlying this paper, you mentioned</p> <p>11 you did more work on the shape side of things; is</p> <p>12 that right?</p> <p>13 A. I did.</p> <p>14 Q. And what would that work have entailed?</p> <p>15 A. We wanted to query by shape.</p> <p>16 Q. Okay. And how would that have worked?</p> <p>17 A. We created features related to the shape</p> <p>18 of a -- the object of -- as it populated the</p> <p>19 database, and then we would query against those</p> <p>20 features.</p> <p>Flickner Depo at 214-215</p>

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		<p>4 Q. What do you mean by the images of shot                      5 boundaries were indexed?                      6 A. Each -- each shot -- the shot -- the shot                      7 boundary detection is trying to extract key frames                      8 or break the video into small subsec --                      9 subsections -- hang on. Let me think here a                      10 second.                      11 So the shot boundary here is different                      12 than key framing. So I'll -- I'll retract what I                      13 said earlier. This -- while similar, they're not                      14 the same.                      15 Q. What are the differences?                      16 A. Shot boundaries are typically detected at                      17 fade to black, and key frames are supposed to be a                      18 representative still image of the video segment.                      19 Q. How would a shot boundary index allow one                      20 to query a video by content?                      21 A. It gives you semantical information as                      22 related to what the -- that -- that -- that is a --</p> <p style="text-align: right;">Page 214</p> <hr/> <p>1 a reasonable amount of return video. It's -- it's                      2 breaking it into small snippets.                      3 Q. Does it extract features from the key                      4 frames?                      5 A. If there are key frames extracted, it --                      6 it will reference key frames.</p> <p>Flickner Depo at 40-42</p>

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		<p>3 Q. Okay. Could you take as -- as you did in 4 the query by image search system, could you just 5 search a video using this system? 6 A. You could search for a key frame and that 7 could point you to a video. 8 Q. As an input into the system, could you 9 search -- could you input a whole video and then 10 the system would extract the key frames and then -- 11 A. Yes. 12 Q. -- search that using that? 13 A. If I recall correctly, yes. 14 Q. Okay. And the way -- the method by which 15 it did so, as you mentioned, was -- would it 16 extract key frames from the video, extract features 17 from those key frames, and then search those 18 features; is that right? 19 A. Correct. 20 Q. Okay. Other than the use of shots and 21 key frames, is there any difference between the 22 video search functionality disclosed here and the</p> <hr/> <p>Page 40</p> <p>1 query by image search system? 2 A. There may have been. 3 Q. Can you think of any now? 4 A. No. 5 Q. When you searched for -- or when you 6 searched a video using this system, what would 7 the -- or what would the system return? 8 A. I don't remember if we returned the 9 stills or a small -- small video clip. 10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p>
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		<p>1 A. Right.</p> <p>Flickner Depo at 87.</p> <p>4 Q. What feature extraction methods did the                      5 UC Davis implementation of QBIC rely on?                      6 A. It was similar to the other texture,                      7 shape, color and layout.                      8 Q. Was there any indexing scheme used?                      9 A. There may have been some text indexing                      10 scheme used.</p> <p>Flickner 8/29/23 Depo at 42</p> <p>4 Q. So let's just start at a high level. Tell                      5 me generally what is QBIC?                      6 A. QBIC was a technology -- stands for query                      7 by image content. It was a way of extracting                      8 features of various types, putting those features in                      9 a database and then searching the database to get                      10 images that looked visually similar or semantically                      11 similar.                      12 Q. And when you say "semantically similar,"                      13 what do you mean?                      14 A. You could query based on semantics. You                      15 could ask for what does a microphone look like and                      16 you get various incantations of visual microphones.                      17 Q. So you could do a text or keyword query?                      18 A. You could.</p> <p><i>Id.</i> at 44</p> <p>2 Q. And how did that problem, going through                      3 film stocks being a relatively labor tedious                      4 process, how did that play into developing QBIC?                      5 A. Well, just like you could query -- you                      6 could query text based on court documents or things                      7 like that, now you can make visual queries.                      8 Q. And querying text was known. People were                      9 doing that before the QBIC project started?                      10 A. Yes.</p>

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		<p><i>Id.</i> at 45–47</p> <p>6 Q. And going back to your testimony about  7 querying text or keywords, does that mean OCR or  8 does that -- does that mean something else?  9 A. You could do OCR.  10 Q. Okay. And OCR --  11 A. I assume OCR, you mean optical character  12 recognition?  13 Q. Correct. So that could include OCR?  14 A. Yeah.  15 Q. And that was a known technology at the  16 time the QBIC project started?  17 A. Yes.  18 MR. EDWARDS: We'll mark Exhibit 2.  19 (Deposition Exhibit 2 was marked.)  20 BY MR. EDWARDS:  21 Q. And, Mr. Flickner, before we get to  22 Exhibit 2, did -- going back to the OCR, did the  23 QBIC system itself do OCR?  24 A. No.  25 Q. It did not. Did the QBIC system ever</p>

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		<p>1 interface with any other software products that did                  2 do OCR?                  3 A. Yes.                  4 Q. What software products?                  5 A. There was a research system that a guy                  6 named Dick Casey built.                  7 (Reporter seeks clarification.)                  8 A. Dick Casey.                  9 Q. And what was the research system called?                  10 A. I don't remember.                  11 Q. And Dick Casey was at IBM?                  12 A. Yeah.                  13 Q. And when you say "research system," are                  14 you referring to just this OCR system or are you                  15 referring to this system that -- a system that                  16 interacted with QBIC?                  17 A. I was referring to the OCR system.                  18 Q. Okay. And was there a system constructed                  19 that interfaced QBIC with this OCR system?                  20 A. I don't recall.                  21 Q. Do you know if there were any IBM                  22 commercial products that implemented QBIC and OCR?                  23 A. I don't recall.                  24 Q. So earlier I'd asked you did the QBIC                  25 system ever interface with any other software</p> <hr/> <p style="text-align: right;">Page 47</p> <p>1 products that did OCR and you said yes, and you said                  2 it was a research system that Dick Casey built; is                  3 that correct?                  4 A. Yeah.                  5 Q. And when you say that it interfaced with                  6 it, was that internally at IBM?                  7 A. Yes.                  8 Q. Okay. And what was the purpose of having                  9 the QBIC system interface with the OCR system?                  10 A. Just to demonstrate new capabilities.</p> <p><i>Id.</i> at 76</p>

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		<p>9 Q. I could have taken a picture of an  10 electronic billboard or display and submit that to  11 the system?  12 A. Yep.  13 Q. Stamps?  14 A. Yep.  15 Q. Posters?  16 A. Why not?  17 Q. Magazine?  18 A. Subject to copyright issues, yes.  19 Q. Certainly.  20 How about a passport? validity  21 A. Could be done.  22 Q. An album cover?  23 A. Could be done.  24 Q. And could those images not only contain  25 objects but also symbols, like a -- like a logo or a</p> <p style="text-align: right;">Page 77</p> <p>1 trademark?  2 A. Yes.</p> <p><i>Id.</i> at 187–188</p> <p>8 Q. And if you look at the top paragraph, last  9 sentence, it says, "You can now search for images by  10 specifying" -- excuse me. Strike that.  11 It says, "You can now search for images by  12 specifying content attributes (such as color,  13 texture, shape, and layout) and data description  14 elements (such as category and related character and  15 numeric business data)."  16 Do you see that?  17 A. Um-hum.  18 Q. And data description elements, are those  19 things like text or keyword searches that we had  20 talked about before?  21 A. Um-hum.  22 MR. HANSEN: Objection; lacks foundation.  23 (Reporter seeks clarification.)  24 BY MR. EDWARDS:  25 Q. Are those the same as text or keyword</p>

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		<p style="text-align: right;">Page 188</p> <p>1 searches that we talked about before?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: Text or feature -- textures and                  4 keywords?                  5 BY MR. EDWARDS:                  6 Q. No. I'm sorry, let me ask it so it's                  7 clear.                  8 Data description elements, such as                  9 category and character and numeric business data,                  10 that would be the same as a text or keyword search                  11 that we talked about before; correct?                  12 A. Correct.</p> <p><i>Id.</i> at 190–191                  22 Q. So [as read], "Once the image catalogs are                  23 created, you can use the Image Query component to                  24 find image and business information. Business                  25 information, such as character and numeric data, are</p>



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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p>Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 <b>It's just a particular frame in a video.</b></p>
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<b>Description</b>	and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.
<p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p>	<p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p>
<p style="text-align: center;"><b>Image Classification</b></p>	<p style="text-align: center;"><b>Image Formats</b></p>
<p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p>	<p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"><li>• Audio Visual Connection (AVC) images</li><li>• OS/2 bitmap</li><li>• Windows 3.x bitmap</li><li>• PCX</li><li>• Intel and Motorola TIFF</li><li>• TARGA TGA</li><li>• TIFF (FAX)</li><li>• GIF</li><li>• Kodak Photo-CD</li></ul>
<p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p>	<p style="text-align: center;"><b>Product Positioning</b></p>
<p style="text-align: center;"><b>Image Query</b></p>	<p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p>
<p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"><li>• Image content, such as color, shape, texture, or layout</li><li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li><li>• Combinations of image content and data description.</li></ul>	<p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p>
<p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p>	<p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"><li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li><li>• Query and display images</li><li>• View or listen to video and audio information</li><li>• Display formatted text</li></ul>
	<p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, the '278 patent acknowledges that acquiring information about objects through symbols, such as barcodes or some other means to encode detectable information in the image or on the object, were traditional methods known in the art and not part the present invention. '278 Patent, 3:39-48. Indeed, the '278 patent acknowledges that algorithms, software, and hardware components were commercially available at the time of the invention that could detect and decode symbols, such as barcodes or text, in an input image. <i>Id.</i> at 14:54-59. This limitation was thus known in the art by patentee’s own admission, and by asserting this claim, Plaintiff is attempting to reclaim disavowed claim scope and claim subject matter which patentee has acknowledged is not part of the invention.</p>
[1C]	extracting symbol information based on the symbolic content according to symbol type;	<p>QBIC discloses extracting symbol information based on the symbolic content according to symbol type.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore</p>


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		<p>content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as</p>

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		<p>color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>QBIC Demo (IBM000747)</p>  <p>Flickner Depo at 185</p>

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		<p>4 So for -- for a search in the MediaMiner</p> <p>5 version of QBIC, would the -- the QBIC query be</p> <p>6 compared to all of the records in the database?</p> <p>7 A. I suspect there was support for text</p> <p>8 refinement, based on what I'm seeing here.</p> <p>9 Q. And this is the text refinement that</p> <p>10 would be keyword searching?</p> <p>11 A. Yeah. As I read this on page 735, it's</p> <p>12 clear that you can do -- use image content as the</p> <p>13 query; "Show me images LIKE this one."</p> <p>14 Q. And -- and that is a search without</p> <p>15 using -- without necessarily using a text search or</p> <p>16 keywords, right?</p> <p>17 A. Right.</p> <p><b>Flickner Depo at 217</b></p> <p>7 Q. And do you see anything here that</p> <p>8 describes making queries on extracted features from</p> <p>9 video frames?</p> <p>10 A. No, I do not.</p> <p>11 MR. DANG: Objection. Lacks foundation.</p> <p>12 Q. (By Ms. Hayden) These are just -- the --</p> <p>13 the queries here are just about text queries; is</p> <p>14 that right?</p> <p>15 A. Correct.</p> <p>...</p> <p><b>Flickner Depo at 25-26</b></p>

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		<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that                    1 right?                  2 A. That's correct.</p> <p>Flickner 8/29/31 Depo at 44</p>



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		<p>2 Q. And how did that problem, going through                      3 film stocks being a relatively labor tedious                      4 process, how did that play into developing QBIC?                      5 A. Well, just like you could query -- you                      6 could query text based on court documents or things                      7 like that, now you can make visual queries.                      8 Q. And querying text was known. People were                      9 doing that before the QBIC project started?                      10 A. Yes.</p> <p><i>Id.</i> at 45–47</p> <p>6 Q. And going back to your testimony about                      7 querying text or keywords, does that mean OCR or                      8 does that -- does that mean something else?                      9 A. You could do OCR.                      10 Q. Okay. And OCR --                      11 A. I assume OCR, you mean optical character                      12 recognition?                      13 Q. Correct. So that could include OCR?                      14 A. Yeah.                      15 Q. And that was a known technology at the                      16 time the QBIC project started?                      17 A. Yes.                      18 MR. EDWARDS: We'll mark Exhibit 2.                      19 (Deposition Exhibit 2 was marked.)                      20 BY MR. EDWARDS:                      21 Q. And, Mr. Flickner, before we get to                      22 Exhibit 2, did -- going back to the OCR, did the                      23 QBIC system itself do OCR?                      24 A. No.                      25 Q. It did not. Did the QBIC system ever</p>

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		<p>1 interface with any other software products that did                  2 do OCR?                  3 A. Yes.                  4 Q. What software products?                  5 A. There was a research system that a guy                  6 named Dick Casey built.                  7 (Reporter seeks clarification.)                  8 A. Dick Casey.                  9 Q. And what was the research system called?                  10 A. I don't remember.                  11 Q. And Dick Casey was at IBM?                  12 A. Yeah.                  13 Q. And when you say "research system," are                  14 you referring to just this OCR system or are you                  15 referring to this system that -- a system that                  16 interacted with QBIC?                  17 A. I was referring to the OCR system.                  18 Q. Okay. And was there a system constructed                  19 that interfaced QBIC with this OCR system?                  20 A. I don't recall.                  21 Q. Do you know if there were any IBM                  22 commercial products that implemented QBIC and OCR?                  23 A. I don't recall.                  24 Q. So earlier I'd asked you did the QBIC                  25 system ever interface with any other software</p> <hr/> <p style="text-align: right;">Page 47</p> <p>1 products that did OCR and you said yes, and you said                  2 it was a research system that Dick Casey built; is                  3 that correct?                  4 A. Yeah.                  5 Q. And when you say that it interfaced with                  6 it, was that internally at IBM?                  7 A. Yes.                  8 Q. Okay. And what was the purpose of having                  9 the QBIC system interface with the OCR system?                  10 A. Just to demonstrate new capabilities.</p> <p><i>Id.</i> at 76</p>

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		<p>9 Q. I could have taken a picture of an  10 electronic billboard or display and submit that to  11 the system?  12 A. Yep.  13 Q. Stamps?  14 A. Yep.  15 Q. Posters?  16 A. Why not?  17 Q. Magazine?  18 A. Subject to copyright issues, yes.  19 Q. Certainly.  20 How about a passport? validity  21 A. Could be done.  22 Q. An album cover?  23 A. Could be done.  24 Q. And could those images not only contain  25 objects but also symbols, like a -- like a logo or a</p> <p style="text-align: right;">Page 77</p> <p>1 trademark?  2 A. Yes.</p> <p><i>Id.</i> at 187–188</p> <p>8 Q. And if you look at the top paragraph, last  9 sentence, it says, "You can now search for images by  10 specifying" -- excuse me. Strike that.  11 It says, "You can now search for images by  12 specifying content attributes (such as color,  13 texture, shape, and layout) and data description  14 elements (such as category and related character and  15 numeric business data)."  16 Do you see that?  17 A. Um-hum.  18 Q. And data description elements, are those  19 things like text or keyword searches that we had  20 talked about before?  21 A. Um-hum.  22 MR. HANSEN: Objection; lacks foundation.  23 (Reporter seeks clarification.)  24 BY MR. EDWARDS:  25 Q. Are those the same as text or keyword</p>

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		<p style="text-align: right;">Page 188</p> <p>1 searches that we talked about before?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Text or feature -- textures and</p> <p>4 keywords?</p> <p>5 BY MR. EDWARDS:</p> <p>6 Q. No. I'm sorry, let me ask it so it's</p> <p>7 clear.</p> <p>8 Data description elements, such as</p> <p>9 category and character and numeric business data,</p> <p>10 that would be the same as a text or keyword search</p> <p>11 that we talked about before; correct?</p> <p>12 A. Correct.</p> <p>IBM0002263 at 2264</p>

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<p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p>	<p>and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p>
<p><b>Image Classification</b></p>	<p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p>
<p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p>	<p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p>
<p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p>	<p><b>Image Formats</b></p>
<p><b>Image Query</b></p>	<p>Ultimedia Manager 1.1 understands these image formats:</p>
<p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p>	<ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCX</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul>
<p>Image Query allows searches by three methods:</p>	<p><b>Product Positioning</b></p>
<ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul>	<p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p>
<p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p>	<p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p>
	<p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p>
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		<p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p><i>See also</i> Flickner Depo at 22-25, 40-42, 54-55, 87, 98-90.</p>

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[1D]	determining a validity of the document based at least in part on the image and the symbol information; and	<p>QBIC discloses determining a validity of the document based at least in part on the image and the symbol information.</p> <p>IBM0002390 at 2391-92:</p>



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		<p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p>



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		<p>“We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color queries return items with matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p> <p>Figure 7 shows a histogram query on still images and a color query on video r-frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right.</p> <p>Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying</p>

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		<p>texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture (pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object). An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects and features to implement logical And semantics.</p> <p>....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.</p> <p><b>INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION.</b></p>

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		<p>Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at pp. 7–8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content)</p>

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		<p>technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>Flickner Depo at 22-23</p> <p>8 Q. Okay. And let's do -- what about            9 texture, could you extract texture features from an            10 image?            11 A. We did.            12 Q. And how would you do that?            13 A. I don't remember exact features we were            14 using. There were -- we published some papers on            15 them.            16 Q. Okay. Was there any reasoning behind            17 picking the features that you chose?            18 A. Yes.            19 Q. And what was that reasoning?            20 A. We wanted to make it so that the results            21 were perceptually good.            22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p> <hr/> <p>1 A. That people would get -- would agree that            2 this is a better match, that the ordering was            3 reasonable and...            4 Q. So by that, do you mean that people would            5 view the results returned as the closest or close            6 matches to your -- to your image?            7 A. It was -- it would satisfy their query.</p> <p><i>Id.</i> at 33–37</p>

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		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>	

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		<p>Flickner Depo at 143</p> <p>6 Q. (By Ms. Hayden) Okay. Going back to                      7 the -- the demos we were talking about earlier, we                      8 can use the stamps demo in Exhibit 4 as an example.                      9 In the stamps demo, as shown on                      10 Exhibit 4, was -- was there any way that a user                      11 could specify a distance or a difference or a                      12 threshold between the query and the results that --                      13 that he wanted displayed?                      14 A. In the custom queries, there are probably                      15 ways to specify some of the parameters. So if you                      16 look at Exhibit 4, there's custom query percentage                      17 and custom inquiry on the left.</p> <p><i>Id.</i> at 76–77</p> <p>9 Q. I could have taken a picture of an                      10 electronic billboard or display and submit that to                      11 the system?                      12 A. Yep.                      13 Q. Stamps?                      14 A. Yep.                      15 Q. Posters?                      16 A. Why not?                      17 Q. Magazine?                      18 A. Subject to copyright issues, yes.                      19 Q. Certainly.                      20 How about a passport?                      21 A. Could be done.                      22 Q. An album cover?                      23 A. Could be done.                      24 Q. And could those images not only contain                      25 objects but also symbols, like a -- like a logo or a                      trademark?                      A. Yes.</p> <p><i>Id.</i> at 77–78</p> <p style="text-align: right;">Page 77</p>

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		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 187–188</p>



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		<p>8 Q. And if you look at the top paragraph, last                      9 sentence, it says, "You can now search for images by                      10 specifying" -- excuse me. Strike that.                      11 It says, "You can now search for images by                      12 specifying content attributes (such as color,                      13 texture, shape, and layout) and data description                      14 elements (such as category and related character and                      15 numeric business data)."                      16 Do you see that?                      17 A. Um-hum.                      18 Q. And data description elements, are those                      19 things like text or keyword searches that we had                      20 talked about before?                      21 A. Um-hum.                      22 MR. HANSEN: Objection; lacks foundation.                      23 (Reporter seeks clarification.)                      24 BY MR. EDWARDS:                      25 Q. Are those the same as text or keyword                      Page 188                      1 searches that we talked about before?                      2 MR. HANSEN: Objection; lacks foundation.                      3 THE WITNESS: Text or feature -- textures and                      4 keywords?                      5 BY MR. EDWARDS:                      6 Q. No. I'm sorry, let me ask it so it's                      7 clear.                      8 Data description elements, such as                      9 category and character and numeric business data,                      10 that would be the same as a text or keyword search                      11 that we talked about before; correct?                      12 A. Correct.</p> <p><i>Id.</i> at 190–191                      22 Q. So [as read], "Once the image catalogs are                      23 created, you can use the Image Query component to                      24 find image and business information. Business                      25 information, such as character and numeric data, are</p>

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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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		<p><i>See also</i> Flickner Depo at 54-55, 89-90, 185, 217</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	recognizing the document as a first target object based at least in part on	<p>QBIC discloses this limitation.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally</p>

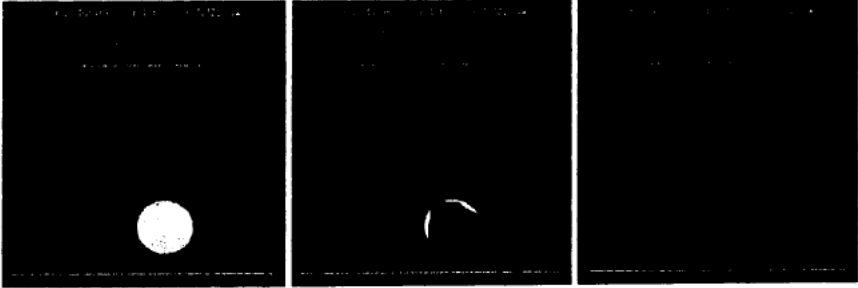
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		<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391-92</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2392-93:</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[i,j]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}, M_{[2,3]} \times M_{[3,2]}, M_{[3,3]}, M_{[3,4]} \times M_{[4,3]}, M_{[4,4]}, M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2393-95:</p>



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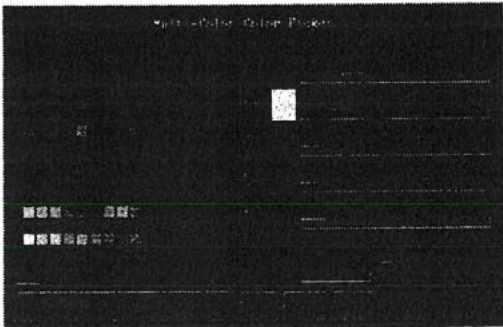
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2395</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “ Find all images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <i>R*</i>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>IBM0002390 at 2396:</p>

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		<p><b>4.1. Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. This interface is made up of four parts (listed from top to bottom): the window menu, the tool selection buttons, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images. There are are nine drawing tools provided by the interface: Polygon, Rectangle, Ellipse, Paint Brush, Eraser, Line Draw, Object Move, Fill Area, Snake Outline. For example the Polygon tool allows the user to click or drag around bounding edges of the object to be outlined, this can then be refined by the snakes method providing a shrink-wrap effect.</p> <p>Before using any tool on an image the user must first click New to create an object entry (Two shown on bottom of figure 4). The user can then type any text associated with the object to be outlined, or can do this after outlining the object. The user then selected an outlining tool and defines the “mask”. Multiple tools can be used and the last change can be removed with the Undo button or all changes removed with the Clear button.</p> <p>QBIC (Query by Image Content) at 1</p>

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		<p>Query by example using <i>color histograms</i></p> <ul style="list-style-type: none"> <li>Example image:                             <div> </div> </li> <li>One of the colour histograms for the example image is shown in Fig. 28.1.                             <div> </div> </li> </ul> <p><b>Colour Histogram of Image</b></p> <ul style="list-style-type: none"> <li>Store a histogram vector for each image in the database,                      compare images using mean squared difference,                      return images sorted by this metric.</li> </ul> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p>

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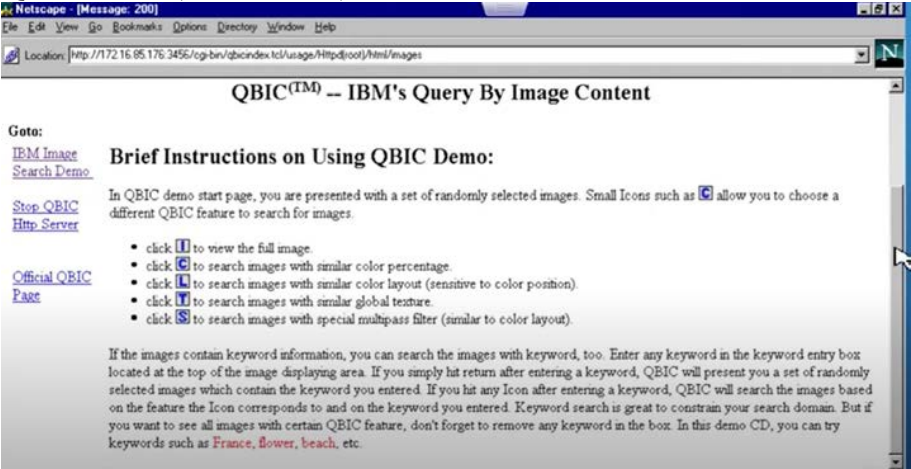
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		<p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with</p>

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		<p>text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>QBIC Demo (IBM000747)</p>  <p>QBIC Demo (IBM000747)</p>




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		 <p>QBIC Demo (IBM000747)</p> 

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		 <p>Flickner Depo at 78-79</p>



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		<p>6 Q. How would the Db2 universal search a                      7 query image using QBIC technology?                      8 A. You would create a -- create a manager                      9 QB- -- or create a QBIC catalog.                      10 Q. What's a QBIC catalog?                      11 A. It's an instance of a table that has a                      12 bunch of images in it.                      13 Q. And forgive me, what's an instance of a                      14 table?                      15 A. You create a table -- create a database,                      16 and then in the database you create a table and you                      17 have maybe like a file name, and then the actual                      18 image bits into it.                      19 Q. And how would you search for images using                      20 that table?                      21 A. You could search -- you could use                      22 whatever you wanted to for the -- the SQL query</p> <hr/> <p style="text-align: right;">Page 78</p> <p>1 to -- to filter, and then that would give you a                      2 list of results. And then you'd rank all of those                      3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 201</p>

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		<p>5 Q. Now, to search a video by content using                      6 CueVideo, how would the features be extracted from                      7 the video?                      8 MS. HAYDEN: Objection. Foundation.                      9 THE DEPONENT: You typically would                      10 extract -- you -- you try to find key frames and                      11 then you populate the image database with key                      12 frames.                      13 Q. (By Mr. Dang) And how would you search                      14 for those key frames in the image data?                      15 A. You could use a QBIC-like engine.                      16 Q. And by QBIC-like engine, what do you                      17 mean?                      18 A. Some image content-based retrieval                      19 system.                      20 Q. And what would the CueVideo system return                      21 in response to a video query?                      22 A. Typically, video snippets or videos</p> <p>Flickner Depo at 159                      10 Q. Would either version of the stamps demo                      11 allow a user to submit an unknown image as the                      12 query and ask the system to find images similar to                      13 that query image?                      14 A. I suspect it did.                      15 Q. Why do you suspect that?                      16 A. Because that's one of the nice things you                      17 can do with QBIC.</p> <p>Flickner Depo at 209-210</p>

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		<p>13 Q. Okay. Let me ask -- let me ask that                      14 question using -- using an example.                      15 Say I had a file that -- that was a                      16 snippet of a Star Wars movie.                      17 Could the CueVideo system take that                      18 snippet of the -- of a Star Wars movie and indicate                      19 to the user what Star Wars movie that snippet is                      20 from?                      21 A. Most likely, yes.                      22 Q. And how do you know that?                      1 A. Based on my knowledge in content-based                      2 imagery -- content-based retrieval, in general,                      3 that would be one of the first things you would try                      4 to implement in a video search system.</p> <p>Flickner Depo at 75-76                      11 Q. What's a Db2 universal extender?                      12 A. It's the extension of Db2 for other media                      13 types, for other types of data.                      14 Q. What do you mean by extension?                      15 Would it add functionality to the Db2                      16 database?                      17 A. Correct.                      18 Q. Is one of those added functionalities the                      19 image extender?                      20 A. Most likely.                      21 Q. What's an image extender?                      22 A. It's ability to image queries or</p>

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		<p>1 similarity queries on image data -- on image                  2 datasets.                  3 Q. Did the image extender incorporate QBIC                  4 technology?                  5 A. I believe it did.                  6 Q. Did the image extender allow a user of                  7 the Db2 universal database to search images by                  8 their content?                  9 A. I believe it did.</p> <p>Flickner Depo at 162-163</p> <p>9 Q. Was a text search required to be used                  10 with every query in the trademark demo?                  11 A. No.                  12 Q. Did the trademark demo return a set                  13 number of -- of results?                  14 A. No.                  15 Q. How did the trade -- how did the                  16 technology implemented in the trademark demo decide                  17 how many results to return to the user?                  18 A. So it was -- it was an exact match or a                  19 binary search for the text fields using some                  20 metric, like string at a distance, or something                  21 like that, and that would give you a list and a                  22 rank by the image features.</p> <p style="text-align: right;">Page 162</p> <hr/> <p>1 Q. And would this search look at all of the                  2 records that are indexed in the QBIC catalogs?                  3 A. The text index could avoid looking at                  4 some.</p> <p>Flickner 8/29/23 Depo at 33-37</p>

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		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>	

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 52–53</p> <p>12 Q. Underneath there's a sentence that says,                      13 "There are three logical steps in a QBIC                      14 application: Database population, feature                      15 calculation, and image query."                      16 Do you see that?                      17 A. Yeah.                      18 Q. You agree with that?                      19 A. Yeah.                      20 Q. All right. Well, let's talk about the                      21 first step, database population.                      22 What is database population?                      23 A. It's taking a set of images, extracting                      24 the features and putting them in a database.                      25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that                      2 in the database as well?                      3 A. Could be.                      4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      10 also add the image to the database, preparing a                      11 reduced thumbnail and adding any available text                      12 information to the database.                      13 A. Yep.                      14 Q. Is that correct?                      15 A. Yep.</p> <p><i>Id.</i> at 77–78</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99</p> <p>20 Q. So for each of color, texture, shape,</p> <p>21 sketch, there are algorithms that are performing</p> <p>22 some mathematical computation to calculate those</p> <p>23 features; is that right?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's talk about the color</p>



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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two                  2 different color computations that are done. One is                  3 average color, the other is color histogram; is that                  4 right?                  5 A. There certainly are those two.                  6 Q. Say again.                  7 A. There certainly are those two.                  8 Q. Okay. And for average color, let's talk                  9 about that first, it says [as read], "We compute the                  10 average," and it lists four things, "(R, G, B), (Y,                  11 i, q), (L, a, b), and MTM coordinates of each object                  12 and image."                  13 You see that?                  14 A. Yep.                  15 Q. So does that mean that it does -- every                  16 time it -- if it computes average color, it computes                  17 all four of those things? Or are those optional,                  18 meaning that it can compute one as opposed -- or                  19 some combination of those four?                  20 A. Some combination of those four.                  21 Q. Okay. Are there different algorithms for                  22 each of those four or is it the same algorithm?                  23 A. RGB, Yiq and LAB are all linear                  24 transformations.                  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed                  2 over time going forward from 1993?                  3 A. Most likely they did.                  4 Q. Do you recall any details for how they may                  5 have changed?                  6 A. No.                  7 Q. Do you know if functionality was added to                  8 compute average color?                  9 A. No.                  10 Q. Do you -- do you recall any other                  11 algorithms or methodologies that were used besides                  12 the four that are listed here?                  13 A. No.                  14 Q. Okay. Second methodology to compute color                  15 is referred to as color histogram here; is that                  16 correct?                  17 A. Yes.                  18 Q. And so at a high level can you explain to                  19 me what a color histogram is?                  20 A. A histogram is a count of each value. And                  21 so, for example, if you have 1, 2, 3 as a value and                  22 you say 1, 2, 3 again, the histogram would say 2                  23 because there are two 1s, two 2s, and two 3s. So                  24 it's a count of the number of values across the                  25 image.</p>	
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my                  2 head.                  3 Q. That's something different from a linear                  4 transformation?                  5 A. It might be a different linear                  6 transformation. I don't recall.                  7 Q. Okay. So for average color, the                  8 algorithms will compute that based on some                  9 combination of those four methodologies?                  10 A. Yes.                  11 Q. Okay. Do you know if those methodologies                  12 evolved over time? So this -- so, for example, this                  13 argu- -- excuse me -- article was written in 1993.                  14 Do you know if the way in which QBIC computed                  15 average color changed over time or did it stay the                  16 same?                  17 MR. STRAUSSMAN: Objection; compound.                  18 MR. EDWARDS: Let me rephrase.                  19 THE WITNESS: I don't recall.                  20 MR. EDWARDS: Let me rephrase.                  21 BY MR. EDWARDS:                  22 Q. So this article was written in 1993, and                  23 it lists four methodologies for computing average                  24 color features.                  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?                  2 A. Pixels, color.                  3 Q. So is it measuring the probability                  4 density --                  5 A. It's a --                  6 Q. -- of a color being in an image?                  7 A. It's a PDF estimator.                  8 Q. And what does PDF stand for?                  9 A. Probability density function.                  10 Q. Okay. Once the color histogram is                  11 computed, is it normalized after that?                  12 A. Yes, it was normalized.                  13 Q. And why did you normalize the color                  14 histogram?                  15 A. Because different images would have                  16 different color balances.                  17 (Reporter seeks clarification.)                  18 A. Balances, yeah.                  19 Q. Is a -- is a reason why you normalize the                  20 color histogram in -- for stored images -- well,                  21 strike that.                  22 Did you -- did you normalize color                  23 histograms when you extract -- strike that.                  24 When you calculated the color histogram                  25 features from a query image and a stored image, is</p>	

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appeasing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>

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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or 2 more of these features than the other? 3 A. Yes. 4 Q. Which one? 5 A. Shape. 6 Q. Okay. 7 (Witness reviews document.) 8 A. So one thing I can state is originally I 9 couldn't remember the name of the edge operator -- 10 and the name is Canny, the Canny edge operator -- 11 when we were talking about finding edges. 12 Q. Okay. So this -- the paragraph on 13 IBM 2393 refreshed your memory that shape 14 calculation used Canny edge detection? 15 A. No, that's sketch. 16 Q. Oh, I'm sorry. 17 A. I'm just stating that originally I was 18 asked a question about standard edge operators. I 19 couldn't remember the name. The name was Canny. 20 Q. Canny. And Canny is used in the sketch 21 calculation? 22 A. Yeah, it's used in the sketch calculation. 23 Q. Understood. Okay. Let's go back to 24 shape. 25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob. 2 Q. Can you say the name of the word again? 3 A. I think it's called perround. 4 Q. Per round? 5 A. Yeah. 6 Q. Those -- are those two words, p-e-r, 7 r-o-u-n-d? 8 A. P-e-r -- one word. 9 Q. Okay. Perround, one word. 10 A. It's basically the perimeter squared over 11 area. 12 (Reporter seeks clarification.) 13 A. Perimeter squared over area. 14 (Reporter seeks clarification.) 15 A. Length of the -- over area. 16 Q. Okay. So let's step back a little bit. 17 So it says -- the second paragraph says [as read], 18 "Our shape features are based on a combination of 19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features 20 area, circularity, eccentricity, major access 21 orientation and a set of algebraic moment 22 invariants," i-n-v-a-r-i-a-n-t-s. 23 Did I read that correctly? 24 A. Um-hum. 25 Q. Okay. For circularity, that is computed</p>
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that. 2 To calculate the shape feature in a query 3 image or a stored database image, is the first step 4 to convert that image into a binary image? 5 A. I don't think so. 6 Q. So if you look at the second paragraph -- 7 and the reason why I ask is -- it's the second 8 sentence in the second paragraph under "Shape 9 features." It says [as read], "All shapes are 10 assumed to be non-occluded planar shapes allowing 11 for each shape to be represented as a binary image." 12 See that? 13 A. Yeah. 14 Q. And then the next sentence says [as read], 15 "The area is computed as the number of pixels set in 16 the binary image." 17 A. Right. 18 Q. So that's why I ask is it the first step 19 in calculating shape to convert the image to binary? 20 A. Yes. 21 Q. And then once you convert it to binary 22 image, then what do you do next in order to 23 calculate the shape? 24 A. You're computing something called 25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct? 2 A. Right. 3 Q. All right. Area is the number of pixels 4 in the binary image? 5 A. In the binary blob. 6 Q. In the binary what? 7 A. Blob. 8 Q. Blob. And when you say "blob," what does 9 that refer to? 10 A. The outline of the object that you're 11 doing a shape query on. 12 Q. And so are each of these, area, 13 circularity, eccentricity, major axis orientation 14 and algebraic moment invariants, are those each 15 different algorithms or is it all the same 16 algorithm? 17 A. It's different algorithms. 18 Q. Okay. And since you worked on the shape 19 feature the most, do you recall any other details 20 that are not disclosed in this paragraph? 21 A. Well, this evolved and we ended up doing 22 an implementation of something that's not in here. 23 Q. Okay. And what was that implementation? 24 A. Something called turning angle per round, 25 turning angle, which is -- it looks at the tangent</p>

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		<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So</p> <p>2 you're computing the turning angle. You're</p> <p>3 computing this angle that represents a shape in a</p> <p>4 very interesting way.</p> <p>5 They don't seem to be very good for</p> <p>6 human -- so if you asked a human whether these two</p> <p>7 shapes are similar, they would say "yes," but under</p> <p>8 that feature set.</p> <p>9 Q. And you call that something per round?</p> <p>10 What was the name of it? Started with a T.</p> <p>11 Turrent?</p> <p>12 A. Turning angle.</p> <p>13 Q. Oh, turning angle.</p> <p>14 A. Yeah.</p> <p>15 Q. Well, it said -- your answer -- you did</p> <p>16 say turning angle, but you said something called</p> <p>17 something per round, and it started with a T. I</p> <p>18 thought you said turrent, but maybe I misunderstood.</p> <p>19 MR. STRAUSSMAN: Tangent?</p> <p>20 THE WITNESS: Tangent angle, yeah.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Okay. So something called tangent per</p> <p>23 round, is that what you would call it, this --</p> <p>24 A. No.</p> <p>25 Q. -- this implementation?</p>	<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle.</p> <p>2 Q. Okay. So the name of the new</p> <p>3 implementation you're talking about for shape</p> <p>4 calculation is called turning angle?</p> <p>5 A. It used turning angle as a major feature.</p> <p>6 Q. Okay. Was there any other name it went</p> <p>7 by?</p> <p>8 A. I don't recall.</p> <p>9 Q. All right. And that was -- that</p> <p>10 methodology was implemented to calculate shape on a</p> <p>11 query image and an image stored in the database post</p> <p>12 this article?</p> <p>13 A. Yes.</p> <p>14 Q. Was that the -- did that -- did that</p> <p>15 implementation, the turning angle, did that replace</p> <p>16 the methodology in this article or was it</p> <p>17 supplementing the metho- --</p> <p>18 A. Supplementing.</p> <p>19 Q. Okay. Other than turning angle, were</p> <p>20 there any other methodologies used after this</p> <p>21 article?</p> <p>22 A. Not that I recall.</p> <p>23 Q. Okay. Okay. Let's go sketch features, if</p> <p>24 you take a look at that and then let me know when</p> <p>25 you're done reading it.</p>
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Element	'278 Claim Recitation	Exemplary Citations in Reference				
		<p><i>Id.</i> at 119–128</p> <table border="0"> <tr> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p> </td> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p> </td> </tr> </table>	<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>	<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p>
<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>					
<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p>					

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then                  2 you're looking for blue water, white sand.                  3 BY MR. EDWARDS:                  4 Q. Do you recall what the methodologies                  5 used -- that were used to calculate the orientation                  6 of those colors in the image?                  7 MR. HANSEN: Objection; lacks foundation.                  8 THE WITNESS: There's no orientation per se.                  9 It's just position.                  10 BY MR. EDWARDS:                  11 Q. Well, then position. Do you recall what                  12 the methodologies are to calculate the position?                  13 MR. HANSEN: Same objection.                  14 THE WITNESS: Position is something the user                  15 inputs.                  16 BY MR. EDWARDS:                  17 Q. Something you use what?                  18 A. The user had to input.                  19 Q. Okay. And then let's move on to the next                  20 one, T. It says, "Click T to search images with                  21 similar global texture."                  22 A. Yeah.                  23 Q. Do you recall, in your work on the QBIC                  24 project, a feature called global texture that could                  25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?                  2 A. G-a-b-o-r.                  3 Q. So switch over and look at the second page                  4 of this Exhibit 6.                  5 So -- well, first back -- go back to -- go                  6 back to the first page. If you see on the left-hand                  7 side it says, "Goto: IBM Image Search Demo," and a                  8 little finger there is clicking it.                  9 You see it's in red?                  10 A. Yeah.                  11 Q. Okay. So that's clicking on that link.                  12 And then the second page is going to the IBM image                  13 search demo.                  14 A. Okay.                  15 Q. Okay? On the second page it is showing                  16 thumbnails with the different icons that we just                  17 walked through, I, C, L, T, S, on each of those                  18 icons.                  19 Do you see that?                  20 A. Yep.                  21 Q. Do you recognize this as a similar layout                  22 to the QBIC demos you hosted in the '90s?                  23 A. I don't.                  24 Q. You don't?                  25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .                  2 Q. Say again?                  3 A. I missed one of your words. A feature                  4 called what?                  5 Q. I said do you recall in your work on the                  6 QBIC project a feature called global texture that                  7 was extracted from the image?                  8 A. Yes.                  9 Q. Okay. Is that -- is that akin to texture                  10 that we looked at earlier?                  11 A. Yes.                  12 Q. Okay. And the last one is S. It's,                  13 "Search images with special multipass filter."                  14 Do you recall, in your work on the QBIC                  15 project, being able to calculate a feature called                  16 multipass filter?                  17 A. Probably Gabor functions.                  18 Q. Say again?                  19 A. Gabor functions.                  20 Q. One more time and louder.                  21 A. Gabor functions.                  22 Q. Gabor functions. Okay. What are Gabor                  23 functions?                  24 A. Gabor functions are a way of producing                  25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM                  2 website that was the AIX operating system in                  3 Exhibit 3, that did not have a similar thumbnail                  4 layout like this?                  5 A. A thumbnail, yes. I don't recall it had                  6 the buttons, the I, C, L, T, S.                  7 Q. You don't recall it had all the buttons or                  8 some of the buttons?                  9 A. All the buttons.                  10 Q. Okay. So you don't recall that it had any                  11 buttons?                  12 A. I don't -- yeah. I don't recall.                  13 Q. It could have, it couldn't have, you just                  14 don't remember?                  15 A. I just don't remember, yeah.                  16 Q. Okay. But the one that you hosted on                  17 IBM's website, it did have thumbnails in a similar                  18 format here?                  19 A. Yeah, it had thumbnails.                  20 Q. And these thumbnails represent the images                  21 that are stored in the database?                  22 A. Yes.                  23 Q. Okay. Here, the 470 images would be                  24 reflected at least -- one, two, three, four, five,                  25 six, seven -- eight of them right here in this</p>



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		<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>
		<p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

*Id.* at 135 – 136

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		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p><i>Id.</i> at 139–165</p>



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		<p>5 Q. And for the image that you use as a base                      6 for the query, the things we all talked about in                      7 terms of feature extraction for average color, color                      8 histogram, shape, texture, sketch, all of those                      9 things, the same algorithms would be used in order                      10 to extract those features from the image query?                      11 A. They're different algorithms. You would                      12 use an algorithm.                      13 Q. I'm sorry. Say that again?                      14 A. The algorithms are different between the                      15 shape features and the color features and sketch                      16 features.                      17 Q. Yeah. Understood. What I'm trying --                      18 what I'm trying to understand is, the process that                      19 we talked about before, when you populate the                      20 database and you extract the features from the                      21 images that are stored in the database.                      22 You know, we went through all those                      23 different algorithms that are used for shape, color,                      24 both average color and histogram, texture and                      25 sketch.</p>

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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>

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		<p style="text-align: right;">Page 142</p> <p>1 QBIC system would uncompress it?                  2 A. Yep.                  3 Q. And then it would extract whatever feature                  4 you want from that uncompressed image?                  5 A. Correct.                  6 Q. And then those extracted features from the                  7 uncompressed JPEG image are used in the matching                  8 process?                  9 A. Correct.                  10 Q. Okay. And you were using -- you were                  11 doing this for JPEG image -- or the QBIC system was                  12 doing this for JPEG images in the -- in the '90s?                  13 A. Yes.                  14 Q. Okay. So once the system -- now, we're                  15 only talking about image-based queries, image using                  16 as input for the queries.                  17 Once you submit an image for the query, if                  18 it's a -- you do your preprocessing that need to be                  19 done. Features are extracted. So now we've got                  20 just the extracted features, whatever those are.                  21 What happens with those extracted features                  22 next?                  23 A. They're put in the database and then                  24 potentially there are indexes built that help you do                  25 fast search against those features.</p>	<p style="text-align: right;">Page 144</p> <p>1 that does a comparison for say texture?                  2 A. You say the matching algorithm?                  3 Q. Correct.                  4 A. Yes, they could be different.                  5 Q. Well, let's talk about them. We can get                  6 into detail here.                  7 Well, before we -- before we get there, so                  8 how does the QBIC system display the results of                  9 matches to the user?                  10 A. Typically just thumbnails in a window in                  11 multiple ordered hits.                  12 Q. Okay. And it displays them in the order                  13 by which they're most similar. So the, you know,                  14 best match to the next best match to the next best                  15 match, so on and so forth?                  16 A. Correct.                  17 Q. Okay. And you said the system determines                  18 similarity based on some distance measure between                  19 the extracted features in the image query versus the                  20 stored image?                  21 A. The features of the stored image.                  22 Q. But it's a -- it's some sort of distance                  23 measure?                  24 A. Yes.                  25 Q. Okay. So let's go back to Exhibit 2.</p>
		<p style="text-align: right;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm                  2 talking about for a query, so I'm taking an image                  3 and submitting it to a system as a query.                  4 A. Query by example.                  5 Q. Query by example. Okay. Once those                  6 features extracted for that image, what happens next                  7 in the process?                  8 A. You take the feature vector and you                  9 present it to the database and say return the best                  10 matches to this feature vector.                  11 Q. Okay. So the system would compare -- the                  12 QBIC system would compare the features that are                  13 calculated from the input image to stored calculated                  14 features of the images in the database and come up                  15 with a match?                  16 A. Yes.                  17 Q. Okay. And those matches would be sorted                  18 or arranged in order of most similar?                  19 A. Yes.                  20 Q. And would algorithms do these comparisons?                  21 A. Yes.                  22 Q. Would it be a different algorithm for each                  23 of the features? So, for example, would there be an                  24 algorithm that does the comparison for color                  25 histogram and then there's a different algorithm</p>	<p style="text-align: right;">Page 145</p> <p>1 So if you turn to page IBM 2393 and                  2 rolling over to IBM 2395, that's a discussion on the                  3 image query. And so what I want to do -- I have a                  4 couple high-level questions, but then I want to walk                  5 through each one. Color starts on 2394, then                  6 texture and then shape and sketch are on 2395.                  7 So in terms of the -- in terms of the                  8 distance measure, Mr. Flickner, if -- I know you                  9 said that the results are termed based on those that                  10 are most similar but it could come up with something                  11 that's an exact match; is that right?                  12 A. It's possible.                  13 Q. Like the distance measure, the result                  14 would be zero if it was an exact match; right?                  15 A. Typically you'd get that only if you had                  16 the query image the same as a result image.                  17 Q. Right. But that's a possibility?                  18 A. Yeah.                  19 Q. Okay. So let's take a look at color --                  20 it's on -- starting at the top of 2394. You know,                  21 take your time and read that and then I want to ask                  22 you some questions about it.                  23 (Witness reviews document.)                  24 A. Okay.                  25 Q. Okay. So let's first start with average</p>

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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between  2 the query image and the database image using  3 weighted Euclidean distance; is that right?  4 A. Yep.  5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.  6 And can you just tell us at a high level  7 what -- if you can -- what Euclidean distance is?  8 A. So if you have multiple features or  9 multiple scaler features, you have to ask the  10 question I'm trying to build a distance from that  11 vector to a query vector.  12 And as you build that -- the distance, you  13 have -- you may want to weight different elements of  14 the vector differently. And we found out that using  15 variance normalization, where weights of the  16 variance of the feature, gave good aesthetic  17 results.  18 (Reporter seeks clarification.)  19 A. Aesthetic results.  20 Q. And I apologize, I couldn't hear what you  21 said. You said, "And we found out that using  22 variance" . . .  23 A. So you normalize each feature with its  24 variance.  25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)  2 Q. Well, let me ask my -- let me get my  3 question out first.  4 So we talked about the features for  5 average color before are RGB, Yiq, LAB and MTM.  6 A. Correct.  7 Q. And so, for example, for the RGB, you're  8 saying that you would take the R and you would  9 divide it by the variants of red and green, for  10 example --  11 A. Just variants of red.  12 Q. Okay. And so you could do the same for  13 the others, for Yiq or LAB?  14 A. Exactly.  15 Q. Okay. You do that for both the image  16 input query and the stored image; correct?  17 A. Correct.  18 Q. And then you're calculating the distance  19 between them, so determining how similar they are  20 based on the distance?  21 A. Yeah, or vector distance.  22 Q. Understood.  23 A. Two vectors of differences --  24 (Reporter seeks clarification.)  25 A. Two vectors with a distance calculation on</p>	
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.  2 Q. With its variance.  3 A. And then compute the average.  4 Q. Okay.  5 A. Or, I'm sorry, compute the weighted sum.  6 So red divided by the variants of red, plus green  7 divided by the variants of green --  8 (Reporter seeks clarification.)  9 A. Red divided by the variants of red, green  10 divided by the variants of green, L divided by the  11 variants of L, that's how you combine the various  12 features.  13 Q. Understand. And L represents what?  14 A. Luminance.  15 Q. Okay. And this is -- you're talking  16 specifically with respect to average color?  17 A. Well, the variance normalization is well  18 known in terms of multidimensional feature merging.  19 Q. But for average color, you wouldn't use  20 luminance, right, as a -- as a variant?  21 A. Luminance would just -- you wouldn't use  22 just luminance. You could use luminance . . .  23 Q. Well, so the color features we talked  24 about before would be RGB, Yiq, LAB --  25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.  2 Q. You're going to have to repeat that and be  3 just a little bit louder, Mr. Flickner. Sorry.  4 A. That's all right. Let me get my thoughts  5 together.  6 So we have multiple dimensional features.  7 It's not unusual to take each dimension and  8 normalize it by the variance because that gives  9 you -- what that does is if you have tight variances  10 you divide it by, you get bigger numbers. So you  11 have more information close by.  12 Q. What was the word you said before "close  13 by"?  14 A. I don't remember.  15 THE REPORTER: Information?  16 THE WITNESS: Information close by?  17 BY MR. EDWARDS:  18 Q. Okay. Okay. So now let's talk about  19 color histograms.  20 A. Okay.  21 Q. Okay? Well, stop. Let's go back to  22 average color. So is there -- you described the  23 weighted Euclidean distance that's calculated  24 between the query image and the database image for  25 average color.</p>	

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall                  2 that's not disclosed in the paragraph at IBM 2394?                  3 A. Not that I recall.                  4 Q. Okay. Do you recall whether this distance                  5 methodology changed after this article or it stayed                  6 the same?                  7 A. It changed.                  8 Q. Are you certain or do you know?                  9 A. I'm not certain, but I'm pretty certain.                  10 Q. And how did it change?                  11 A. Different features were shaped like an                  12 inch in color. The algorithm evolved. It wasn't                  13 static.                  14 Q. And how did it evolve?                  15 A. I don't recall all the details.                  16 Q. Do you recall whether it supplemented the                  17 weighted Euclidean distance or replaced it?                  18 A. I don't recall.                  19 Q. Is it fair to say there was always some                  20 distance measurement to determine similarity for                  21 average color in the QBIC system?                  22 A. There's some measurement, yeah.                  23 Q. Okay. Let's talk about color histogram.                  24 So in order to determine the similarity                  25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was                  2 determined by weighted Euclidean distance; is that                  3 right?                  4 MR. HANSEN: Same objection.                  5 THE WITNESS: Correct.                  6 BY MR. EDWARDS:                  7 Q. And how did -- how was that weighted                  8 Euclidean distance determined?                  9 A. It was inverse variance.                  10 (Reporter seeks clarification.)                  11 A. Variance.                  12 Q. And it was inverse variance for components                  13 like coarseness, contrast and directionality?                  14 A. Correct.                  15 Q. Okay. And do you recall if that                  16 methodology changed or stayed the same after this                  17 article for the QBIC system?                  18 A. Most likely it evolved.                  19 Q. Do you know for sure?                  20 A. No.                  21 Q. Do you recall any details?                  22 A. No.                  23 Q. All right. Let's talk about shape next.                  24 The similarity between the query image and                  25 the database image also used weighted Euclidean</p>	
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines                  2 distance between normalized histograms?                  3 A. Correct.                  4 Q. Do you recall any details of how that                  5 worked?                  6 A. Not off the top of my head.                  7 Q. Do you recall whether that methodology                  8 evolved for matching color histograms after this                  9 article?                  10 A. Not that I recall.                  11 Q. Okay. All right. Let's talk about                  12 texture next. And I don't know if you've read that,                  13 but that's at the bottom of 2394 and it goes to just                  14 barely at the top of 2395.                  15 (Witness reviews document.)                  16 A. Okay.                  17 Q. So for texture, the similarity is                  18 determined by the distance or the weighted Euclidean                  19 distance between the query object and -- the query                  20 object image and the database object image; is that                  21 right?                  22 MR. HANSEN: Objection; vague and ambiguous.                  23 THE WITNESS: Can you repeat.                  24 BY MR. EDWARDS:                  25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?                  2 A. Correct.                  3 Q. And do you recall how that worked?                  4 A. There's computing moments. And we used                  5 the shape measure, which I mentioned earlier,                  6 curvature and turning angle.                  7 (Reporter seeks clarification.)                  8 A. Curvature and turning angle.                  9 Q. And the curvature and turning angle would                  10 be compared between the image query and the database                  11 image; correct?                  12 A. Correct.                  13 Q. And do you recall if that methodology                  14 changed after this article came out in '93?                  15 A. Yes, it did.                  16 Q. How so?                  17 A. Well, in the IEEE computer paper, we                  18 described a different way of doing shape measures.                  19 And they included the moment calculations.                  20 Q. And you use the moment calculations to                  21 determine a distance between the image query and                  22 the -- and the database image?                  23 A. Yes.                  24 Q. Sorry?                  25 A. Yeah. Yes.</p>	

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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?</p> <p>2 A. Given a binary blob, certain high-level</p> <p>3 moments and then you create -- compute the</p> <p>4 eigenvectors of certain matrices that are created --</p> <p>5 (Reporter seeks clarification.)</p> <p>6 A. Eigenvectors, e-i-g-e -- i-n -- to compute</p> <p>7 the eigenvectors of certain matrices. And that</p> <p>8 would give you translation and rotation and</p> <p>9 variance.</p> <p>10 Q. And so after the Exhibit 3 1995 IEEE</p> <p>11 article, did that methodology change to compute the</p> <p>12 distance for shape?</p> <p>13 A. I don't recall.</p> <p>14 Q. So the methodology for shape that you just</p> <p>15 described using moment calculations, that is</p> <p>16 different from what is described in the 1993 article</p> <p>17 for weighted Euclidean distance?</p> <p>18 A. We still might have used weighted</p> <p>19 Euclidean distance when the underlying features are</p> <p>20 different.</p> <p>21 Q. Understood.</p> <p>22 And the underlying features are different</p> <p>23 in the sense that in the 1995 article you're using</p> <p>24 what features?</p> <p>25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment</p> <p>2 invariants.</p> <p>3 (Witness reviews document.)</p> <p>4 A. Is there any other papers that we have</p> <p>5 here?</p> <p>6 Q. Nope.</p> <p>7 A. Everything else is screenshots?</p> <p>8 MR. STRAUSSMAN: I don't think you introduced</p> <p>9 any other papers.</p> <p>10 THE WITNESS: I saw it earlier today.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. Why don't we do it this way. In terms of</p> <p>13 the feature calculations that were -- for shape on</p> <p>14 page IBM 900 of Exhibit 3 versus page --</p> <p>15 A. So if you look at 2393.</p> <p>16 Q. What page are you directing me to?</p> <p>17 A. 2393.</p> <p>18 Q. Okay.</p> <p>19 A. So it talks about the moment invariants as</p> <p>20 well.</p> <p>21 Q. Okay.</p> <p>22 A. These are those matrices that you compute</p> <p>23 eigenvectors of.</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. Matrices that you compute eigenvectors of.</p>	
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)</p> <p>2 Q. I think the page you may be looking for is</p> <p>3 IBM 900 on the left side.</p> <p>4 (Witness reviews document.)</p> <p>5 A. What else do we have here?</p> <p>6 Q. So if you'll look at -- if you'll -- if</p> <p>7 you'll compare page IBM 900 from Exhibit 3 to page</p> <p>8 IBM 2393 from Exhibit 2, those are the descriptions</p> <p>9 in both articles about the features that are</p> <p>10 calculated.</p> <p>11 A. I'm trying to remember what --</p> <p>12 MR. STRAUSSMAN: Can you direct him a little</p> <p>13 closer?</p> <p>14 BY MR. EDWARDS:</p> <p>15 Q. Can I show you? Do you mind?</p> <p>16 I believe this is what you're looking for.</p> <p>17 So if you look right here (indicating).</p> <p>18 (Witness reviews document.)</p> <p>19 A. That's the same as this one (indicating).</p> <p>20 We had another -- there's another discussion about</p> <p>21 moments.</p> <p>22 Q. So if you look at -- under "Shape</p> <p>23 features" at 2393, right there, where you're looking</p> <p>24 at --</p> <p>25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment</p> <p>2 invariants in the 1993 SPIE article?</p> <p>3 A. Correct.</p> <p>4 Q. Right. And then if you go to the IEEE</p> <p>5 article that you primarily co-authored, on page 900,</p> <p>6 it refers to shape queries using area, circularity,</p> <p>7 eccentricity, major-axis direction and features</p> <p>8 derived from the object moments.</p> <p>9 A. Right.</p> <p>10 Q. Is that the same thing as algebraic moment</p> <p>11 invariants?</p> <p>12 A. Right.</p> <p>13 Q. So it looks like the methodologies are the</p> <p>14 same for the features that are extracted between the</p> <p>15 papers; is that right?</p> <p>16 A. I thought one paper had algebraic moments</p> <p>17 and one had turning angle. Maybe they both had</p> <p>18 turning angle.</p> <p>19 (Reporter seeks clarification.)</p> <p>20 A. Turning angle. Algebraic moments.</p> <p>21 Turning angles.</p> <p>22 Q. The 1993 paper refers to algebraic moment</p> <p>23 invariants. The IEEE paper, on IBM 900, refers to</p> <p>24 features derived from object moments.</p> <p>25 Are those the same thing?</p>	

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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.</p> <p>2 Q. Okay. And so turning angles, which you've</p> <p>3 previously testified on, do you think that</p> <p>4 calculating shape features based on turning angles</p> <p>5 came after these papers?</p> <p>6 A. No. They're mentioned in these papers.</p> <p>7 Q. Okay. So they're included in these</p> <p>8 papers?</p> <p>9 A. Yes.</p> <p>10 Q. And so any distance measurement using</p> <p>11 weighted Euclidean distance would have taken into</p> <p>12 account turning angles?</p> <p>13 A. As a feature, yeah. Yes.</p> <p>14 Q. For both -- for both papers?</p> <p>15 A. For both papers.</p> <p>16 Q. Okay. Let's talk about sketch, which</p> <p>17 is -- if you'll just stick with 2395, which is</p> <p>18 Exhibit 2.</p> <p>19 MR. STRAUSSMAN: Can you direct him?</p> <p>20 THE WITNESS: I found it.</p> <p>21 MR. STRAUSSMAN: Okay.</p> <p>22 (Witness reviews document.)</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Let me know when you're finished reading</p> <p>25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the</p> <p>2 best matches based on order of similarity?</p> <p>3 A. Um-hum.</p> <p>4 Q. Does iterated query refinement mean that I</p> <p>5 can further refine that query to search for things</p> <p>6 like shape, like a -- you know, some shape in the --</p> <p>7 in the query image, like a logo or an icon, and that</p> <p>8 will further refine the results to give me things</p> <p>9 that have that similar shape inside the results of</p> <p>10 the color histogram?</p> <p>11 A. Yes.</p> <p>12 Q. And then I can -- I can keep doing that, I</p> <p>13 can further even refine that result by using a</p> <p>14 keyword, for example?</p> <p>15 A. Yes. Or you could do it all at once.</p> <p>16 Q. Okay. So the results of the query -- so</p> <p>17 we talked about before that the results of the</p> <p>18 queries display thumbnails of the database images</p> <p>19 based on similarity of which they match; correct?</p> <p>20 A. Correct.</p> <p>21 Q. And then those thumbnails can provide</p> <p>22 links to the original image or, if it was an</p> <p>23 r-frame, it could be -- you could provide a link to</p> <p>24 the video; correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.</p> <p>2 Q. For sketch, the similarity between the</p> <p>3 query image and the database image uses an algorithm</p> <p>4 that performs logical binary correlation of the</p> <p>5 binary image?</p> <p>6 A. Yes.</p> <p>7 Q. Are there any other details you recall for</p> <p>8 the sketch comparison beyond what's disclosed in</p> <p>9 this paragraph on IBM 2395?</p> <p>10 A. Not that I recall.</p> <p>11 Q. Do you recall the methodology for</p> <p>12 determining similarity of the input image and the</p> <p>13 database image for sketch changing after this</p> <p>14 article?</p> <p>15 A. Not that I recall.</p> <p>16 Q. So if you go to the next page,</p> <p>17 Mr. Flickner, which is 2396, the Section 4.2 talks</p> <p>18 about performing queries.</p> <p>19 A. Um-hum.</p> <p>20 Q. And in the last sentence it refers to</p> <p>21 something called iterated query refinement.</p> <p>22 A. Yes.</p> <p>23 Q. And what does that refer to?</p> <p>24 A. It's a way you can refine the query.</p> <p>25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links</p> <p>2 to information about the image that was associated</p> <p>3 with the image in the database?</p> <p>4 A. Yes.</p> <p>5 Q. And, again, that can be that -- whatever</p> <p>6 information that the user inputted or was associated</p> <p>7 with the image from the source?</p> <p>8 A. Yes.</p> <p>9 Q. Could the results also display a matching</p> <p>10 score so the user could see how well the particular</p> <p>11 result matched to the -- to the query image?</p> <p>12 A. It could.</p> <p>13 Q. Okay.</p> <p>14 MR. EDWARDS: I'm going to hand you the next</p> <p>15 exhibit, Mr. Flickner.</p> <p>16 (Deposition Exhibit 10 was marked.)</p> <p>17 MR. EDWARDS: Handing you what's been marked as</p> <p>18 Exhibit 10.</p> <p>19 For the record, it's IBM Bates Nos. 002418</p> <p>20 to 2430.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. The title of this article is "Updates to</p> <p>23 the QBIC system."</p> <p>24 Do you see that?</p> <p>25 A. Yes.</p>



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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?                  2 A. Yes.                  3 Q. You are listed as a co-author of this                  4 article; is that correct?                  5 A. Yes.                  6 Q. And it is a paper that is published in the                  7 SPIE; correct?                  8 A. Correct.                  9 Q. In 1997; correct?                  10 A. Yes. It was 1997 or 1998.                  11 Q. No later than 1998; correct?                  12 A. Correct.                  13 Q. So just want to kind of orient you to the                  14 first page, which is IBM 2419.                  15 A. It's '98 because '97 is a different paper.                  16 Q. Well, if you turn the page, look at the                  17 footer on the right-hand side.                  18 Are you familiar that SPIE usually                  19 includes footers with the volume and the date at the                  20 bottom?                  21 A. Yeah.                  22 Q. And if you look at the footer kind of                  23 towards the right it says -786X-97-\$10 [sic]?                  24 A. Yeah.                  25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?                  2 A. Yep.                  3 Q. Okay. So let's -- I'm going to have you                  4 jump around, so I apologize in advance. Let's go to                  5 the -- kind of the back, IBM 2428.                  6 A. Okay.                  7 Q. Is that example of the stamps demo that                  8 was available on IBM's website?                  9 A. Yes.                  10 Q. All right. And if you look at the top in                  11 the location URL it has the almaden.ibm website                  12 address; correct?                  13 A. Correct.                  14 Q. All right. Let's flip forward to 2429.                  15 And is 2429 a screenshot of a trademark                  16 demo that was also available in the Almaden --                  17 excuse me -- almaden.ibm website?                  18 A. Yes.                  19 Q. Okay. And that demo looks like the                  20 trademark query is based on shape; is that right?                  21 A. It uses shape as one similarity feature.                  22 Q. Right. So the trademarks are converted to                  23 a binary image, like we talked before -- talked                  24 about before, and then they're -- the matching                  25 process is done based on those binary images?</p>
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the                  2 conference was in '98.                  3 Q. Submission was in '97. So the paper was                  4 published in '97 and then the conference you                  5 presented it at was in 1998?                  6 A. That's possible.                  7 Q. Do you recall presenting this paper at a                  8 conference in 1998?                  9 A. No, I don't.                  10 Q. So the first page refers to the Photonics                  11 West 1999 -- excuse me. Photonics West 1998                  12 Electronic Imaging Conference in San Jose.                  13 Do you recall attending that conference?                  14 A. It's likely I did, but I don't recall.                  15 Q. Okay. But you would agree with me this                  16 paper was made available at least as early as 1998;                  17 correct?                  18 A. Yes.                  19 Q. Okay. So the first page, IBM 2419. Under                  20 "Introduction," at the time of this paper it says,                  21 last line on the first paragraph, "Several online                  22 demos of QBIC are available at                  23 <a href="http://www.qbic.almaden.ibm.com">http://www.qbic.almaden.ibm.com</a>."                  24 Do you see that?                  25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.                  2 Q. Okay. And here we're showing the query                  3 image is a -- is a heart -- a heart pattern with                  4 Love's next to it. It's in the top part of the                  5 screenshot.                  6 A. Yep.                  7 Q. And the results are shown below that under                  8 "Shapes judged to be most similar"; is that right?                  9 A. Correct.                  10 Q. Okay. And the results also show                  11 underneath each one the trademark number followed by                  12 matching score after the colon.                  13 Do you see that?                  14 A. Yes.                  15 Q. And this is -- is this an example of what                  16 you told me before, that matching scores could be                  17 presented to the user?                  18 A. Yes.                  19 Q. And so is it the lower the score, the                  20 closer the match; is that correct?                  21 A. Typically, yes.                  22 Q. Okay. So 39 would be the -- so the first                  23 image at the top left is a 39, the one next to it is                  24 a 46, so the 39 would be a closer match than the 46;                  25 correct?</p>



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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

Element	'278 Claim Recitation	Exemplary Citations in Reference				
		<p><i>Id.</i> at 174–182</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; border-right: 1px solid black; padding-right: 10px;"> <p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. 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		<p style="text-align: right;">Page 178</p> <p>1 the image as well?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: It points to the file that's the                  4 QBIC catalog.                  5 BY MR. EDWARDS:                  6 Q. Can you walk us through that one more                  7 time? And just be a little bit louder, sorry.                  8 MR. HANSEN: Same objection.                  9 THE WITNESS: So the QBIC catalog is a set of                  10 files that hold data about visual features in the                  11 image.                  12 (Reporter seeks clarification.)                  13 THE WITNESS: Visual features. The image                  14 extender lets you search against that database,                  15 against that object.                  16 BY MR. EDWARDS:                  17 Q. The image extender lets you search against                  18 that catalog, the name of that catalog?                  19 A. The catalog, yeah.                  20 Q. Okay. And it does so by using a pointer                  21 from the handle in the table?                  22 MR. HANSEN: Objection; lacks foundation.                  23 THE WITNESS: Correct.                  24 BY MR. EDWARDS:                  25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold                  2 data for the following image features: Average                  3 color, Histogram color, Positional color and                  4 Texture."                  5 Is that right?                  6 A. Yep.                  7 Q. Okay. We spoke about average color,                  8 histogram color and texture; correct?                  9 A. Right.                  10 Q. What is positional color?                  11 A. We talked about it briefly. It's color in                  12 particular locations in the image.                  13 Q. Ah. Understood.                  14 That is -- that is similar to L in the                  15 demo that we looked at, which is called color                  16 layout.                  17 A. Okay, yes.                  18 Q. Is that correct?                  19 A. I don't remember if it's called L. Sounds                  20 right.                  21 Q. If you look at --                  22 MR. EDWARDS: If you can show -- give him                  23 Exhibit 6.                  24 THE WITNESS: Oh, this L. Yes.                  25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.                  3 MR. HANSEN: Objection; lacks foundation, calls                  4 for speculation.                  5 MR. EDWARDS: You can put that enormous exhibit                  6 aside.                  7 THE WITNESS: Test 1, 2, 3.                  8 BY MR. EDWARDS:                  9 Q. Go back to Exhibit 3, please. If you                  10 could turn to the page Bates-labeled IBM 894 with                  11 the architecture picture.                  12 A. Okay.                  13 Q. So I just -- I just want to kind of walk                  14 the -- through this architecture, Mr. Flickner. But                  15 as a high level, I just want to understand, is                  16 this -- is this a high-level architecture that would                  17 generally be used for any implementation of QBIC?                  18 A. Yes.                  19 Q. All right. So first step is you submit                  20 still images or r-frames for feature extraction; is                  21 that correct?                  22 A. Correct.                  23 Q. Okay. Features are extracted, such as                  24 color, texture, shape, sketch and text; correct?                  25 A. Location, yep.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 182</p> <p>1 Q. And location. Including the ones that I                  2 listed; correct?                  3 A. Yep.                  4 Q. Okay. After feature extraction is done,                  5 the images and those features for the database                  6 images are stored in the database; correct?                  7 A. Correct.                  8 Q. And then once those are stored, a user can                  9 query using some sort of a user interface; is that                  10 right?                  11 A. Correct.                  12 Q. And the user can query based on color,                  13 texture, shape, multi-object, sketch, location or                  14 text; is that right?                  15 A. Correct.                  16 Q. Okay. Those features are then decomposed                  17 and extracted from the query image and then a                  18 matching engine is used to compare those similarly                  19 extracted features from the stored images; is that                  20 correct?                  21 A. Correct.                  22 Q. And then the best matches are returned in                  23 similarity of order back to the user; is that right?                  24 A. Correct.                  25 Q. Okay. Thank you for that.</p> <p><i>Id.</i> at 190–191                  22 Q. So [as read], "Once the image catalogs are                  23 created, you can use the Image Query component to                  24 find image and business information. Business                  25 information, such as character and numeric data, are</p>

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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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		<p><i>Id.</i> at 198 – 199</p> <p>15 Q. Okay. And then if we can go to IBM 849.</p> <p>16 There?</p> <p>17 A. Yeah.</p> <p>18 Q. Top of the page says, "Adding image search</p> <p>19 to your Content Manager."</p> <p>20 Do you see that?</p> <p>21 A. Yeah. Yeah.</p> <p>22 Q. And the first paragraph starts -- talks</p> <p>23 about QBIC.</p> <p>24 Do you see that?</p> <p>25 A. Yeah.</p> <hr/> <p style="text-align: right;">Page 199</p> <p>1 Q. It says, "The image search server uses</p> <p>2 IBM's QBIC (query by image content) technology to</p> <p>3 help you search for objects by certain visual</p> <p>4 properties, such as color and texture."</p> <p>5 Did I read that correctly?</p> <p>6 A. Yes.</p> <p>7 Q. It says [as read], "The image search</p> <p>8 server analyzes images and stores the image</p> <p>9 information in a database. Then users can run image</p> <p>10 queries, which use the visual properties of image,</p> <p>11 to match colors, textures, and their positions</p> <p>12 without describing them -- describing them in</p> <p>13 words."</p> <p>14 Did I read that correctly?</p> <p>15 A. Yes.</p> <p>16 Q. And that's consistent with the features</p> <p>17 and functionalities that we have talked about in the</p> <p>18 1993 SPIE and 1995 IEEE article; correct?</p> <p>19 A. Correct.</p>

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		<p><i>Id.</i> at 312 – 313</p> <p>21 Q. For every implementation of QBIC, if an                      22 input image has an object and the object has colors,                      23 the color histogram feature would match those stored                      24 image that include objects with similar colors;                      25 correct?</p> <hr/> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 317–322</p> <p>22 Q. Okay. So for every commercial                      23 implementation of QBIC as of the IEEE 1995 article                      24 in Exhibit 3, those implementation calculated                      25 features of a query image and stored image; is that</p>

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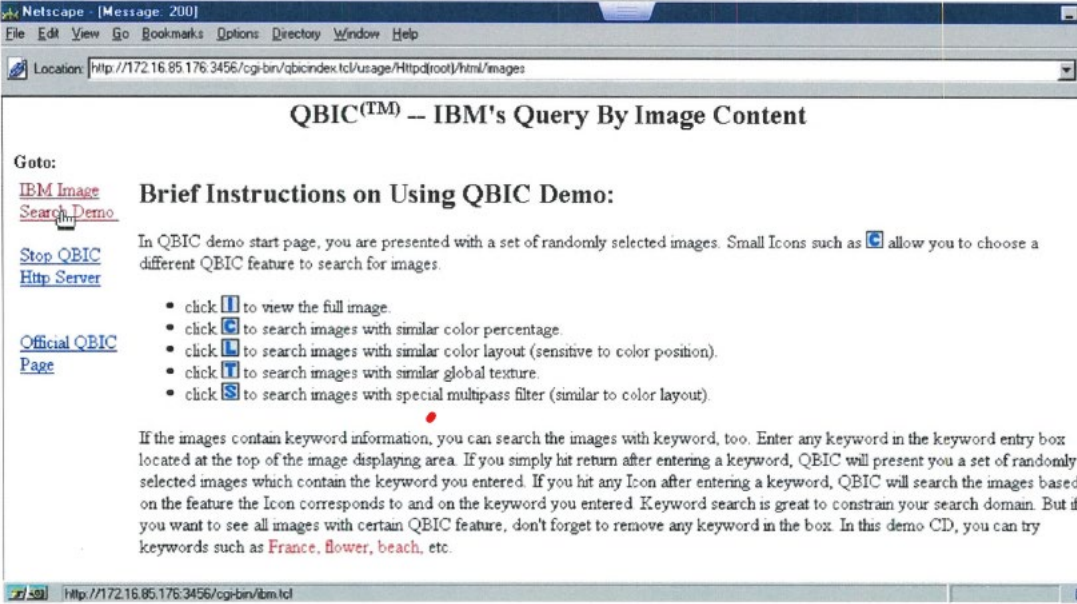
Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content ("QBIC") System

		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>	
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query,"</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>	



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 Central District of California, No. 2:20-cv-7872


Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 322</p> <p>1 indicates how confident the system is that the                  2 features of the stored image match the features of                  3 the input image; correct?                  4 A. Correct.</p> <p>Flickner 8/29/23 Depo at Ex. 6 at 1</p>  <p><i>Id.</i> at 2.</p>



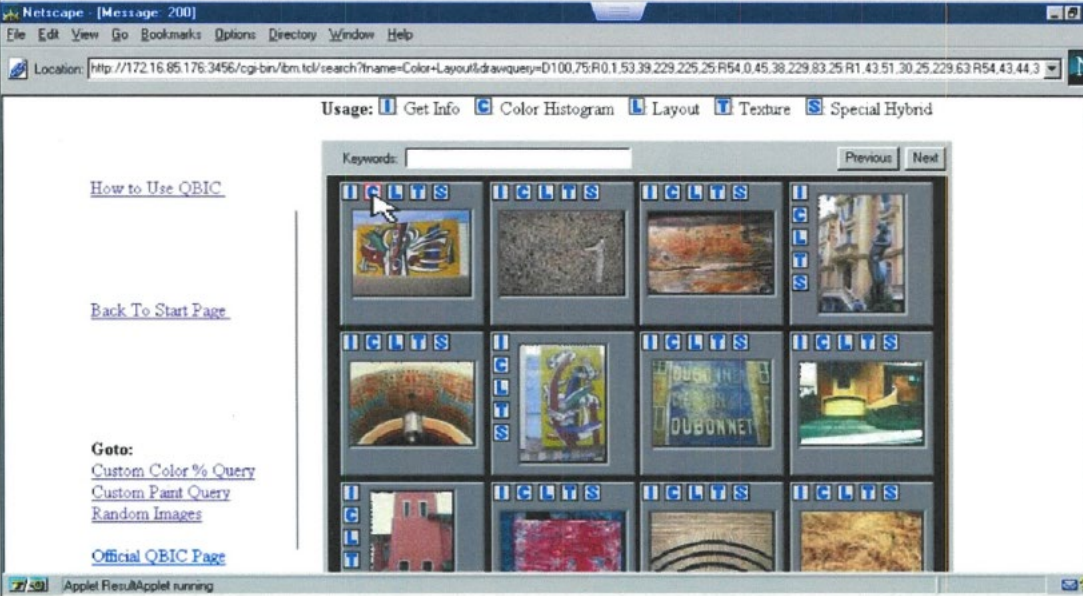
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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo Ex. 7 at 1</p>


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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>


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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo at Ex. 8</p>

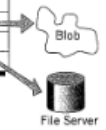
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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2                  IBM000001 at 39 – 41</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference																																					
		<p style="text-align: right;"><b>Data structures</b></p> <p><b>Handles</b></p> <p>When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a <b>handle</b> to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object's attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.</p> <p>User Table</p> <table border="1"> <thead> <tr> <th>ID</th> <th>Name</th> <th>Picture</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Handle 1</td> </tr> <tr> <td></td> <td></td> <td>Handle 2</td> </tr> </tbody> </table> <p>Administrative Support Tables</p> <table border="1"> <thead> <tr> <th colspan="3">Common Attributes</th> </tr> <tr> <th>Handle</th> <th>Importer</th> <th>Updater</th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Unique Attributes</th> </tr> <tr> <th>Handle</th> <th>Width</th> <th>Height</th> <th>Numcolors</th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>  <p>The diagram shows arrows pointing from the 'Handle' column of the 'Common Attributes' table to a cloud labeled 'Blob', and from the 'Handle' column of the 'Unique Attributes' table to a cylinder labeled 'File Server'.</p> <p><i>Figure 8. Handles</i></p> <p><b>QBIC catalogs</b></p> <p>A <b>QBIC catalog</b> is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.</p> <p>You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p style="text-align: right;">Chapter 2. DB2 extender concepts 19          IBM 000039</p>	ID	Name	Picture			Handle 1			Handle 2	Common Attributes			Handle	Importer	Updater	Handle 1			Handle 2			Unique Attributes				Handle	Width	Height	Numcolors	Handle 1				Handle 2			
ID	Name	Picture																																					
		Handle 1																																					
		Handle 2																																					
Common Attributes																																							
Handle	Importer	Updater																																					
Handle 1																																							
Handle 2																																							
Unique Attributes																																							
Handle	Width	Height	Numcolors																																				
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Handle 2																																							

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® DB2® Universal Database: Image, Audio, and Video Extenders <span style="float: right;">IBM 000040</span></p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot catalog file name</li> <li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li> <li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li> <li>• Shot number</li> <li>• Starting frame number</li> <li>• Ending frame number</li> <li>• Representative frame number</li> <li>• Name of a file that contains the contents of the representative frame</li> </ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot handle</li> <li>• Video table name</li> </ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts 21                  IBM 000041</p> <p>IBM0002263 at 226</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>Description</b></p> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <p style="text-align: center;"><b>Image Classification</b></p> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <p style="text-align: center;"><b>Image Query</b></p> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p>and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <p style="text-align: center;"><b>Image Formats</b></p> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCX</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <p style="text-align: center;"><b>Product Positioning</b></p> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <p style="text-align: center;">295-042 -2-</p> <p style="text-align: right;">IBM 0002264</p>



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		<p>IBM000777 at 794</p> <div style="border: 1px solid black; padding: 10px;"> <p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b>              You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b>              This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"> <li>• Improved installation procedures</li> <li>• Additional connectors for relational databases                      Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li> <li>• Advanced information mining and search capabilities                      Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li> <li>• Workflow capabilities                      By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li> <li>• Federated level access control                      You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li> <li>• Additional support for Content Manager:                         <ul style="list-style-type: none"> <li>- List, add, retrieve, update, and delete of content class</li> <li>- Asynchronous retrieval of object content</li> </ul> </li> </ul> </div> <p><i>See also</i> Flickner Depo at Flickner Depo at 22-25, 25-26, 36, 54-55, 88, 89-90</p>

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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.i]	the image,	<p>QBIC discloses this limitation.</p> <p><i>See</i> limitation 1E above.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>


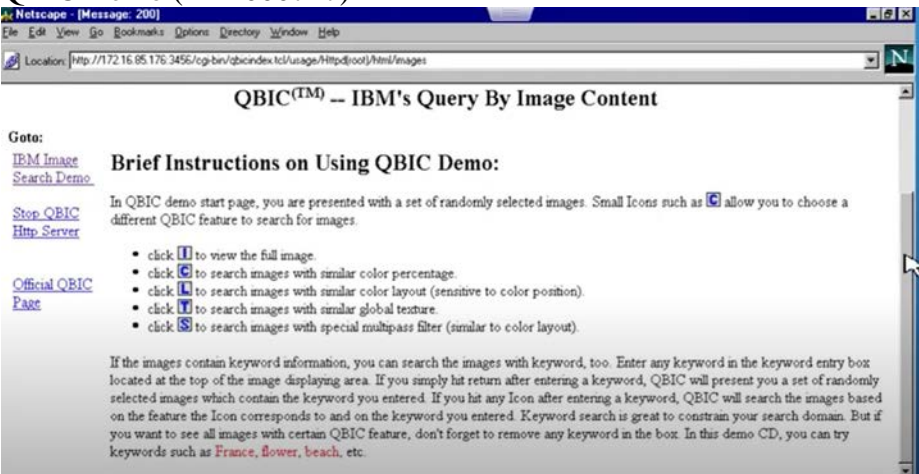
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[1E.ii]	the symbol information,	<p>QBIC discloses this limitation.</p> <p><i>See</i> limitations 1D and 1E above.</p> <p>Flickner Depo at 185, 217</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.iii]	and a query of a database storing target object information associated with a plurality of target objects including the first target object;	<p>QBIC discloses this limitation.</p> <p><i>See</i> limitation 1E above.</p>

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Invalidity Chart for U.S. Patent 9,031,278 based on the Query by Image and Video Content (“QBIC”) System

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		<p><b>QBIC Demo (IBM000747)</b></p>  <p><b>QBIC Demo (IBM000747)</b></p> 

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		<p>Flickner Depo at 20</p> <p>3 Q. Okay. And the steps that -- at least as</p> <p>4 I understand it -- is you'd have database</p> <p>5 population, feature calculation and image query; is</p> <p>6 that right?</p> <p>7 A. Uh-huh. Yes.</p> <p>8 Q. So let's -- let's start with database</p> <p>9 population.</p> <p>10 What was the database population step?</p> <p>11 A. It's a process of taking a set of images,</p> <p>12 and then putting them in -- into the database and</p> <p>13 the extracting the features and putting the</p> <p>14 features in the database.</p> <p>20 Q. And how large were these database</p> <p>21 structures?</p> <p>22 A. In the order of 15,000 images.</p> <p>Flickner Depo at 25-26</p> <p>Flickner Depo at 18</p>

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		<p>14 A. Well, we did stuff with the San Francisco                      15 Museum, the stamps database, trademark database.                      16 So we did some of the stuff with Davis --                      17 Q. Okay.                      18 A. -- UC Davis. I remember we talked to a                      19 couple people at Davis.                      20 Q. So was this an active area of research in                      21 the 1990s?                      22 A. Yeah.</p> <p>Flickner Depo at 88-89</p>

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		<p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.              16 Q. (By Mr. Dang) Were there any              17 circumstances under which the system would not              18 compute the distance for every image in the              19 database during a search?              20 A. If there was a text filter on it, we              21 didn't.              22 Q. Did the Fine Arts Museum of San Francisco</p> <hr/> <p style="text-align: right;">Page 88</p> <p>1 similarly use the QBIC system?              2 A. They did.              3 Q. When did they use the QBIC system?              4 A. It was in the '90s, if I recall right.              5 Q. How did they use the QBIC system?              6 A. Similar to the way Davis did, as I              7 recall.              8 Q. What sorts of images were they including              9 in their database?              10 A. Paintings.</p> <p>Flickner Depo at 142</p>

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		<p>1 Q. Do you recall what type of indexing was                  2 used in the database associated with the 1998 demo                  3 version?                  4 A. Most likely, it was just a linear index.                  5 Q. And what do you mean by linear index?                  6 A. You just -- you -- you compute the                  7 features on every record in the database -- you                  8 compare the features against every record in the                  9 database.</p> <p>Flickner Depo at 168-169</p> <p>16 Q. What do you mean that it lets you access                  17 the -- the neighbors to your query point?                  18 A. So your incoming query -- say it's an                  19 image -- you compute a feature vector. And then                  20 you compute some orthogonal transform of the                  21 feature vector such as a wave transform or                  22 wavelets. There's a variety --</p> <p style="text-align: right;">Page 168</p> <hr/> <p>1 MR. DeCLERCK: Slow down, please.                  2 THE DEPONENT: Wavelets, other types of                  3 features that do dimensionality reduction. And                  4 then you put the reduced dimensionality feature                  5 vector into the database, and then the database                  6 queries and R*-tree to be able to get points nearby                  7 to the -- in the lower dimensional space.</p>



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		<p>Flickner Depo at 181</p> <p>5 A. I do not recall the -- the UI parts of</p> <p>6 it.</p> <p>7 Q. And earlier you -- you mentioned a query</p> <p>8 engine.</p> <p>9 What did you mean by that phrase?</p> <p>10 A. The architecture QBIC was client server.</p> <p>11 There were -- there's an API to query the database,</p> <p>12 and there was a GUI then to display and control</p> <p>13 through the creation of the queries.</p> <p>14 The GUI evolved because when we started,</p> <p>15 there was no Web. This would have been even</p> <p>16 pre-1990. So all the original versions used the</p> <p>17 X Window system. But as the Web came online, we --</p> <p>18 we migrated the -- the GUI part to the Web.</p> <p>Flickner Depo at 91-92</p> <p>13 Q. And could you, in general terms, describe</p> <p>14 what Virage was?</p> <p>15 A. It was a content-based retrieval system</p> <p>16 tailored to secure surveillance information.</p> <p>17 Q. And you went to their website; was there</p> <p>18 something on their website, say, a demonstration?</p> <p>19 A. I don't remember.</p> <p>20 Q. Was their system commercially available</p> <p>21 during the 1990s?</p> <p>22 A. Yes.</p>

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		<p>1 Q. How did their content-based retrieval                  2 system work?                  3 A. It was similar to QBIC.                  4 Q. Could you, say, extract features from a                  5 query image?                  6 A. Yes.                  7 Q. And could you search those features into                  8 some sort of reference database?                  9 A. Yes.</p> <p>Flickner Depo at 48-49                  4 Q. What feature extraction methods did the                  5 UC Davis implementation of QBIC rely on?                  6 A. It was similar to the other texture,                  7 shape, color and layout.</p> <p>Flickner Depo at 209-210                  13 Q. Okay. Let me ask -- let me ask that                  14 question using -- using an example.                  15 Say I had a file that -- that was a                  16 snippet of a Star Wars movie.                  17 Could the CueVideo system take that                  18 snippet of the -- of a Star Wars movie and indicate                  19 to the user what Star Wars movie that snippet is                  20 from?                  21 A. Most likely, yes.                  22 Q. And how do you know that?</p> <p>Flickner 8/29/23 Depo at 53 – 56</p>

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		16 Q. And when it refers to "text information," 17 what is it referring to? 18 A. Anything that could be extracted in the 19 context of how the image was annotated. 20 Q. And when you say "annotated," annotated by 21 the user who was populating the database? 22 A. Could be. 23 Q. What else could it be? 24 A. It could be the supplier of the data. 25 Q. Okay. So you may have some annotations

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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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		<p><i>Id.</i> at 60 – 62</p> <p>25 Q. Okay. And so let's say that objects were</p> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done</p> <p>2 with those objects? Were they stored, for example,</p> <p>3 as a separate image or were they somehow linked to</p> <p>4 or associated with the image from which they were</p> <p>5 extracted?</p> <p>6 A. Typically they were linked.</p> <p>7 Q. They were linked to the source image?</p> <p>8 A. Yeah.</p> <p>9 Q. Okay. And this was done in the database?</p> <p>10 A. Could be done in the database.</p> <p>11 Q. How was it done?</p> <p>12 A. It was probably done in a text database or</p> <p>13 some sort of key index pair database. So database</p> <p>14 has a lot of different meanings.</p> <p>14 Q. Yeah, that was a bad question.</p> <p>15 Once the objects are identified within a</p> <p>16 particular source image that's stored in the</p> <p>17 database, how are the objects linked to the source</p> <p>18 image in the key --</p> <p>19 A. The key would have been, like, the image</p> <p>20 name and the value would have been the definition of</p> <p>21 the -- of the objects.</p> <p><i>Id.</i> at 103</p>

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		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p> <p><i>Id.</i> at 129 – 131</p>

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		<p>9 Q. Okay? And if you want to compare, or you                      10 can take my word for it, the image in the top left                      11 corner, the querying image, is the same one that was                      12 on Exhibit 7.                      13 A. Yes.                      14 Q. Okay. And here the user's clicking the I                      15 icon, which stands for "Get Info."                      16 Do you see that?                      17 A. Um-hum.                      18 Q. On the first page?                      19 A. Yeah.                      20 Q. And the second page is doing what?                      21 A. Is presenting the image at full                      22 resolution.                      23 Q. Okay. And was there a similar                      24 functionality on the demo app on the -- on the                      25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	



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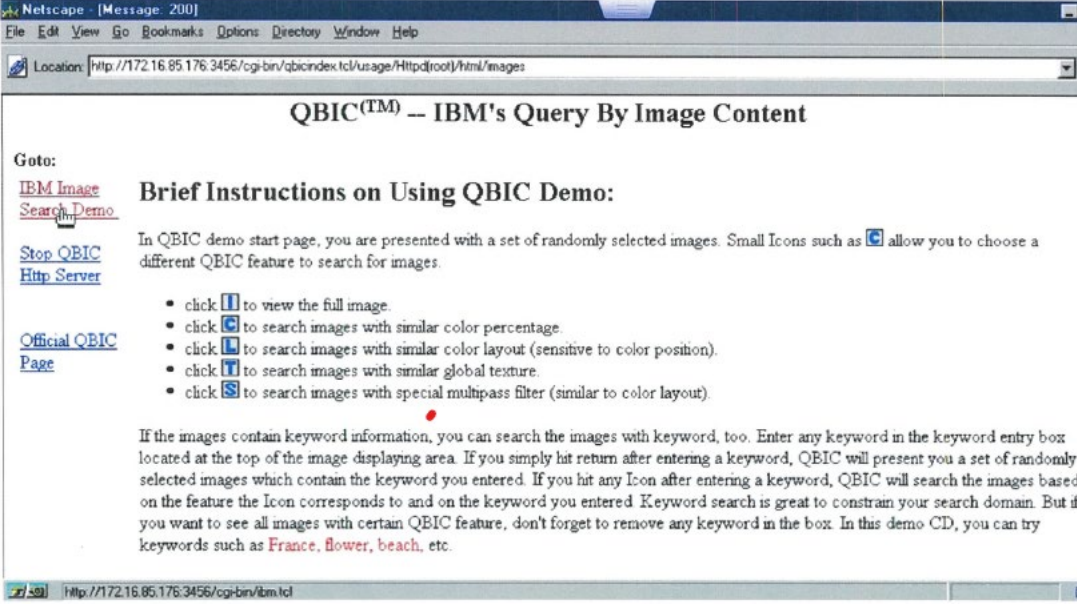
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		<p><i>Id.</i> at 161</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p> <p>Flickner 8/29/23 Depo at Ex. 6 at 1</p>

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		 <p><i>Id.</i> at 2.</p>

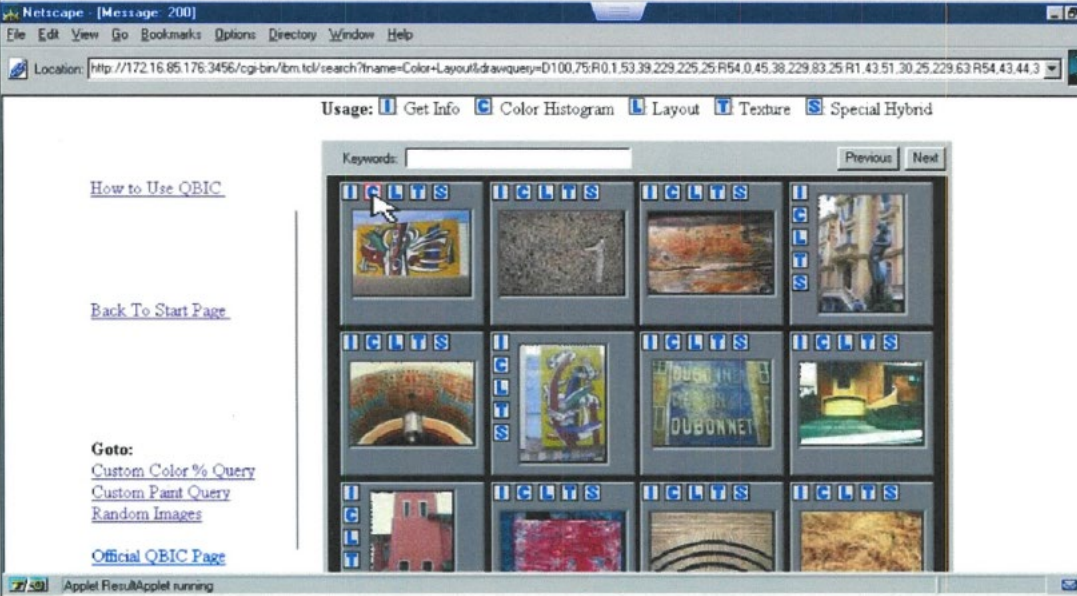
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		 <p><i>Id.</i> at 2</p>

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		 <p>Flickner 8/29/23 Depo at Ex. 8</p>



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		 <p><i>Id.</i> at 2</p> <p>See also Flickner Depo at 22-25, 25-26, 36, 39-40, 54-55, 75-76, 78-79, 159,</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references</p>


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		contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1F]	receiving, via an address, first target object information associated with the first target object,	<p>QBIC discloses receiving, via an address, first target object information associated with the first target object.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391-92</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2392-93:</p>



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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2 / Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <math>m</math> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[i,j]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}</math>, <math>M_{[2,3]} \times M_{[3,2]}</math>, <math>M_{[3,3]}</math>, <math>M_{[3,4]} \times M_{[4,3]}</math>, <math>M_{[4,4]}</math>, <math>M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size <math>64 \times 64</math>. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2393-95:</p>

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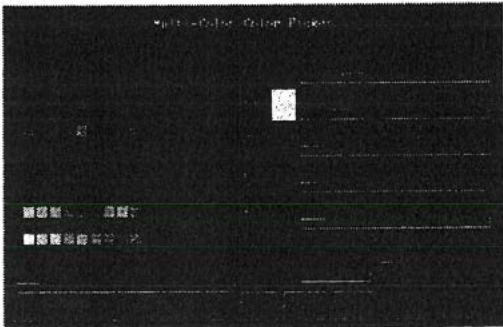
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>

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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2395:</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “ Find all images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <math>R^*</math>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>IBM0002390 at 2396-98</p>



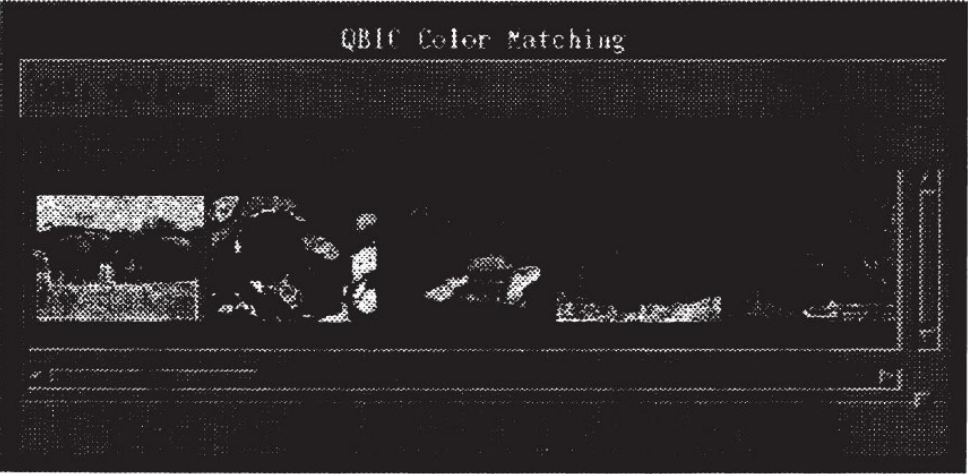
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		<p><b>4.1. Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. This interface is made up of four parts (listed from top to bottom): the window menu, the tool selection buttons, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images. There are nine drawing tools provided by the interface: Polygon, Rectangle, Ellipse, Paint Brush, Eraser, Line Draw, Object Move, Fill Area, Snake Outline. For example the Polygon tool allows the user to click or drag around bounding edges of the object to be outlined, this can then be refined by the snakes method providing a shrink-wrap effect.</p> <p>Before using any tool on an image the user must first click New to create an object entry (Two shown on bottom of figure 4). The user can then type any text associated with the object to be outlined, or can do this after outlining the object. The user then selected an outlining tool and defines the “mask”. Multiple tools can be used and the last change can be removed with the Undo button or all changes removed with the Clear button.</p> <p><b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of (R, G, B) sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to nth best match (n is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9</p>

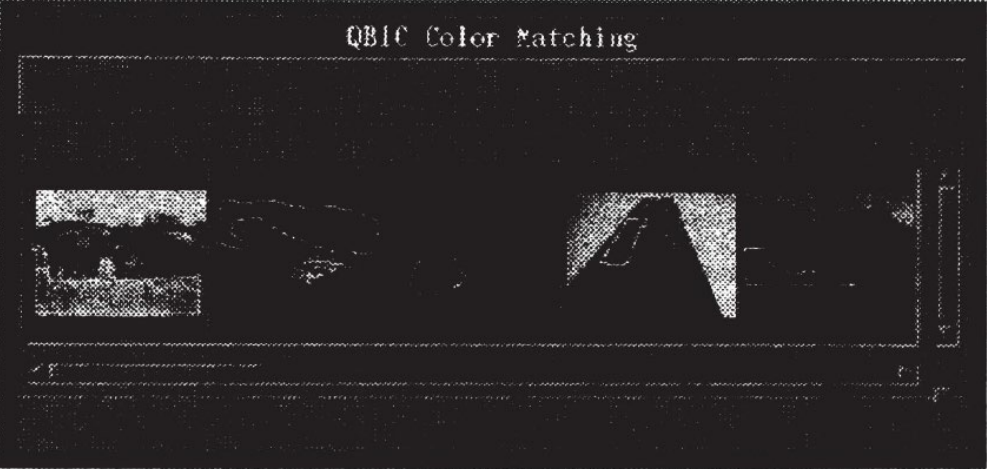
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		 <p>Figure 7: Result of query by example using color only.</p>

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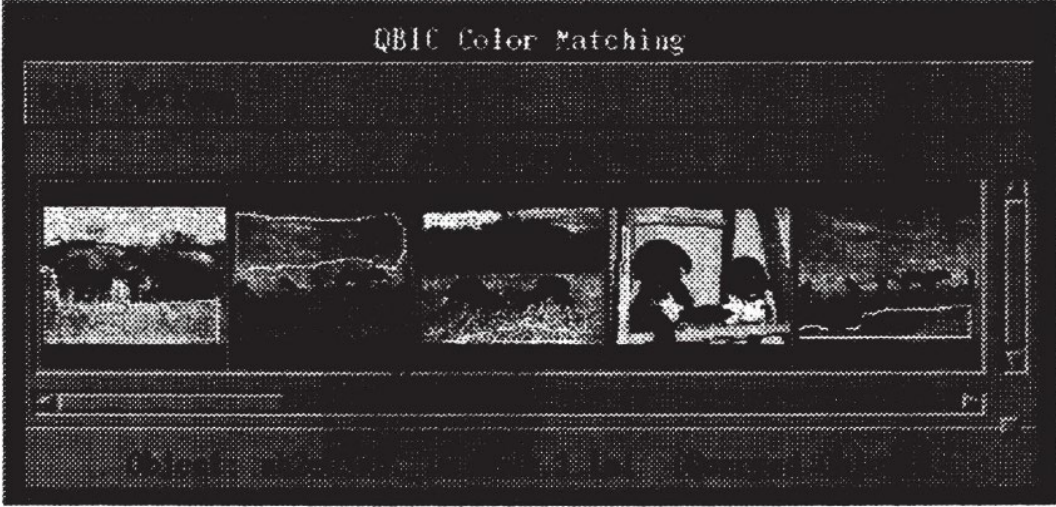
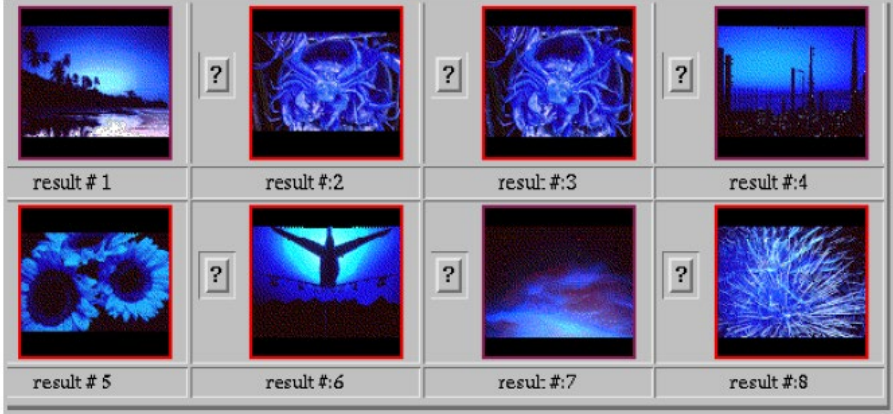
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		 <p>Figure 8: Result of query by example using texture only.</p>



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		 <p>Figure 9: Result of query by example using color and texture.</p> <p>QBIC (Query by Image Content) at 1</p>  <p>Result of QBIC Search</p>

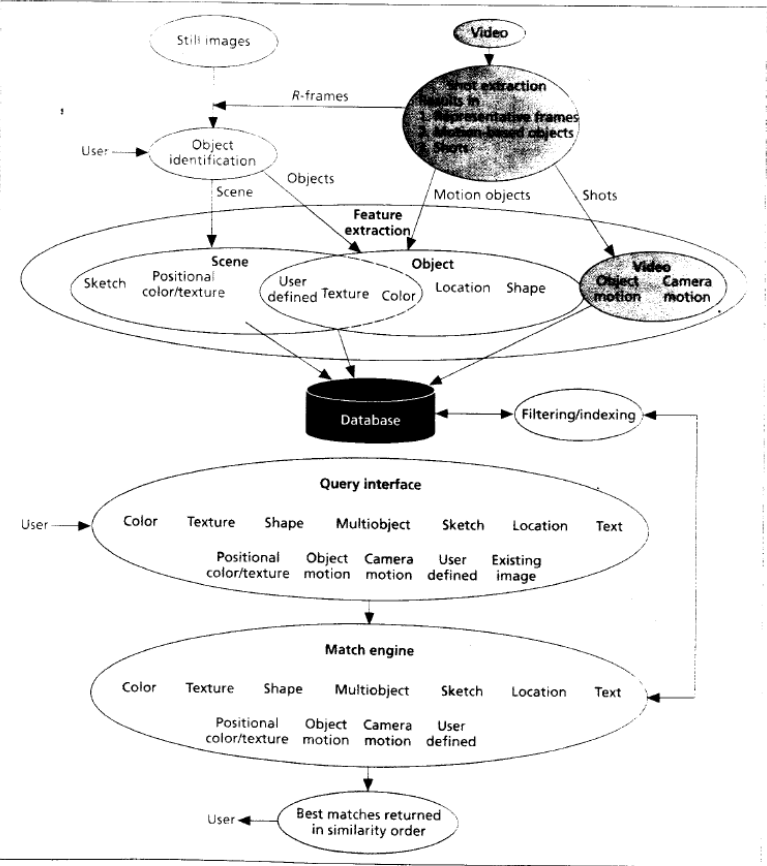
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		<p>Query by Image and Video Content: The QBIC System (IBM 0000893–902): “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>

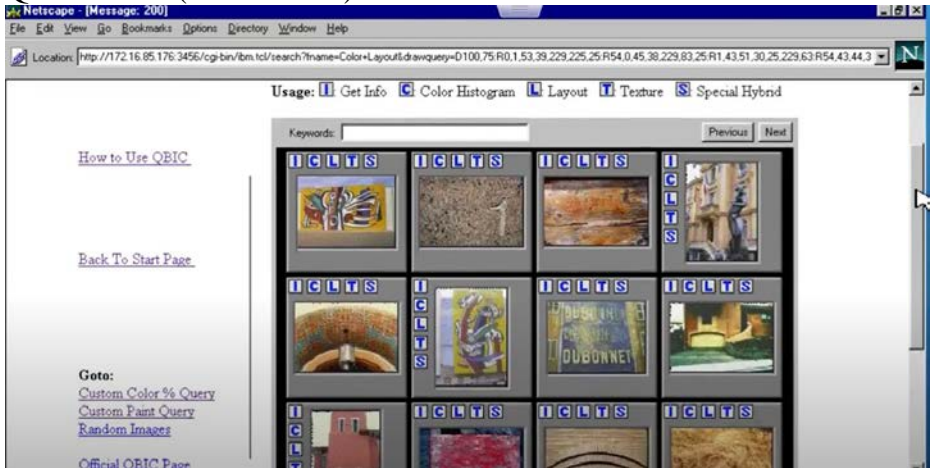
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		 <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p>


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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747)</p> 

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		<p>QBIC Demo (IBM000747)</p>  <p>Flickner Depo at 201-202</p>

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		<p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p>

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		<p>1 with -- where you already -- you had already seeked</p> <p>2 to the -- the point of the -- of the match.</p> <p>3 Q. Would it return the same video as the</p> <p>4 query video?</p> <p>5 A. It would -- it would return snippets, as</p> <p>6 I recall.</p> <p>7 Q. And snippets of which videos?</p> <p>8 A. Of the video that's -- the -- that the</p> <p>9 database has been created with.</p> <p>10 Q. Were those video snippets indexed in any</p> <p>11 way?</p> <p>12 A. I'm sure they were.</p> <p> </p> <p>Flickner Depo at 131-132</p> <p>14 Q. An action that the QBIC system would</p> <p>15 automatically take based on the results it would</p> <p>16 return.</p> <p>17 A. So you're saying as you return results,</p> <p>18 you do some post-filtering on the image or the --</p> <p>19 what -- what kind of --</p> <p>20 Q. Perhaps not -- not post-filtering.</p> <p>21 But, for example, displaying a hyperlink</p> <p>22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p> <p> </p> <p>Flickner 8/29/23 Depo at 53-56</p>

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		16 Q. And when it refers to "text information," 17 what is it referring to? 18 A. Anything that could be extracted in the 19 context of how the image was annotated. 20 Q. And when you say "annotated," annotated by 21 the user who was populating the database? 22 A. Could be. 23 Q. What else could it be? 24 A. It could be the supplier of the data. 25 Q. Okay. So you may have some annotations



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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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		<p><i>Id.</i> at 68–72</p> <p>22 Q. Okay. And in what form would those                  23 results be displayed to me? For images would they                  24 be displayed as a thumbnail?                  25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those                  2 be displayed to you?                  3 A. It could be as a thumbnail or as a short                  4 video clip or as a single representative frame.                  5 Q. Okay. So they could be -- so for a video,                  6 there's a video that matched the image query of an                  7 r-frame, the results I could get back could include                  8 three things. It could be a still image, it could                  9 be a thumbnail, or it could be an r-frame                  10 representation?                  11 A. R-frame, I think, is representative frame.                  12 So it was a key frame in that video sequence,                  13 summary frame.                  14 Q. Once I ran a query on an r-frame; right?                  15 Well, let's stop there.                  16 If I run a query on still images,                  17 typically the results I would get back are                  18 thumbnails that are most similar to the                  19 characteristics which I queried from the query                  20 image; right?                  21 A. You could get thumbnails back. You could                  22 also get the full-sized image back.                  23 Q. Okay.                  24 A. Thumbnail is a tool for helping you return                  25 lots of results and quickly scan it.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference	
		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I                  2 have to click on the thumbnail in order to bring up                  3 the full-sized image?                  4 A. You could.                  5 Q. Otherwise I could automatically receive                  6 the full-sized image as part of the result?                  7 A. You could.                  8 Q. Okay. So walk through that process if I'm                  9 using an r-frame of a video. If I do a -- if I run                  10 a query on an r-frame of a video as a -- an image                  11 query, how could I get the results back?                  12 MR. HANSEN: Objection; vague and ambiguous.                  13 BY MR. EDWARDS:                  14 Q. In what form would I get the results back?                  15 MR. HANSEN: Same objection.                  16 THE WITNESS: You could get back the still                  17 r-frame, representative frame, you could get back                  18 the thumbnail, or you could get back the entire                  19 video clip that that r-frame represents, a few                  20 frames.                  21 BY MR. EDWARDS:                  22 Q. If I received a thumbnail or the r-frame,                  23 would there be some sort of link I could click on to                  24 get the underlying full video?                  25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic                  2 units initially returned in a video query."                  3 Meaning the r-frames?                  4 A. Correct.                  5 Q. "For example, in a query for shots that                  6 are dominantly red, a set of r-frames will be                  7 displayed. To see the actual video shot, the user                  8 clicks on the displayed r-frame icon."                  9 A. Yep.                  10 Q. And that was one of the ways you were                  11 describing that the results of a r-frame query would                  12 be returned to the user?                  13 A. Right.                  14 Q. Do you know if that was the preferred way                  15 that was used in demos in commercial applications?                  16 MR. HANSEN: Objection; vague and ambiguous,                  17 lacks foundation.                  18 MR. STRAUSSMAN: You can answer.                  19 THE WITNESS: I don't know.                  20 BY MR. EDWARDS:                  21 Q. But, Mr. Flickner, this -- generally this                  22 article represents the status of the QBIC technology                  23 as of the date of this publication, which is                  24 September 1995; is that right?                  25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.                  2 THE WITNESS: As I recall -- I'm not sure                  3 definitely, but, yes, this is -- you could do that.                  4 BY MR. EDWARDS:                  5 Q. So let's go to page IBM 898.                  6 So if you'll take -- just read that                  7 paragraph that starts with the header                  8 "Representative Frame Generation."                  9 MR. STRAUSSMAN: And if you need to read                  10 anything else to put it in context, feel free to do                  11 so.                  12 THE WITNESS: Okay.                  13 (Witness reviews document.)                  14 THE WITNESS: So what was your question, again?                  15 BY MR. EDWARDS:                  16 Q. If you go to the sentence that says,                  17 "First" -- it's the second sentence in that                  18 paragraph. It says, "First, during database                  19 population, r-frames are treated as still images."                  20 See that?                  21 A. Yeah.                  22 Q. And that's what you told me earlier;                  23 correct?                  24 A. Yeah.                  25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --                  2 Q. Okay.                  3 A. -- there's an editorial process.                  4 Q. Say that last part?                  5 A. There's an editorial process. You submit                  6 it, they edit and make changes and eventually it                  7 appears.                  8 Q. Right. So what you're saying is there's                  9 some lag between the time that you wrote the article                  10 and the time it was published?                  11 A. Yeah.                  12 Q. So this article -- but this article                  13 represents the state of the QBIC technology at least                  14 as of September 1995?                  15 A. Yeah. Yes.                  16 Q. And then let's go to IBM 900.                  17 And take your time to orient yourself on                  18 that page, but what I really want to ask you about                  19 is the last paragraph on the left-hand column going                  20 up to the top of the right-hand column.                  21 A. Yep.                  22 Q. So it says this paper describes [as read],                  23 "a prototype system that uses image and video                  24 content as the basis for retrievals."                  25 Is that right?</p>

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		<p><i>Id.</i> at 118–119</p> <p>18 Q. So do you know what happens if you clicked                      19 I?                      20 A. Yeah, you -- pops the window up and you                      21 see the full image.                      22 Q. Okay.                      23 (Reporter seeks clarification.)                      24 A. It pops the window up.                      25 Q. And how do you know that?</p> <hr/> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such                      2 a . . .                      3 MR. STRAUSSMAN: You got to speak up.                      4 BY MR. EDWARDS:                      5 Q. That's how you implemented what?                      6 A. You implement what the instructions say.                      7 Q. Okay. Is that a similar implementation                      8 for the other demos that you worked on?                      9 A. Most likely, yes.                      10 Q. Okay. So you click on I and then I would                      11 take you to a link that showed the full image?</p> <p><i>Id.</i> at 129 – 131</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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			<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	
			<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 160–161</p> <p>16 Q. Okay. So the results of the query -- so</p> <p>17 we talked about before that the results of the</p> <p>18 queries display thumbnails of the database images</p> <p>19 based on similarity of which they match; correct?</p> <p>20 A. Correct.</p> <p>21 Q. And then those thumbnails can provide</p> <p>22 links to the original image or, if it was an</p> <p>23 r-frame, it could be -- you could provide a link to</p> <p>24 the video; correct?</p> <p>25 A. Correct.</p> <hr/> <p>1 Q. And does the thumbnail also provide links</p> <p>2 to information about the image that was associated</p> <p>3 with the image in the database?</p> <p>4 A. Yes.</p> <p>5 Q. And, again, that can be that -- whatever</p> <p>6 information that the user inputted or was associated</p> <p>7 with the image from the source?</p> <p>8 A. Yes.</p> <p>9 Q. Could the results also display a matching</p> <p>10 score so the user could see how well the particular</p> <p>11 result matched to the -- to the query image?</p> <p>12 A. It could.</p> <p><i>Id.</i> at 321</p>

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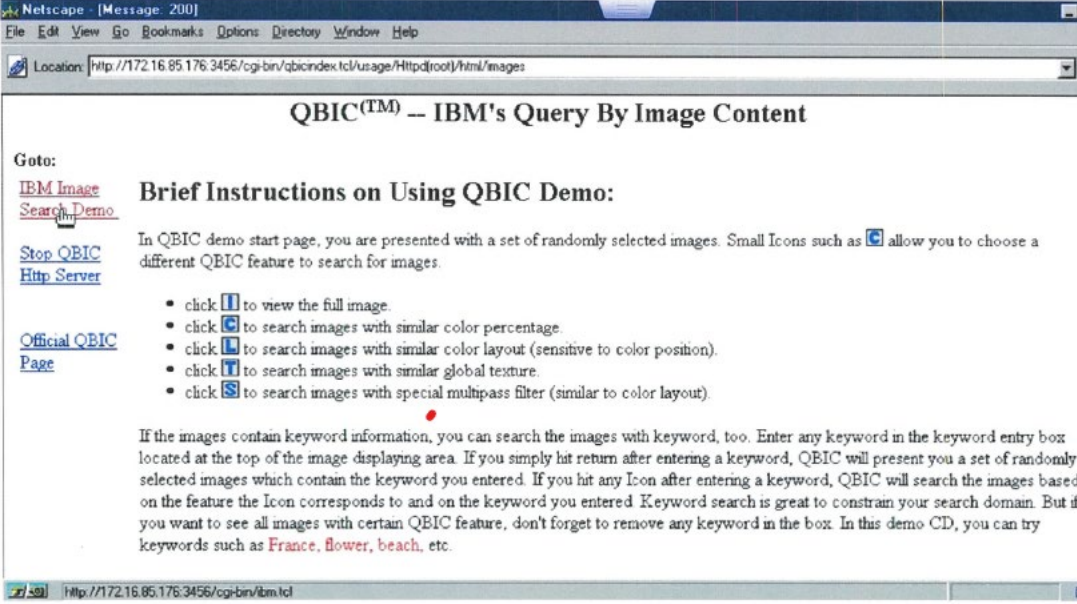
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>5 Q. Mr. Flickner, every commercial                      6 implementation of QBIC as of the Exhibit 3, IEEE                      7 1995 article, returned results of the matching                      8 process to the user in the form of a stored image                      9 and information associated with that image; is that                      10 fair?                      11 MR. HANSEN: Objection; lacks foundation.                      12 THE WITNESS: Yes.                      13 BY MR. EDWARDS:                      14 Q. Okay. And a thumbnail is an image;                      15 correct?                      16 A. Thumbnail is an image.</p> <p><i>See also</i> Flickner Depo at 54-55, 75-76, 78-79, 88, 89-90, 159, 209-210                      Flickner 8/29/23 Depo at Ex. 6 at 1</p>




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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2.</p>

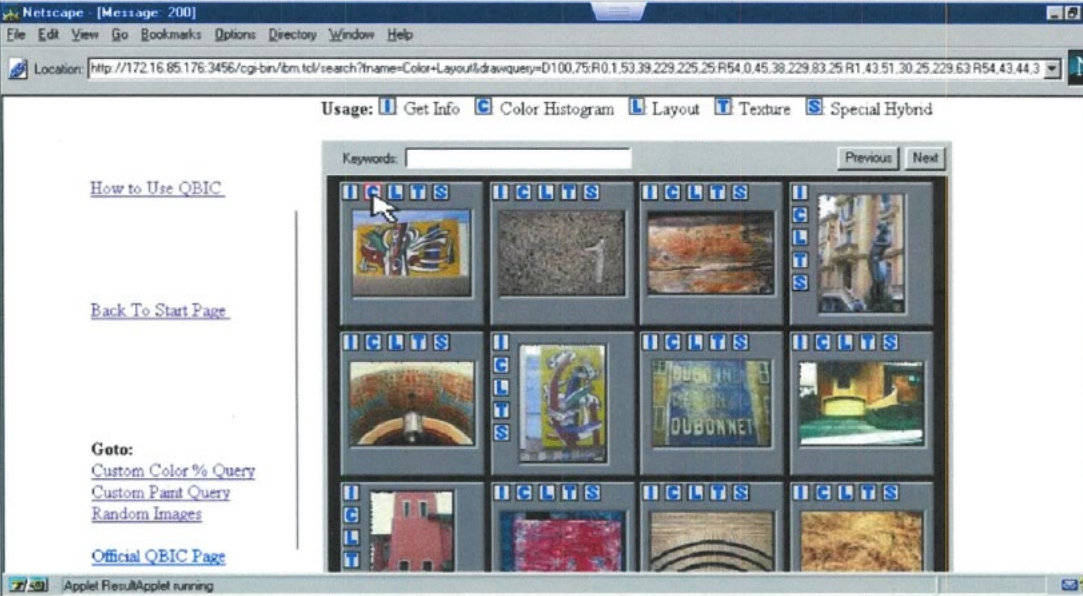
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo Ex. 7 at 1</p>


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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>


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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo at Ex. 8</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2</p>



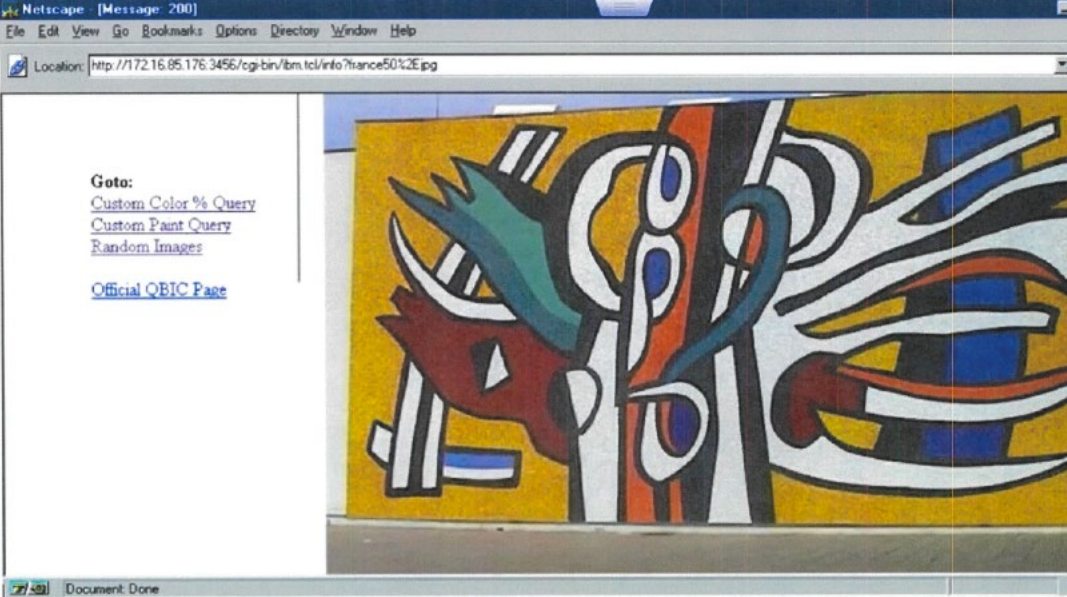
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		 <p>The screenshot shows a Netscape browser window with the title bar "Netscape - [Message 200]". The address bar contains the URL "http://172.16.85.176:3456/cgi-bin/libm.tcl/info?france50%2Ejpg". The main content area displays a webpage with the following elements:</p> <ul style="list-style-type: none"><li>Section title: <b>Image france50.jpg</b></li><li>Section title: <u>How to Use QBIC</u></li><li>Link: <u>Back To Start Page</u></li><li>Section title: <b>Goto:</b></li><li>Link: <u>Custom Color % Query</u></li><li>Link: <u>Custom Paint Query</u></li><li>Link: <u>Random Images</u></li><li>Link: <u>Official QBIC Page</u></li></ul> <p>The image on the right side of the page is a colorful, abstract graphic with yellow, blue, red, and white elements, resembling a stylized face or mask. The browser's status bar at the bottom indicates "Document: Done".</p> <p><i>Id.</i> at 3</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo at Ex. 9</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar</p>

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		<p>known problems, according to known methods which would yield predictable results.</p>
[1F.i]	<p>wherein the first target object information comprises a response regarding the validity of the document.</p>	<p>QBIC discloses that the first target object information comprises a response regarding the validity of the document.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>“When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image</p>



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		<p>and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):                      “Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>Flickner 8/29/23 Depo at 187–188</p>

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		<p>8 Q. And if you look at the top paragraph, last                      9 sentence, it says, "You can now search for images by                      10 specifying" -- excuse me. Strike that.                      11 It says, "You can now search for images by                      12 specifying content attributes (such as color,                      13 texture, shape, and layout) and data description                      14 elements (such as category and related character and                      15 numeric business data)."                      16 Do you see that?                      17 A. Um-hum.                      18 Q. And data description elements, are those                      19 things like text or keyword searches that we had                      20 talked about before?                      21 A. Um-hum.                      22 MR. HANSEN: Objection; lacks foundation.                      23 (Reporter seeks clarification.)                      24 BY MR. EDWARDS:                      25 Q. Are those the same as text or keyword                      Page 188                      1 searches that we talked about before?                      2 MR. HANSEN: Objection; lacks foundation.                      3 THE WITNESS: Text or feature -- textures and                      4 keywords?                      5 BY MR. EDWARDS:                      6 Q. No. I'm sorry, let me ask it so it's                      7 clear.                      8 Data description elements, such as                      9 category and character and numeric business data,                      10 that would be the same as a text or keyword search                      11 that we talked about before; correct?                      12 A. Correct.</p> <p><i>Id.</i> at 190–191                      22 Q. So [as read], "Once the image catalogs are                      23 created, you can use the Image Query component to                      24 find image and business information. Business                      25 information, such as character and numeric data, are</p>

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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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		<p><i>Id.</i> at 197–198</p> <p>17 Q. First sentence says, "Many paper-intensive                      18 enterprises, such as insurance companies and                      19 financial institutions, administer large volumes of                      20 business-related content. The need for an                      21 enterprise solution for managing and accessing                      22 business information spans many industries."                      23 Did I read that correctly?                      24 A. Yes.                      25 Q. Okay. For -- is it -- is it your                      1 experience and understanding that QBIC is something                      2 that would be beneficial for businesses that have                      3 large volumes of business-related content?                      4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC                      8 functionality was good for insurance companies and                      9 financial institutions.                      10 Do you recall that?                      11 A. Yes.                      12 Q. Do you agree with that?                      13 A. Yes.                      14 Q. Okay. QBIC would be good for any company                      15 that has large amounts of business-related                      16 information, including multimedia content, correct?                      17 A. Correct.</p> <p><i>See also</i> Flickner Depo at 22-23, 54-55, 89-90, 143.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other</p>

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		<p>prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**2. Claim 3 (Non-Asserted)**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
3	<p>The method of claim 1, wherein the symbolic content comprises a unique code.</p>	<p>QBIC discloses the method of claim 1, wherein the symbolic content comprises a unique code.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other</p>

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		<p>tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>Flickner Depo at 185, 217.</p> <p>Flickner 8/29/31 Depo at 44</p> <p>2 Q. And how did that problem, going through 3 film stocks being a relatively labor tedious 4 process, how did that play into developing QBIC? 5 A. Well, just like you could query -- you 6 could query text based on court documents or things 7 like that, now you can make visual queries. 8 Q. And querying text was known. People were 9 doing that before the QBIC project started? 10 A. Yes.</p>
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		<p><i>Id.</i> at 45–47</p> <p>6 Q. And going back to your testimony about 7 querying text or keywords, does that mean OCR or 8 does that -- does that mean something else? 9 A. You could do OCR. 10 Q. Okay. And OCR -- 11 A. I assume OCR, you mean optical character 12 recognition? 13 Q. Correct. So that could include OCR? 14 A. Yeah. 15 Q. And that was a known technology at the 16 time the QBIC project started? 17 A. Yes  18 MR. EDWARDS: We'll mark Exhibit 2. 19 (Deposition Exhibit 2 was marked.) 20 BY MR. EDWARDS: 21 Q. And, Mr. Flickner, before we get to 22 Exhibit 2, did -- going back to the OCR, did the 23 QBIC system itself do OCR? 24 A. No. 25 Q. It did not. Did the QBIC system ever</p>
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		<p>1 interface with any other software products that did 2 do OCR? 3 A. Yes. 4 Q. What software products? 5 A. There was a research system that a guy 6 named Dick Casey built. 7 (Reporter seeks clarification.) 8 A. Dick Casey. 9 Q. And what was the research system called? 10 A. I don't remember. 11 Q. And Dick Casey was at IBM? 12 A. Yeah. 13 Q. And when you say "research system," are 14 you referring to just this OCR system or are you 15 referring to this system that -- a system that 16 interacted with QBIC? 17 A. I was referring to the OCR system. 18 Q. Okay. And was there a system constructed 19 that interfaced QBIC with this OCR system? 20 A. I don't recall. 21 Q. Do you know if there were any IBM 22 commercial products that implemented QBIC and OCR? 23 A. I don't recall. 24 Q. So earlier I'd asked you did the QBIC 25 system ever interface with any other software</p> <hr/> <p style="text-align: right;">Page 47</p> <p>1 products that did OCR and you said yes, and you said 2 it was a research system that Dick Casey built; is 3 that correct? 4 A. Yeah. 5 Q. And when you say that it interfaced with 6 it, was that internally at IBM? 7 A. Yes. 8 Q. Okay. And what was the purpose of having 9 the QBIC system interface with the OCR system? 10 A. Just to demonstrate new capabilities.</p> <p><i>Id.</i> at 76</p>
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		<p>9 Q. I could have taken a picture of an 10 electronic billboard or display and submit that to 11 the system? 12 A. Yep. 13 Q. Stamps? 14 A. Yep. 15 Q. Posters? 16 A. Why not? 17 Q. Magazine? 18 A. Subject to copyright issues, yes. 19 Q. Certainly. 20 How about a passport? validity 21 A. Could be done. 22 Q. An album cover? 23 A. Could be done. 24 Q. And could those images not only contain 25 objects but also symbols, like a -- like a logo or a</p> <p style="text-align: right;">Page 77</p> <p>1 trademark? 2 A. Yes.</p> <p><i>Id.</i> at 187–188</p> <p>8 Q. And if you look at the top paragraph, last 9 sentence, it says, "You can now search for images by 10 specifying" -- excuse me. Strike that. 11 It says, "You can now search for images by 12 specifying content attributes (such as color, 13 texture, shape, and layout) and data description 14 elements (such as category and related character and 15 numeric business data)." 16 Do you see that? 17 A. Um-hum. 18 Q. And data description elements, are those 19 things like text or keyword searches that we had 20 talked about before? 21 A. Um-hum. 22 MR. HANSEN: Objection; lacks foundation. 23 (Reporter seeks clarification.) 24 BY MR. EDWARDS: 25 Q. Are those the same as text or keyword</p>	
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		<p style="text-align: right;">Page 188</p> <p>1 searches that we talked about before? 2 MR. HANSEN: Objection; lacks foundation. 3 THE WITNESS: Text or feature -- textures and 4 keywords? 5 BY MR. EDWARDS: 6 Q. No. I'm sorry, let me ask it so it's 7 clear. 8 Data description elements, such as 9 category and character and numeric business data, 10 that would be the same as a text or keyword search 11 that we talked about before; correct? 12 A. Correct.</p> <p><i>Id.</i> at 190–191</p> <p>22 Q. So [as read], "Once the image catalogs are 23 created, you can use the Image Query component to 24 find image and business information. Business 25 information, such as character and numeric data, are</p>
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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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		<p><i>Id.</i> at 197–198</p> <p>17 Q. First sentence says, "Many paper-intensive 18 enterprises, such as insurance companies and 19 financial institutions, administer large volumes of 20 business-related content. The need for an 21 enterprise solution for managing and accessing 22 business information spans many industries." 23 Did I read that correctly? 24 A. Yes. 25 Q. Okay. For -- is it -- is it your 1 experience and understanding that QBIC is something 2 that would be beneficial for businesses that have 3 large volumes of business-related content? 4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC 8 functionality was good for insurance companies and 9 financial institutions. 10 Do you recall that? 11 A. Yes. 12 Q. Do you agree with that? 13 A. Yes. 14 Q. Okay. QBIC would be good for any company 15 that has large amounts of business-related 16 information, including multimedia content; correct? 17 A. Correct.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each</p>
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		of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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**3. Claim 4**

Claim	'278 Claim Recitation	Exemplary Citations in Reference
4	The method of claim 3, wherein the image includes a representation of the code.	<p>QBIC discloses the method of claim 3, wherein the image includes a representation of the code.</p> <p>IBM0002390 at 2391-92</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.

In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.

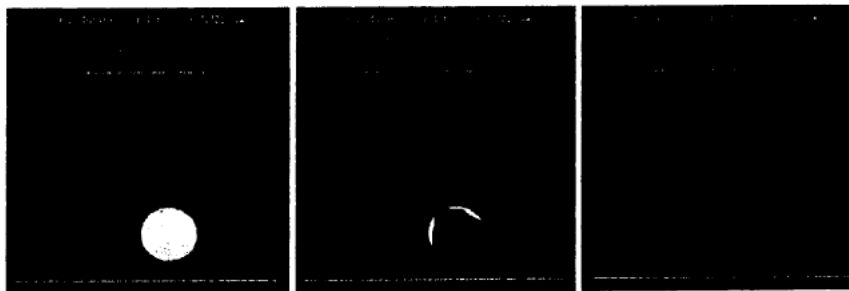


Figure 1: Original image, approximate user outline, and automatically refined outline of sun.

Query by Image and Video Content: The QBIC System (IBM 0000893–902):  
“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” *Id.* at p. 8.

Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):  
“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data



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		<p>types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>Managing Enterprise Information Portal (IBM 000777–880): “Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p> <p>Flickner Depo at 185, 217.</p>
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		<p><i>See claim 3 above.</i></p> <p>Flickner 8/29/23 Depo at 53 – 56</p> <p>16 Q. And when it refers to "text information,"</p> <p>17 what is it referring to?</p> <p>18 A. Anything that could be extracted in the</p> <p>19 context of how the image was annotated.</p> <p>20 Q. And when you say "annotated," annotated by</p> <p>21 the user who was populating the database?</p> <p>22 A. Could be.</p> <p>23 Q. What else could it be?</p> <p>24 A. It could be the supplier of the data.</p> <p>25 Q. Okay. So you may have some annotations</p>
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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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4. Claim 5

Claim	'278 Claim Recitation	Exemplary Citations in Reference
5	<p>The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.</p>	<p>QBIC discloses the method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2397-98</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <i>L</i> component of an (<i>L, a, b</i>) query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <i>X</i> be the query histogram and <i>Y</i> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <i>Z</i>. Then the similarity between <i>X</i> and <i>Y</i> is given by <math>\ Z\  = Z^T A Z</math>, where <i>A</i> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <i>c<sub>i</sub></i> and <i>c<sub>j</sub></i> are the <i>i</i>th and <i>j</i>th colors in the color histograms, and <i>d(c<sub>i</sub>, c<sub>j</sub>)</i> is the <i>MTM</i> color distance, and <i>d<sub>max</sub></i> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <i>X</i> and <i>Y</i>, weighted by <i>A</i>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and</p>

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		<p>videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial</p>
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institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” *Id.* at p. 3.

“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” *Id.* at p. 63.

#### QBIC Demo (IBM000747)





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		<p>Flickner Depo at 28-29</p> <p>2 Q. Okay. And how would you alter it then?</p> <p>3 A. I don't remember exactly how we -- we</p> <p>4 ended up doing it in the actual system. But the</p> <p>5 ways to do it was either specify a parameter in the</p> <p>6 X defaults file or you could -- we could -- we</p> <p>7 could compile it in a color, if we had to, as well.</p> <p>8 Q. Could you, say, take some sort of</p> <p>9 threshold and ask for all images within that</p> <p>10 distance threshold?</p> <p>11 A. You could.</p> <p>12 Q. Okay. And how would you do that?</p> <p>13 A. As you said, you take the threshold</p> <p>14 and -- and use that as -- the distance measuring,</p> <p>15 and you just drop off the images. You wouldn't</p> <p>16 display images that are below the threshold.</p> <p>17 Q. And would the system always return the</p> <p>18 closest match to the image or would it be more</p> <p>19 approximate?</p> <p>20 A. Our system would return closest match --</p> <p>21 Q. Okay.</p> <p>22 A. -- although we did experiment with some</p> <hr/> <p>1 nearest neighbor approximate matches.</p> <p>2 Q. Okay. And were those approximate matches</p> <p>3 ever incorporated into any public QBIC system that</p> <p>4 you're aware of?</p> <p>5 A. I'm not sure I can re- -- that detail I</p> <p>6 can recall.</p> <p>7 Q. And this system, when were -- this was</p> <p>8 all out there in the 19- -- or this system that</p> <p>9 we've been discussing, this was out there in the</p> <p>10 1990s?</p> <p>11 A. It was.</p> <p>12</p>
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		<p>Flickner Depo at 41-42</p> <p>18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>2 Q. Okay. And how many key frames would be 3 returned?</p> <p>4 A. It depends how many you requested.</p> <p>5 Q. Could you alter how many you request?</p> <p>6 A. Probably.</p> <p>7 Q. Could you return key frames based on some 8 defined threshold of the distance?</p> <p>9 A. Probably.</p> <p>Flickner 8/29/23 Depo at 119-128</p>
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		<p style="text-align: right;">Page 118</p> <p>1 Do you see that?                  2 A. Yeah.                  3 Q. And then it describes different icons: I,                  4 C, L, T and S.                  5 Do you see that?                  6 A. Um-hum.                  7 Q. Are those icons similar to the QBIC demo                  8 that you hosted on the IBM's website?                  9 A. I don't recall the specific details. Most                  10 likely, yes.                  11 Q. Okay. So it says, "Click I to view the                  12 full image."                  13 Do you see that?                  14 A. Um-hum.                  15 Q. Was there a similar capability on the demo                  16 that was hosted on IBM's website?                  17 A. I don't recall.                  18 Q. So do you know what happens if you clicked                  19 I?                  20 A. Yeah, you -- pops the window up and you                  21 see the full image.                  22 Q. Okay.                  23 (Reporter seeks clarification.)                  24 A. It pops the window up.                  25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.                  2 Q. Does that correspond to the four features                  3 we looked at earlier, so for -- well, strike that.                  4 For color earlier we looked at two                  5 different flavors. We looked at average color and                  6 we looked at color histogram. So you said --                  7 A. Right.                  8 Q. -- C was color histogram.                  9 Does L correspond to average color or                  10 something different?                  11 A. Well, L has space embedded into it. So                  12 where the color appears in the image matters.                  13 Q. Okay.                  14 A. So C would be the whole image, what was                  15 the color percentage, and L would be I want a                  16 certain percentage in this region and a certain                  17 percentage in this region.                  18 Q. Okay. So what -- if you recall, so to                  19 calculate a color layout feature, do you recall the                  20 details of how that was done?                  21 MR. HANSEN: Objection; foundation.                  22 THE WITNESS: I don't recall.                  23 BY MR. EDWARDS:                  24 Q. Do you recall if that used -- for the                  25 color component, do you recall if that used</p>
		<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such                  2 a...                  3 MR. STRAUSSMAN: You got to speak up.                  4 BY MR. EDWARDS:                  5 Q. That's how you implemented what?                  6 A. You implement what the instructions say.                  7 Q. Okay. Is that a similar implementation                  8 for the other demos that you worked on?                  9 A. Most likely, yes.                  10 Q. Okay. So you click on I and then I would                  11 take you to a link that showed the full image?                  12 A. Um-hum.                  13 Q. Okay. And it says, "Click C to search                  14 images with similar color percentage."                  15 Do you see that?                  16 A. Yep.                  17 Q. Is that the color histogram?                  18 A. Most likely.                  19 Q. Okay. And it says, "Click L to search                  20 images with similar color layout."                  21 What does "color layout" mean?                  22 A. So now you're asking for color in                  23 different positions of the image.                  24 Q. Okay.                  25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?                  2 A. Average color or histogram --                  3 (Reporter seeks clarification.)                  4 MR. HANSEN: Objection; foundation.                  5 THE WITNESS: Average color or histogram color.                  6 So histogram as a space a position in the image.                  7 BY MR. EDWARDS:                  8 Q. Right. And color layout, is that                  9 something that you recall being developed by the                  10 QBIC team as a feature that can be extracted?                  11 A. Right.                  12 Q. Okay. And so it is color in a specific                  13 position?                  14 A. Yes.                  15 Q. Do you recall any of the algorithms that                  16 were used to calculate that?                  17 A. I think we were using color histogram.                  18 Q. Color histogram. Okay. And then how                  19 would you calculate the position aspect of it?                  20 MR. HANSEN: Objection; lacks foundation.                  21 THE WITNESS: We had -- the sketch tools would                  22 let you select a region and paint a color. And then                  23 you'd paint a crude map and then you would go search                  24 for color images that have the blue sky and the                  25 white sand. That's a different query than if you</p>

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then          2 you're looking for blue water, white sand.          3 BY MR. EDWARDS:          4 Q. Do you recall what the methodologies          5 used -- that were used to calculate the orientation          6 of those colors in the image?          7 MR. HANSEN: Objection; lacks foundation.          8 THE WITNESS: There's no orientation per se.          9 It's just position.          10 BY MR. EDWARDS:          11 Q. Well, then position. Do you recall what          12 the methodologies are to calculate the position?          13 MR. HANSEN: Same objection.          14 THE WITNESS: Position is something the user          15 inputs.          16 BY MR. EDWARDS:          17 Q. Something you use what?          18 A. The user had to input.          19 Q. Okay. And then let's move on to the next          20 one, T. It says, "Click T to search images with          21 similar global texture."          22 A. Yeah.          23 Q. Do you recall, in your work on the QBIC          24 project, a feature called global texture that could          25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?          2 A. G-a-b-o-r.          3 Q. So switch over and look at the second page          4 of this Exhibit 6.          5 So -- well, first back -- go back to -- go          6 back to the first page. If you see on the left-hand          7 side it says, "Goto: IBM Image Search Demo," and a          8 little finger there is clicking it.          9 You see it's in red?          10 A. Yeah.          11 Q. Okay. So that's clicking on that link.          12 And then the second page is going to the IBM image          13 search demo.          14 A. Okay.          15 Q. Okay? On the second page it is showing          16 thumbnails with the different icons that we just          17 walked through, I, C, L, T, S, on each of those          18 icons.          19 Do you see that?          20 A. Yep.          21 Q. Do you recognize this as a similar layout          22 to the QBIC demos you hosted in the '90s?          23 A. I don't.          24 Q. You don't?          25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .          2 Q. Say again?          3 A. I missed one of your words. A feature          4 called what?          5 Q. I said do you recall in your work on the          6 QBIC project a feature called global texture that          7 was extracted from the image?          8 A. Yes.          9 Q. Okay. Is that -- is that akin to texture          10 that we looked at earlier?          11 A. Yes.          12 Q. Okay. And the last one is S. It's,          13 "Search images with special multipass filter."          14 Do you recall, in your work on the QBIC          15 project, being able to calculate a feature called          16 multipass filter?          17 A. Probably Gabor functions.          18 Q. Say again?          19 A. Gabor functions.          20 Q. One more time and louder.          21 A. Gabor functions.          22 Q. Gabor functions. Okay. What are Gabor          23 functions?          24 A. Gabor functions are a way of producing          25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM          2 website that was the AIX operating system in          3 Exhibit 3, that did not have a similar thumbnail          4 layout like this?          5 A. A thumbnail, yes. I don't recall it had          6 the buttons, the I, C, L, T, S.          7 Q. You don't recall it had all the buttons or          8 some of the buttons?          9 A. All the buttons.          10 Q. Okay. So you don't recall that it had any          11 buttons?          12 A. I don't -- yeah. I don't recall.          13 Q. It could have, it couldn't have, you just          14 don't remember?          15 A. I just don't remember, yeah.          16 Q. Okay. But the one that you hosted on          17 IBM's website, it did have thumbnails in a similar          18 format here?          19 A. Yeah, it had thumbnails.          20 Q. And these thumbnails represent the images          21 that are stored in the database?          22 A. Yes.          23 Q. Okay. Here, the 470 images would be          24 reflected at least -- one, two, three, four, five,          25 six, seven -- eight of them right here in this</p>

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		<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>
		<p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

*Id.* at 135 – 136

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		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p><i>Id.</i> at 144</p>
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		<p>17 Q. Okay. And you said the system determines 18 similarity based on some distance measure between 19 the extracted features in the image query versus the 20 stored image? 21 A. The features of the stored image. 22 Q. But it's a -- it's some sort of distance 23 measure? 24 A. Yes.</p> <p><i>Id.</i> at 317–322</p>	<p>22 Q. Okay. So for every commercial 23 implementation of QBIC as of the IEEE 1995 article 24 in Exhibit 3, those implementation calculated 25 features of a query image and stored image; is that</p>
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		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>	
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query,"</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>	

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		<p style="text-align: right;">Page 322</p> <ol style="list-style-type: none"><li>1 indicates how confident the system is that the</li><li>2 features of the stored image match the features of</li><li>3 the input image; correct?</li><li>4 A. Correct.</li></ol> <p><i>See also</i> Flickner Depo at 25-26, 131-132, 162-163</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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Invalidity Chart for U.S. Patent 9,031,278 based on Hewlett-Packard CoolTown System (“CoolTown”)

### **Exhibit F-31**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, CoolTown was made, known or used by others in the United States no later than July 10, 2000. *See generally* T. Kindberg et al., A Web-Based Nomadic Computing System; J. Barton et al., The Cooltown User Experience; cooltown developer’s network, coolbase overview; cooltown developer’s network, people, places, things: web presence for the real world. CoolTown is available as prior art at least under 35 U.S.C. § 102(a). On information and belief, HP was using CoolTown and made it available to the public in the United States by releasing the website on the Internet (and accessible to U.S. users) by at least March 2000, making the software available on the HP website by March 2000, and making available on the Internet (and accessible to U.S. users) the open source code, which reflects the functionality of CoolTown by at least March 2000. *See e.g.*, HP000043–044; HP000045–046; HP000060–061; *see also* <https://www.zdnet.com/article/hp-brings-open-source-to-cooltown/>. Therefore, HP Cooltown was at least known, used, and/or sold to the public by at least 2000. On information and belief, CoolTown is also available as prior art under 102(g). BofA is diligently investigating CoolTown and will supplement with additional information, if necessary.

As shown in the chart below, CoolTown anticipates asserted claims 1, 4, and 5 of the ’278 Patent. To the extent CoolTown is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent CoolTown is found not to anticipate any asserted claims or claim elements of the ’278 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR

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2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'278 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A computer-assisted method, comprising:	<p>CoolTown discloses a computer-assisted method.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p style="padding-left: 40px;">The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1</p> <p><b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology, wireless networks and portable devices. This paper describes how CoolTown ties web resources to physical objects and places, and how users interact with resources using the information appliances they carry, from laptops to smart watches. Enabling the automatic discovery of URLs from our physical surroundings, and using localized web servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we leverage device connectivity to support communication services.</p> <p>Coolbase<sup>1</sup> Overview at 1</p>

<sup>1</sup> See <https://web.archive.org/web/20011030090650/http://cooltown.hp.com/dev/coolbase-overview.asp>

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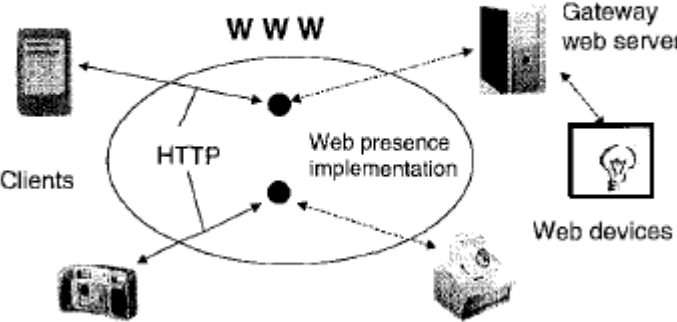
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>coolbase overview</p> <p>The coolbase platform consists of several sub-projects which combine to form a coherent framework for bringing together all the elements necessary to build a cooltown service or application. These sub-projects include software for enabling smart, connected web devices; software for representing people, places and things and their contextual relationships; some supporting hardware and software elements; and sample applications that illustrate the use of these various elements.</p>
[1A]	receiving, via a mobile device, an image comprising a representation of at least a portion of a document;	<p>CoolTown discloses receiving, via a mobile device, an image comprising a representation of at least a portion of a document.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p>

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p style="padding-left: 40px;">The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1  <b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology, networks and portable devices. This paper describes how CoolTown ties web resources to physical places, and how users interact with resources using the information appliances they carry, from laptops to watches. Enabling the automatic discovery of URLs from our physical surroundings, and using servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we provide device connectivity to support communication services.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</p>

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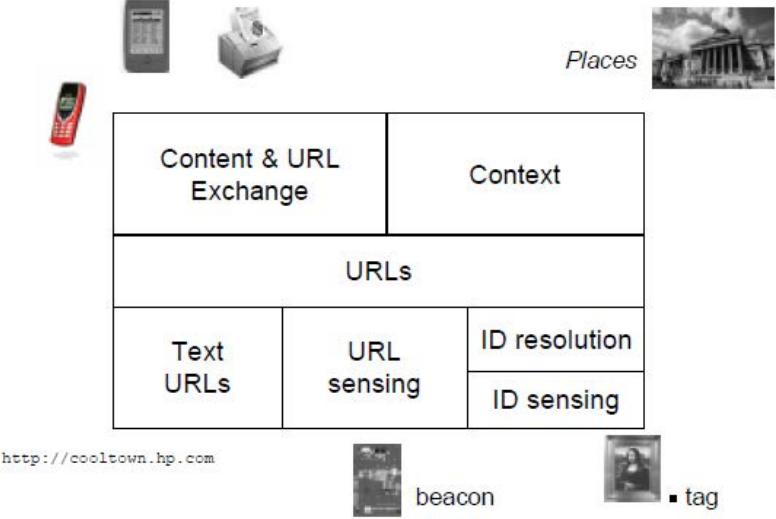
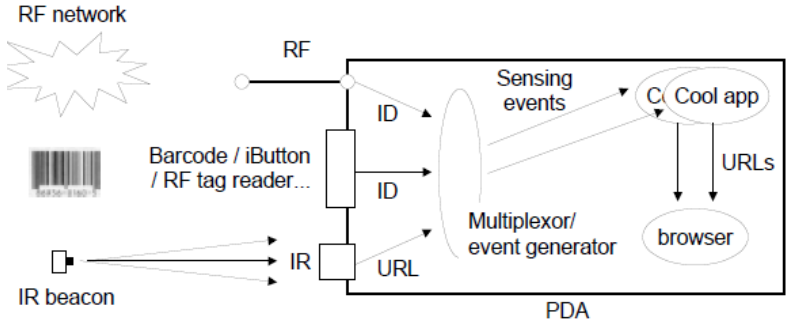
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the "web server" level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like a barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic users carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p> <p>Present-day users of portable wireless devices view them as either adjuncts to larger desktop or workstation computers or as portable communications devices (phones or for e-mail). We view them as portable viewers of web pages and as sources of content, or as clipboards for URLs pointing to discovered content. Then we add support for obtaining location-dependent web pages and for moving content between mobile and fixed but online devices. Figure 2 shows how this support is organized.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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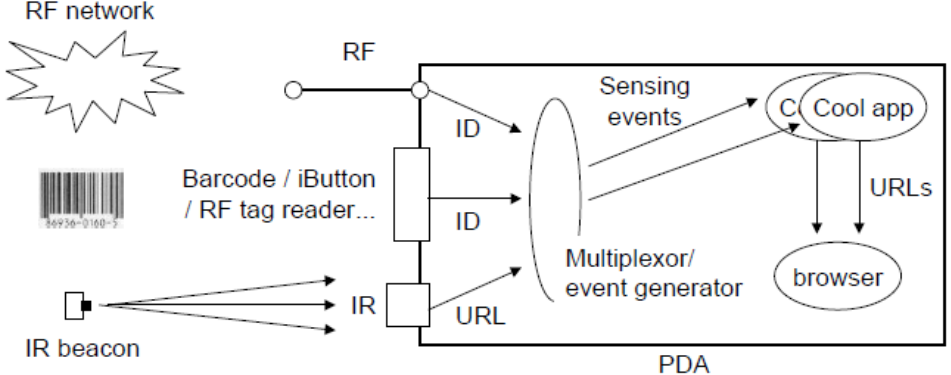
Invalidity Chart for U.S. Patent 9,031,278 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b>                      In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 8</b>                      To accomplish direct content transfer we need only have a simple push interaction: the content source opens a connection to the sink and writes the content (See Figure 5a). The only agreement we need between sources and sinks is the format of the data. Many imaging devices support JPEG format: it serves as the common format for images today. Since devices may use other common formats and since formats do evolve, effective interaction requires some introductory content preceding the data that identifies its format. The format of this introductory or</p> <p><b>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</b></p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these</p>

Element	'278 Claim Recitation	Exemplary Citations in Reference
		references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B]	determining that symbolic content is on the at least the portion of the document based on the image;	<p>CoolTown discloses determining that symbolic content is on the at least the portion of the document based on the image.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3  <b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>



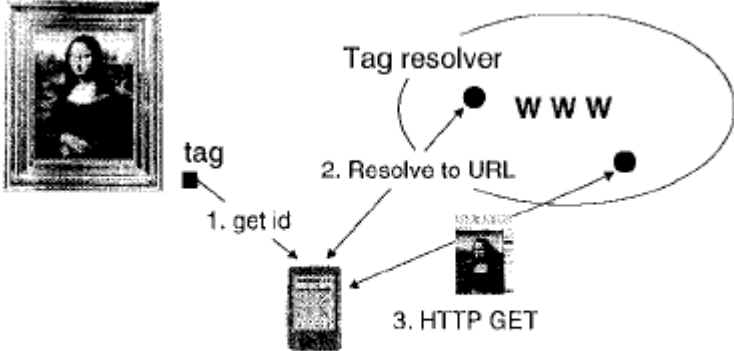
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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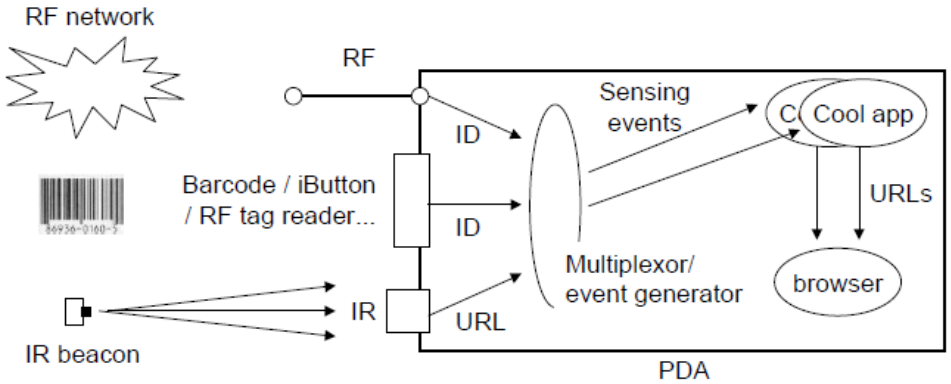
Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>



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		<p>The Cooltown User Experience (HP000088 – 093) at 4</p> <p>be direct: the URL for the web resource is emitted from the beacon. For barcodes or similar identifiers that are too compact to hold a URL, we add a "resolver" that turns sensed values into URLs. With a resolver in place, a wide variety of objects can be associated with web pages. Then the deployment of physical/virtual links should proceed much like web-page construction.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	extracting symbol information based on the symbolic content according to symbol type;	<p>CoolTown discloses extracting symbol information based on the symbolic content according to symbol type.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p>

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book’s ISBN barcode could lead to the local library’s entry for the book, if the resolver for the ISBN is the local</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

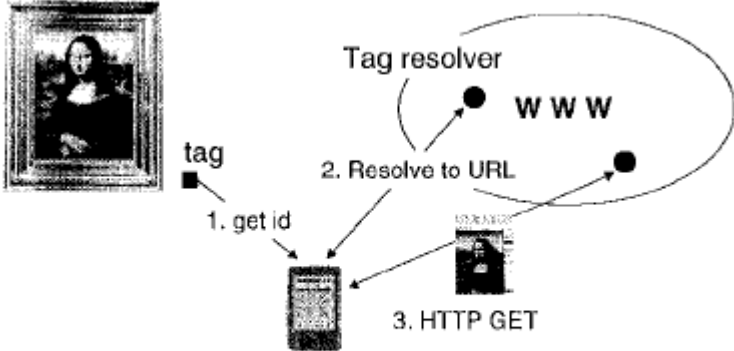
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>The Cooltown User Experience (HP000088 – 093) at 4</p> <p>be direct: the URL for the web resource is emitted from the beacon. For barcodes or similar identifiers that are too compact to hold a URL, we add a"resolver" that turns sensed values into URLs. With a resolver in place, a wide variety of objects can be associated with web pages. Then the deployment of physical/virtual links should proceed much like web-page construction.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place's web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>The Cooltown User Experience (HP000074 – 87) at 4</p> <p>be direct: the URL for the web resource is emitted from the beacon. For barcodes or similar identifiers that are too compact to hold a URL, we add a"resolver" that turns sensed values into URLs. With a resolver in place, a wide variety of objects can be associated with web pages. Then the deployment of physical/virtual links should proceed much like web-page construction.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination</p>

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		<p>with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>determining a validity of the document based at least in part on the image and the symbol information; and</p>	<p>CoolTown teaches determining a validity of the document based at least in part on the image and the symbol information.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or</p>



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		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>



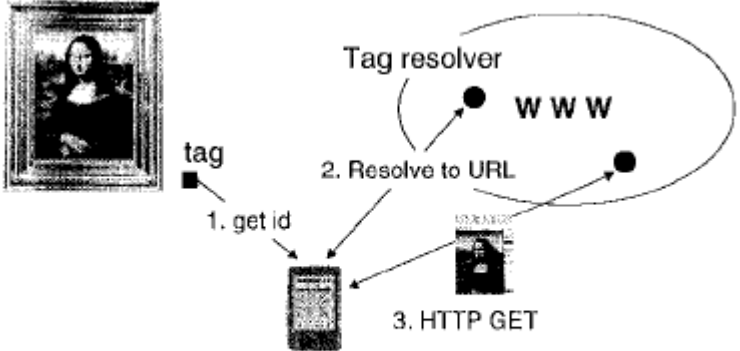
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

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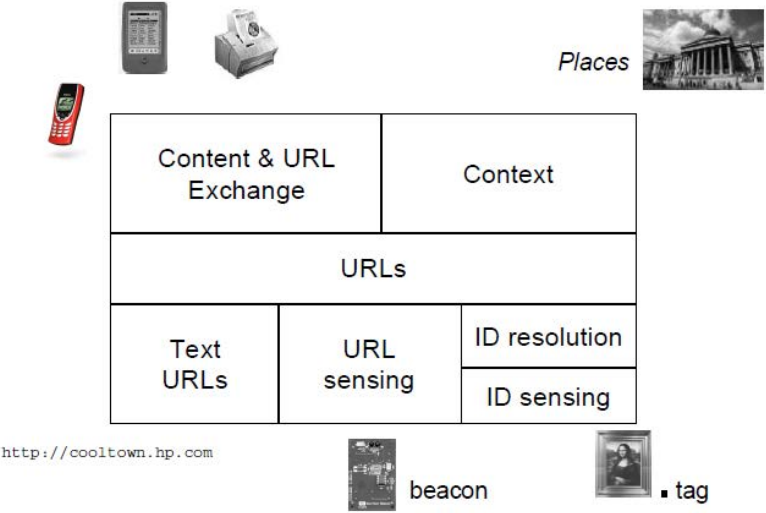
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 10</p> <p><i>Other types of context</i></p> <p>The resolver technology that we have been developing also supports contexts that are not tied to any physical domain. An individual entity such as a painting may possess a point of web presence not only in the context of the gallery where it currently hangs, but also in a variety of virtual art catalogues. It may even have a point of web presence in a private context shared by a group of art students and teachers, which they use to provide comments for one another. That context could contain an entry for each painting in any gallery in the world that students in the class have found interesting. When a student looks up a painting's point of web presence in the context, they will find comments left on that page by other students in the class.</p> <p>Contexts have been established for published artifacts based on their 'distributed object identifier' [10], for products based on their UPC code, for articles in newspapers and magazines, and for artifacts in the office [29] and museums [24]. The research issue is how to choose the context (the resolver) for a given identifier so as to present appropriate resources, but to do so automatically wherever possible. Users require a choice, but a balance is needed between choice and ambiguity. The system must scale to trillions of points of web presence. At CoolTown, we are investigating resolver technologies that will support contexts shared between groups of individuals (the art class) or spanning organizations (the inventory context), while linking those contexts to more global ones where appropriate. Thus a printer's identifier could yield not only its pages within the host organization, but also pages from the manufacturer.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><a href="http://cooltown.hp.com">http://cooltown.hp.com</a></p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

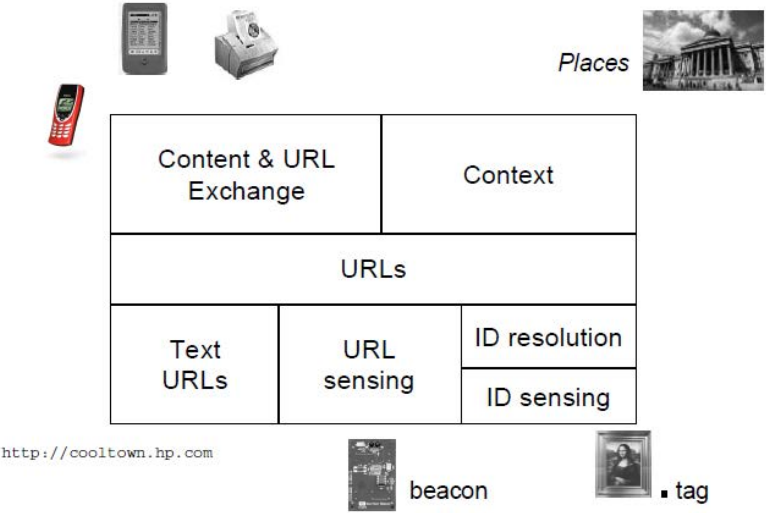
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a 'glyph' [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA's Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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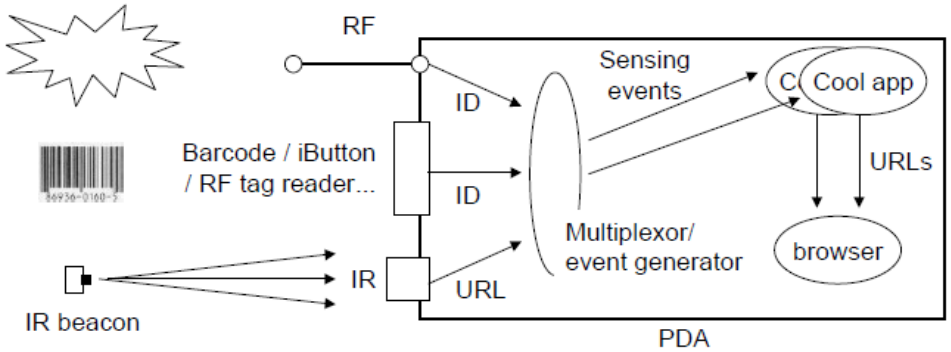
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Element	'278 Claim Recitation	Exemplary Citations in Reference
[1E]	recognizing the document as a first target object based at least in part on	<p>CoolTown discloses this limitation.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>  <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p> <p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p>

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		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



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		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b>          Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard ‘sensing events’, bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in the current activity, so that users can ‘retrace their steps’.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b>          To get an idea of some of the issues in defining place contexts, imagine that Acme Software Inc. sets up a stand at the Wireless Web World exhibition (Figure 4). Acme has to define its own context within the exhibition, which it uses to provide information, printing, purchasing and other services to users who walk up to the stand. Visitors must be able to discover the Acme context when they walk up, distinguish it from that of neighboring exhibits, and, through their devices, these visitors must be able to browse and access the resources that Acme provides within that context. We are mainly interested here in resources that are based around the physical entities found at the exhibition stand. When the visitor reads a barcode attached, say, to a printer or a guest book on display, they are automatically shown the Acme web page offering them a service connected with it.</p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 8</p> <p><b>Indirect Sensing</b></p> <p>In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s Web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding Web page</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

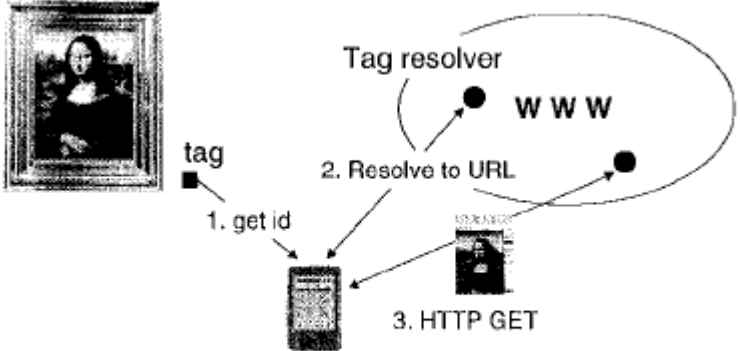
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Invalidity Chart for U.S. Patent 9,031,278 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025 – 34) at 8  <b>Indirect Sensing</b></p> <p>In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s Web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding Web page.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.i]	the image,	<p>CoolTown discloses this limitation.</p> <p><i>See</i> limitation [1E] above.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.ii]	the symbol information,	<p>CoolTown discloses this limitation.</p> <p><i>See</i> limitation [1E] above.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E.iii]	and a query of a database storing target object information associated with a plurality of target objects	<p>CoolTown discloses this limitation.</p> <p><i>See</i> limitation [1E] above.</p>

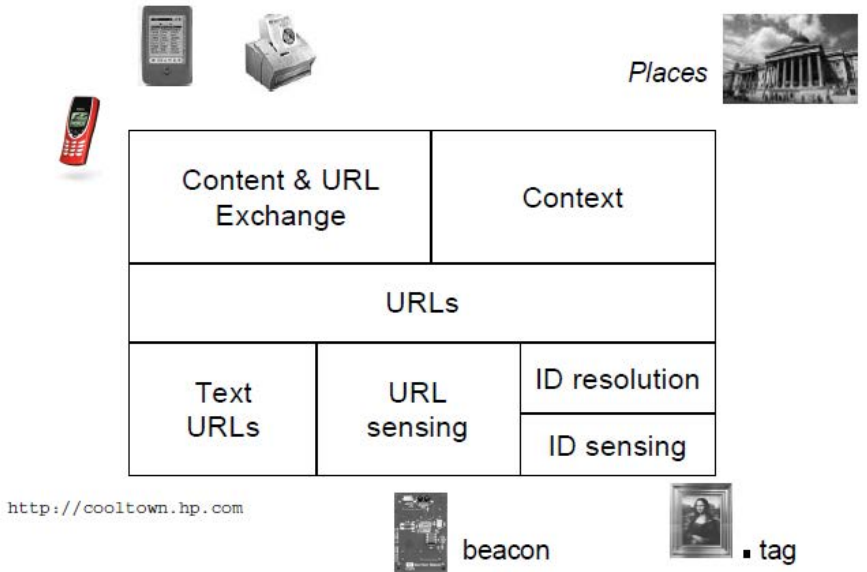
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Element	'278 Claim Recitation	Exemplary Citations in Reference
	including the first target object;	<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	receiving, via an address, first target object information associated with the first target object,	<p>CoolTown discloses receiving, via an address, first target object information associated with the first target object.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>

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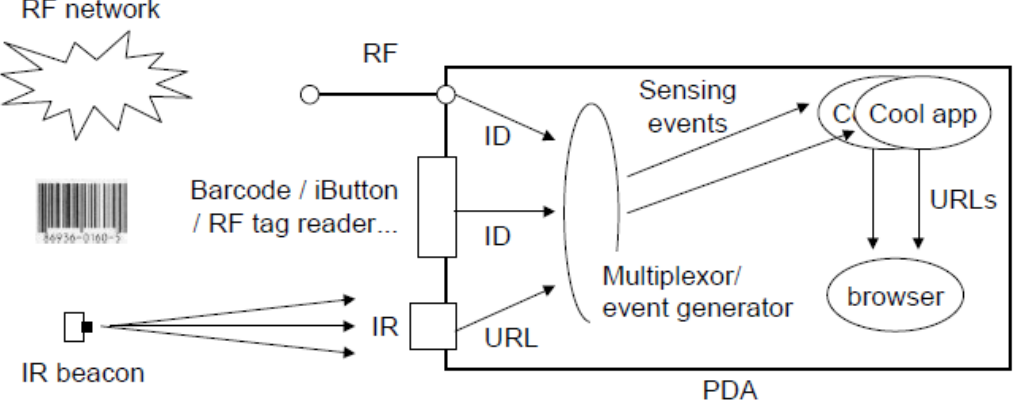
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><a href="http://cooltown.hp.com">http://cooltown.hp.com</a></p> <p>beacon tag</p> <p>Places</p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolve tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in the current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>



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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information about services that the user can browse on their device, and which devices can query.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 5</p> <p><b>2.4 The Common User Experience in Cooltown.</b></p> <p>The three examples above explore various aspects of web presence but they also show a common theme. The typical user experience we seek with web presence is that of collecting links to points of web presence as they are encountered in the physical world. One could even think of the physical world as a web page, with links at certain physical points. Of course the links are URLs presented on the user’s client device and the result of clicking on such a link will be a real web page, delivered to the user’s screen. The user can then travel through the virtual space of the web page with normal Web techniques or the user can travel through the physical space to find a different point of web presence. The user understands URLs as pointers to meta-information about objects at the same level that users of Web browsers now understand URLs as bookmarks for Web content. While this physical/virtual browsing is a typical scenario, we imagine other usage scenarios for web present things, in the same way that the Web supports many usage scenarios in addition to Web browsing.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

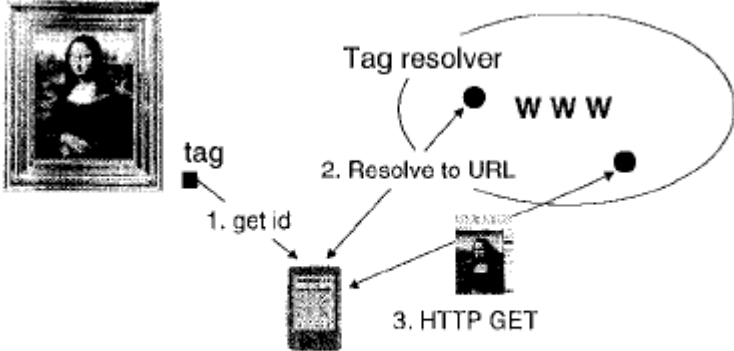
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Invalidity Chart for U.S. Patent 9,031,278 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F.i]	wherein the first target object information comprises a response regarding the validity of the	Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21

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Element	'278 Claim Recitation	Exemplary Citations in Reference
	document.	<p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 10</p>

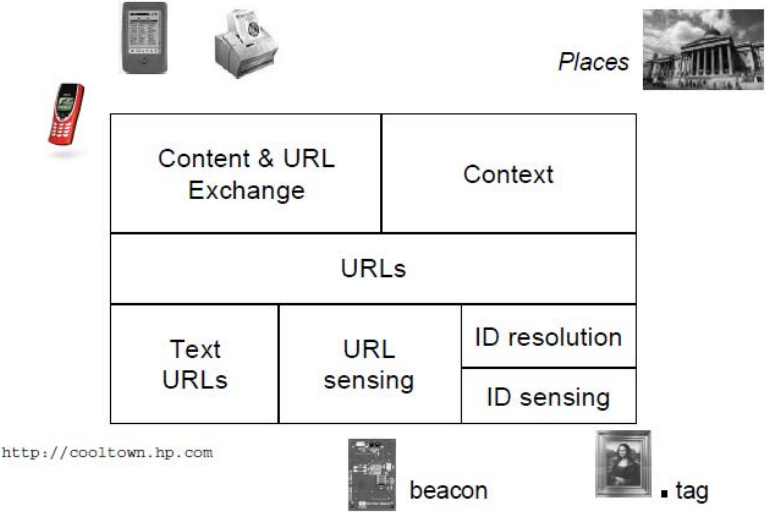
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p><b><i>Other types of context</i></b></p> <p>The resolver technology that we have been developing also supports contexts that are not tied to any physical domain. An individual entity such as a painting may possess a point of web presence not only in the context of the gallery where it currently hangs, but also in a variety of virtual art catalogues. It may even have a point of web presence in a private context shared by a group of art students and teachers, which they use to provide comments for one another. That context could contain an entry for each painting in any gallery in the world that students in the class have found interesting. When a student looks up a painting's point of web presence in the context, they will find comments left on that page by other students in the class.</p> <p>Contexts have been established for published artifacts based on their 'distributed object identifier' [10], for products based on their UPC code, for articles in newspapers and magazines, and for artifacts in the office [29] and museums [24]. The research issue is how to choose the context (the resolver) for a given identifier so as to present appropriate resources, but to do so automatically wherever possible. Users require a choice, but a balance is needed between choice and ambiguity. The system must scale to trillions of points of web presence. At CoolTown, we are investigating resolver technologies that will support contexts shared between groups of individuals (the art class) or spanning organizations (the inventory context), while linking those contexts to more global ones where appropriate. Thus a printer's identifier could yield not only its pages within the host organization, but also pages from the manufacturer.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>

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Element	'278 Claim Recitation	Exemplary Citations in Reference
		 <p><a href="http://cooltown.hp.com">http://cooltown.hp.com</a></p> <p>beacon</p> <p>tag</p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



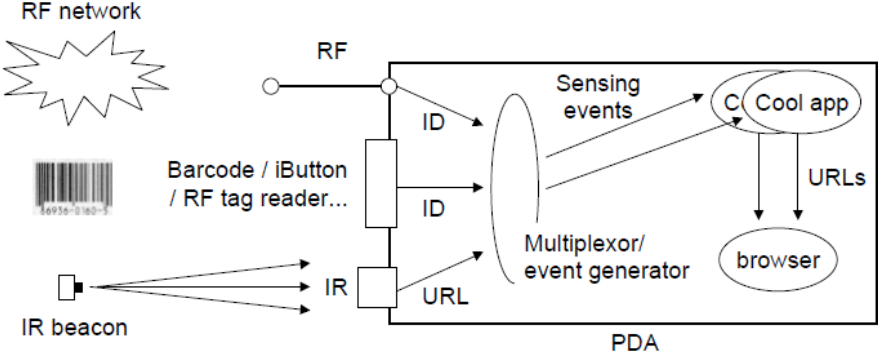
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Element	'278 Claim Recitation	Exemplary Citations in Reference
		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book’s ISBN barcode could lead to the local library’s entry for the book, if the resolver for the ISBN is the local</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>



2. Claim 4

Claim	'278 Claim Recitation	Exemplary Citations in Reference
4	The method of claim 3, wherein the image includes a representation of the code.	<p>CoolTown discloses the method of claim 3, wherein the image includes a representation of the code.</p> <p>A Web-Based Nomadic Computing System at (HP000074 – 87) 3</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p> <p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p>
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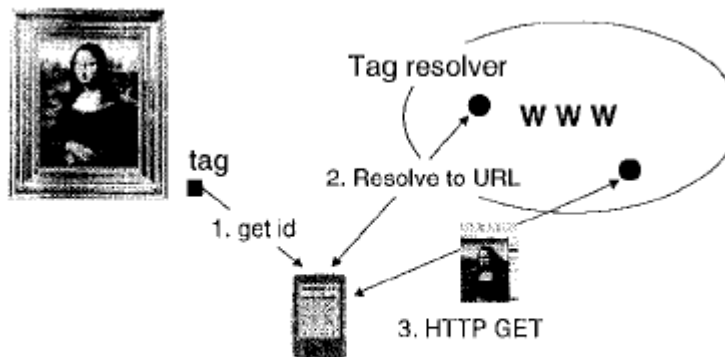
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**Indirect sensing.** In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.

We have been experimenting with indirect sensing where the sensed value is obtained from a *tag*. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.



**Figure 4. Indirect sensing: the web presence for a painting.**

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		<p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>.....</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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### 3. Claim 5

Claim	'278 Claim Recitation	Exemplary Citations in Reference
5	The method of claim 3, further comprising detecting whether there is a match within a specified tolerance and returning a message indicating the absence of a match within a specified tolerance.	To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit G-3**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Rhoads was filed on May 15, 2000, claiming the priority date of May 19, 1999. Rhoads published at least as of September 20, 2005, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Rhoads anticipates asserted claims 1, 4 and 20 of the ’529 Patent. To the extent Rhoads is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Rhoads is found not to anticipate any asserted claims or claim elements of the ’529 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

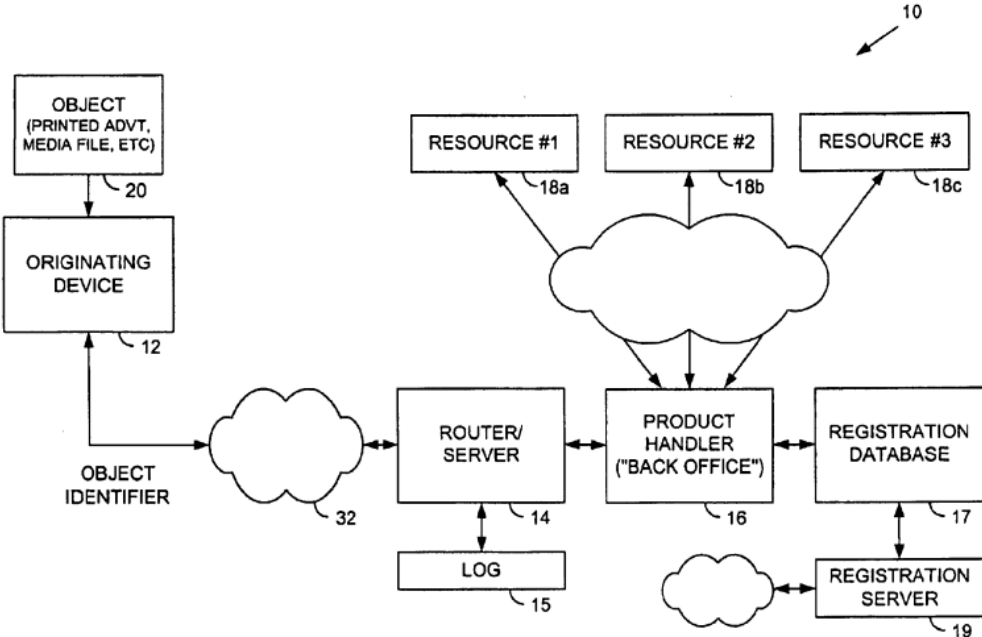
Element	'529 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A system comprising:	<p>Rhoads discloses a system</p> <p>Rhoads at Abstract</p> <ul style="list-style-type: none"> <li>• “A cell phone is equipped with a 2D optical sensor, enabling a variety of applications. For example, such a phone may also be provided with a digital watermark decoder, permitting decoding of steganographic data on imaged objects. Movement of a phone may be inferred by sensing movement of an imaged pattern across the optical sensor's field of view, allowing use of the phone as a gestural input device through which a user can signal instructions to a computer-based process. A variety of other arrangements by which electronic devices can interact with the physical world are also detailed, e.g., involving sensing and responding to digital watermarks, bar codes, RFIDs, etc.”</li> </ul> <p>Rhoads at 5:54-56.</p> <ul style="list-style-type: none"> <li>• “Basically, the technology detailed in this disclosure may be regarded as enhanced systems by which users can interact with computer-based devices.”</li> </ul> <p>Rhoads at 9:35–41</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.”</li> </ul> <p>Rhoads at Fig. 2 (and accompanying description)</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 2</b></p>
[1A]	a camera that captures an image;	Rhoads discloses a camera that captures an image.  Rhoads at Fig. 2 (and accompanying description)



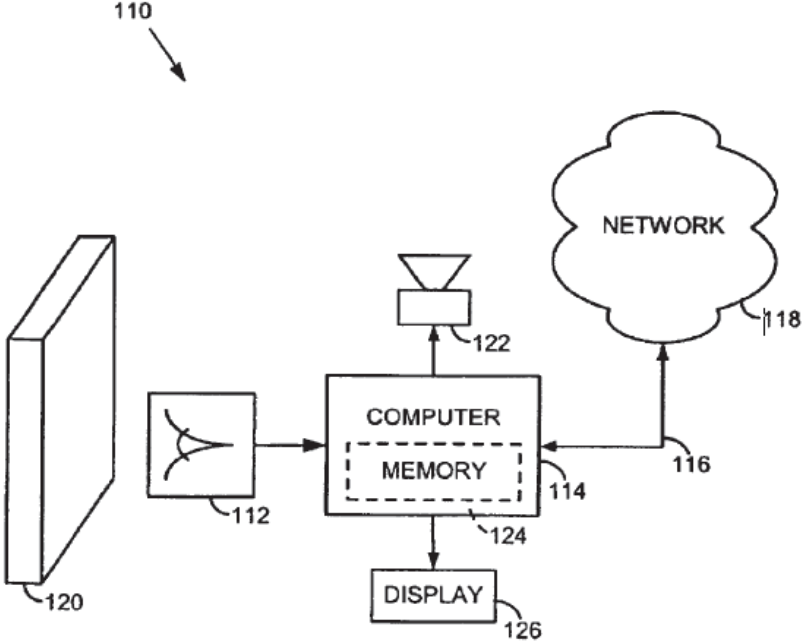
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 3:41–51</p> <ul style="list-style-type: none"> <li>“According to another aspect, the invention includes a promotional method comprising: (a) presenting an object within the field of view of an optical sensor device, the object being selected from the list consisting of a retail product, packaging for a retail product, or printed advertising; (b) acquiring optical data corresponding to the object; (c) decoding plural-bit digital data from the optical data; (d) submitting at least some of said decoded data to a remote computer; and (e) determining at the remote computer whether a prize should be awarded in response to submission of said decoded data.”</li> </ul> <p>Rhoads at 7:24-42</p> <ul style="list-style-type: none"> <li>“Device 12 interacts with an object 20. The object can be electronic or not.”</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</p> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28.”</p> <p>Rhoads at Fig. 11(and accompanying description)</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 11</b></p> <p>Rhoads at 7:13-29</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 11, a basic embodiment 110 of the present technology includes an optical sensor 112, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed</li> </ul>

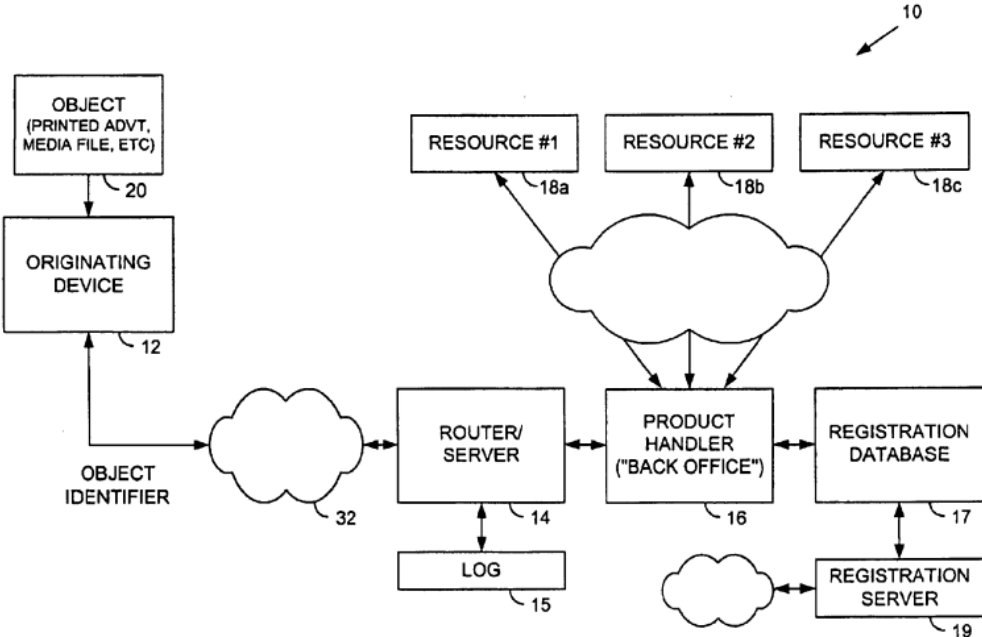
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</p> <p>Rhoads 8:66 – 9:12</p> <ul style="list-style-type: none"> <li>• “In still other embodiments, the camera (or other sensor) can be equipped with one or more auxiliary fixed-focus lenses that can be selectively used, depending on the particular application. Some such embodiments have a first fixed focused lens that always overlies the sensor, with which one or more auxiliary lenses can be optically cascaded (e.g., by hinge or slide arrangements). Such arrangements are desirable, e.g., when a camera is not a dedicated Bedoop sensor but also performs other imaging tasks. When the camera is to be used for Bedoop, the auxiliary lens is positioned (e.g., flipped into) place, changing the focal length of the first lens (which may be unsuitably long for Bedoop purposes, such as infinity) to an appropriate Bedoop imaging range (such as one foot).”</li> </ul> <p>Rhoads at 17:46–54</p> <ul style="list-style-type: none"> <li>• “The building can be provided with an image sensor (such as a video camera or the like), an associated Bedoop. detection system, and the proximity detector. When a user wearing the badge approaches, the proximity detector signals the camera to capture image data. The Bedoop detection system identifies the badge photograph (e.g., by clues as are described in the prior applications, or without such aids), captures optical data, and decodes same to extract the steganographically-embedded data hidden therein.”</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"> <li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service;	<p>Rhoads discloses a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service.</p> <p>Rhoads at Fig. 2 (including accompanying description)</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 9:35–10:10</p> <ul style="list-style-type: none"> <li>“The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.”</p> <p>Rhoads at 3:52–60</p> <ul style="list-style-type: none"> <li>• “According to another aspect, the invention includes a method of interacting with a magazine using a computer, the computer including an internet web browser, the method including: (a) providing a peripheral device having a</li> </ul>

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		<p>sensor; (b) positioning the peripheral device adjacent a first advertisement in the magazine to direct the web browser to a first internet address; and (c) positioning the peripheral device adjacent a second advertisement in the magazine to direct the web browser to a second internet address.”</p> <p>Rhoads at 49:15–35</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 2, a system 10 according to the exemplary embodiment includes an originating device 12, a router/server 14, a product handler 16, a registration database 17, and one or more remote resources 18.</li> </ul> <p>The originating device 12 can take many different forms, e.g., a cell phone, a personal digital assistant (e.g., a Palm Pilot), a personal computer, a barcode scanning system, etc. For expository convenience, the embodiment is described with reference to a personal computer for device 12.</p> <p>Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</p> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object....”</p> <p>Rhoads at 10:22–30</p> <ul style="list-style-type: none"> <li>• “Some embodiments filter the image data at some point in the process to aid in ultimate Bedoop data extraction. One use of such filtering is to mitigate</li> </ul>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>image data artifacts due to the particular optical sensor. For example, CCD arrays have regularly-spaced sensors that sample the optical image at uniformly spaced discrete points. This discrete sampling effects a transformation of the image data, leading to certain image artifacts. An appropriately configured filter can reduce some of these artifacts.”</p> <p>Rhoads at 19:61 – 20:15</p> <ul style="list-style-type: none"> <li>• “The coffee cup is an example of a non-planar object. Another is soft drink cans. Special issues can arise when encoding and decoding markings on such objects. For example, when sensing such an object with a camera or the like, part of the image will be out of focus due to differing distances from the camera to different parts of the can surface.</li> </ul> <p>While parts of an image sensed from a non-planar object, such as a can, may be out of focus, they still convey useful image data. The out of focus areas are just blurred—as if filtered by a low pass filter. But to make use of this information, a further complication must first be addressed: warping.</p> <p>When viewed from a camera, the planar artwork with which the can is wrapped becomes warped. Portions of the can nearest the camera appear at a nominal full scale, while areas successively further around the can curvature (as viewed from the camera) appear progressively more and more spatially compressed. Regardless of the watermarking technology being employed, the physical warp of the can's surface is likewise manifested as a warping of the encoded watermark data.”</p> <p>Rhoads at 38:1 – 19</p> <ul style="list-style-type: none"> <li>• “Post-It® Notes                      Pads of Post-It® notes, or other pads of paper, can be marked by the</li> </ul>

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		<p>manufacturer (either by texturing, watermarked tinting, ink-jet spattering, etc.) to convey steganographic data (e.g., Bedoop data). When such a note is presented to a Bedoop system, the system may launch an application that stores a snapshot of the note. More particularly, the application may mask the note-portion of the image data from the other image data, virtually re-map it to a rectangular format of standardized pixel dimensions, JPEG-compress the resulting image, and store it in a particular computer subdirectory with a name indicating the date of image acquisition, together with the color and/or size of the note. (These latter two data may be indicated by data included in the Bedoop payload.) If the color of the note is indicated by digital data (e.g, in the file name), then the image itself may be stored in grey-scale. When later recalled for display, the white image background can be flooded with color in accordance with the digital color data.”</p> <p>Rhoads at 42:1–12</p> <ul style="list-style-type: none"> <li>• “The optical data collected by the sensor can be processed within the peripheral's processor to extract the steganographically encoded binary Bedoop data therefrom. Or this processing burden can be undertaken by the associated computer system, with the peripheral simply processing and formatting the raw sensor data into sequential frames of image data to be output to that system.</li> </ul> <p>While scanning peripherals of the type described above are typically wired to an associated host system, wireless links (e.g., radio, infrared, ultrasonic, etc.) can of course be used, freeing the user from the constraint imposed by the cable.”</p> <p>Rhoads at 45:19–55</p> <ul style="list-style-type: none"> <li>• “Bedoop technology can be integrated into portable telecommunication</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>terminals, such as cell phones (manufactured, e.g., by Motorola, Nokia, Qualcomm, and others). Such a phone can be equipped with a 1D or 2D image sensor, the output of which is applied to Bedoop decoding circuitry within the phone. This decoding circuitry can be the phone's main CPU, or can be a processing circuit dedicated to Bedoop functionality. (In this as in other embodiments, the decoding can be effected by dedicated hardware, by decoding software executing on a general purpose CPU, etc.)</p> <p>Cell phones are already equipped with numerous features that make them well suited for Bedoop operation. One is that cell phones typically include an LCD or similar screen for display of textual or graphic information, and additionally include buttons or other controls for selecting among menu options presented on the screen (e.g., by moving a cursor). Moreover, cell phones naturally include both audio input and output devices (i.e., microphone and speaker). Still further, the protocol by which cell phones transmit data includes data identifying the phone, so that such data need not be separately encoded. And finally, cell phones obviously provide ready links to remote computer systems. Collectively, these capabilities rival those of the most fully-equipped desktop computer system. Thus, essentially all of the applications detailed elsewhere in this specification can be implemented using cell phone Bedoop systems</p> <p>As with the other Bedoop systems, when Bedoop data is sensed, the phone can respond to the data locally, or it can forward Same over the cellular network to a remote System (or computer network) for handling.”</p> <p>Rhoads at 46:10–12.</p> <ul style="list-style-type: none"> <li>• “Bedoop decoding function within the phone, in other embodiments the image data can be transmitted from the phone and decoded at a remote location.”</li> </ul>

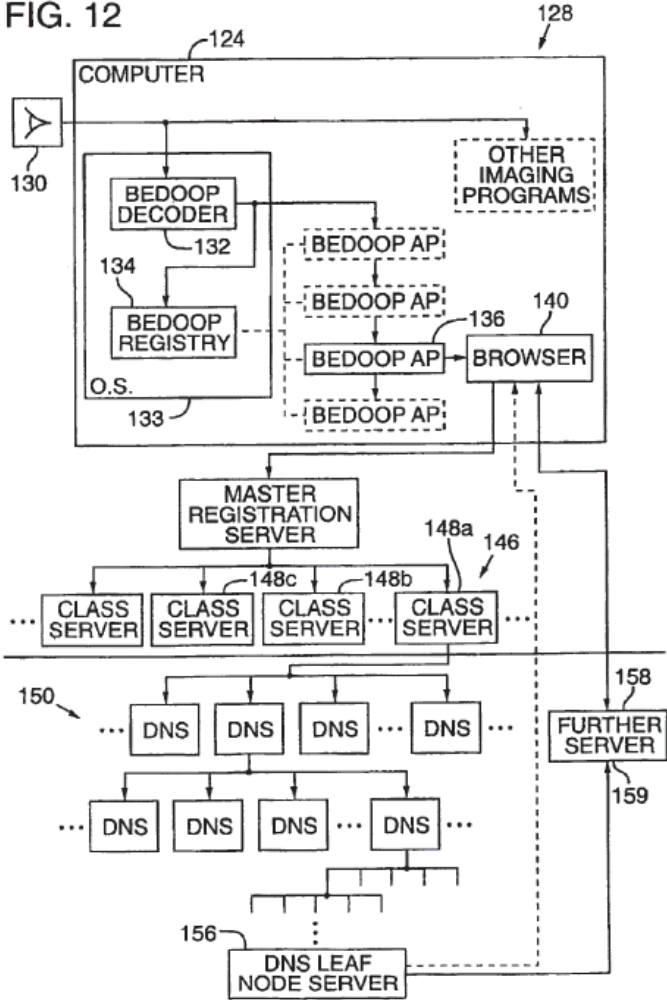
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at Fig. 3</p> <p style="text-align: center;"><b>FIG. 3</b></p> <p>Rhoads at 46:10–12.</p>

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		<ul style="list-style-type: none"> <li>• “Bedoop decoding function within the phone, in other embodiments the image data can be transmitted from the phone and decoded at a remote location.”</li> </ul> <p>Rhoads at 46:47 – 53                      “The provision of image sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The screens on such phones can likewise be used for display of incoming image or video data.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30. Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</li> </ul> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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		<p>FIG. 12</p>  <p>Rhoads at 12:23 – 33</p> <ul style="list-style-type: none"> <li>• “Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default</li> </ul>

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		<p>Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately, or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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[1C]	the service programmed to receive the data;	<p>Rhoads discloses the service programmed to receive the data.</p> <p>Rhoads at Fig. 2 (and accompanying description)</p> <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 12:23 – 33</p> <ul style="list-style-type: none"> <li>“Sometimes the computer system may encounter a Bedoop object for which it does not have a registered application program. In such case, a default Bedoop application can be invoked. This default application can, e.g., establish an internet link to a remote server computer (or a network of such computers), and can transmit the Bedoop data (or a part of the Bedoop data) to that remote computer. The remote server can undertake the response itself, it can instruct the originating computer how to respond appropriately,</li> </ul>



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		<p>or it can undertake some combination of these two responses. (Such arrangements are further considered below.)”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>“Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)” To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.”</li> </ul> <p>Rhoads at 49:19-47</p> <ul style="list-style-type: none"> <li>“Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio,</li> </ul>

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		<p>video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</p> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28. Device driver software 26 serves as a software interface, communicating at a relatively high level with the application programs 28 (e.g., through API instructions whose content and format are standardized to facilitate application programming), and at a relatively low level with the interface electronics 24.”</p> <p>Rhoads at 49:48-65</p> <ul style="list-style-type: none"> <li>• “The detailed embodiment contemplates that the object 20 is a magazine advertisement encoded with a steganographic watermark conveying a plural bit object identifier. The watermark is hidden in the advertisement's image in a manner indiscernable to human observers, but detectable by computer analysis. That analysis is performed by a watermark detector 30.</li> </ul> <p>Watermark detector 30 can be implemented in various different locations in the system of FIG. 1. Typically, the detector is implemented in the originating device 12, e.g., in the driver software 26, or in application software 28 c that serves to link to external resources based on detected watermarks. But it may be implemented elsewhere, e.g., in hardware in the</p>

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		<p>interface electronics 24, in an operating system associated with the device, or outside device 12 altogether. Some systems may have plural watermark detectors, implemented at different locations throughout the system.”</p> <p>Rhoads at 50:21–51:3</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).</li> </ul> <p>In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also</p>

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		<p>communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)</p> <p>The illustrated product handler 16 comprises essentially the same hardware elements as the router 14, e.g., CPU, memory, etc. Although FIG. 2 shows just one product handler, several product handlers can be included in the system—either co-located or geographically distributed. Different handlers can be dedicated to different functions (e.g., serving URLs, serving music, etc.) or to different watermark sources (e.g., one responds to watermarks found in audio, another responds to watermarks found in print advertising, etc.).”</p> <p>Rhoads at Fig. 12 (and accompanying description)</p>

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		<p style="text-align: center;"><b>FIG. 12</b></p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate</p>

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		<p>this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>identify an object within the image:</p>	<p>Rhoads discloses identify an object within the image.                      Rhoads at 4:34 – 51</p> <ul style="list-style-type: none"> <li>• “According to another aspect, the invention includes a method comprising: (a) sensing an object identifier from a first object; (b) sending said first object identifier from a first device to a second device; (c) in response, at said second device, identifying address information corresponding to said first object identifier and sending same to the first device; (d) initiating a link from the first device in accordance with said address information; (e) at said second device, identifying additional objects related to said first object; identifying additional address information corresponding to said additional objects; and sending said additional address information to the first device; and (f) storing said additional address information in a memory at the first device; wherein, if an object included among said identified additional objects is sensed by the first device, the corresponding address information can be retrieved from said memory in the first device without the intervening delays of communicating with the second device.”</li> </ul> <p>Rhoads at 9:35–41</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In</li> </ul>

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		<p>the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.”</p> <p>Rhoads at Fig. 2 (and accompanying description)</p> <p><b>FIG. 2</b></p> <p>Rhoads at 7:13-29</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 11, a basic embodiment 110 of the present technology includes an optical sensor 112, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed</li> </ul>

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		<p>by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</p> <p>Rhoads 7:30 – 46</p> <ul style="list-style-type: none"> <li>• “Consider the milk carton example. The artwork on a milk carton can be adapted to convey Bedoop data. In the preferred embodiment, the Bedoop data is steganographically encoded (e.g., digitally watermarked) on the carton. Numerous digital watermarking techniques are known—all of which convey data in a hidden form (i.e., on human inspection, it is not apparent that digitally encoded data is present). Exemplary techniques operate by slightly changing the luminance, or contours of selected points on artwork or text printed on the carton, or by splattering tiny droplets of ink on the carton in a seemingly random pattern. Each of these techniques has the effect of changing the local luminance at areas across the carton—luminance changes that can be detected by the computer 114 and decoded to extract the encoded digital data. In the case of a milk carton, the data may serve to identify the object as, e.g., a half gallon carton of Alpenrose brand skim milk.”</li> </ul> <p>Rhoads at 9:35–10:10</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul>



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		<p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data.</p> <p>Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.”</p>

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		<p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"> <li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infrared, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.”</li> </ul> <p>Rhoads at 49:3-14:</p> <ul style="list-style-type: none"> <li>• “Detection is the complementary operation to embedding, i.e., discerning a digital identifier from an object.</li> </ul> <p>Response refers to the action taken based on the discerned identifier. The middle two steps—embedding and detection—can employ any of myriad well-known technologies, including 1D and 2D barcodes, magnetic ink character recognition (MICR), optical character recognition (OCR), optical mark recognition (OMR), radio frequency identification (RF/ID), data glyphs, organic transistors, magnetic stripe, metadata, file header information, UV/IR identifiers, and other machine-readable indicia and techniques for associating plural-bit digital data with an electronic or physical object. The detailed embodiment employs watermarking</p>

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		<p>technology, although this is illustrative only.”</p> <p>Rhoads at 50:21-34</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider). In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	distinguish an object present in the image from others using a database that stores data characteristics of	Rhoads discloses distinguish an object present in the image from others using a database that stores data characteristics of target objects.

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	target objects;	<p>Rhoads at Fig. 2</p> <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 9:35–10:21</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern</p>

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		<p>the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>The next step in the decoding process, determining orientation of the Bedoop data, can likewise be discerned by reference to visual clues. For example,</p>

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		<p>some objects include subliminal graticule data, or other calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either placed for that sole purpose (e.g. reference lines or fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also be employed to deduce the orientation of the object by reference to its edges.”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"> <li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices).</li> </ul>

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		<p>Other such tell-tale clues can likewise be used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.”</p> <p>Rhoads at 23:33–54</p> <ul style="list-style-type: none"> <li>• “When a recipient of a business card holds it in front of a Bedoop sensor, the operating system on the local system launches a local Bedoop application. That local Bedoop application, in turn, establishes an external internet connection to a remote business card server. The address of that server may already be known to the local Bedoop application (e.g., having been stored from previous use), or the local Bedoop system can traverse the above-described public network of DNS servers to reach the business card server.</li> </ul> <p>A database on the business card name server maintains a large collection of business card data, one database record per UID. When that server receives Bedoop data from a local Bedoop system, it parses out the UID and accesses the corresponding database record. This record typically includes more information than is commonly printed on conventional business cards. Sample fields from the record may include, for example, name, title, office phone, office fax, home phone, home fax, cellular phone, email address, company name, corporate web page address, personal web page address, secretary's name, spouse's name, and birthday. This record is transmitted back to the originating Bedoop system.”</p> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content. It should be reiterated, however, that the technology is not so limited, and may more generally be</li> </ul>

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		<p>viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</p> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating</p>



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		<p>software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 84:11 – 17</p> <ul style="list-style-type: none"> <li>• “B55. A method comprising:</li> </ul> <p>presenting an object to an optical sensor, the optical sensor producing image data, the object being steganographically encoded with plural bits of digital data;</p> <p>decoding said digital data from the image data; and</p> <p>in response to said digital data, displaying an image of a like object.”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	associate the object with information; and	<p>Rhoads discloses associate the object with information.</p> <p>Rhoads at 22:28–33</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “Magazine (and newspaper) pages can be steganographically encoded with Bedoop data to provide another “paper as portal” experience. As with the earlier-described office document case, the encoded data yields an address to a computer location (e.g., a web page) having the same, or related, content.”</li> </ul> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content. It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</li> </ul> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed</li> </ul>

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		<p>below) from the image. The application sends some or all of this information in a message format to the router 14.</p> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 52:3-29</p> <ul style="list-style-type: none"> <li>• “[user] Sees the data/action associated with the object (e.g., views web page)”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains</p>

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		familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1G]	return the information to the network-enabled device; and	<p>Rhoads discloses return the information to the network-enabled device.                      Rhoads at 22:28–33</p> <ul style="list-style-type: none"> <li>• “Magazine (and newspaper) pages can be steganographically encoded with Bedoop data to provide another “paper as portal” experience. As with the earlier-described office document case, the encoded data yields an address to a computer location (e.g., a web page) having the same, or related, content.”</li> </ul> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content It should be reiterated, however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.                      In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 50:27-60</p> <ul style="list-style-type: none"> <li>• “In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</li> </ul> <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching</p>

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		<p>of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 52:3-29          “[user] Sees the data/action associated with the object (e.g., views web page)”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1H]	the network-enabled device further programmed to present the information related to the object to a user.	Rhoads discloses the network-enabled device further programmed to present the information related to the object to a user.  Rhoads at 22:60 – 23:10 <ul style="list-style-type: none"> <li>• “On presenting a magazine to the optical scanner device of a Bedoop-compliant computer, the computer senses the Bedoop data, decodes same, and launches a web browser to an internet address corresponding to the Bedoop data. If the magazine page is an advertisement, the internet address can provide information complementary to the advertisement. For example, if the magazine page is an advertisement for a grocery item, the Bedoop data can identify a web page on which recipes that make use of the advertised item are presented. If the magazine page includes a photo of a tropical beach, the Bedoop data can lead to a travel web page (e.g., hosted by Expedia or other travel enterprise) that presents fare and lodging information useful to a reader who wants to vacation at the illustrated beach. (The fare information can be customized to the reader's home airport by reference to user profile data stored on the user's computer and relayed to the web site to permit customization of the displayed page.)”</li> </ul> Rhoads at 48:32–53 <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content It should be reiterated,</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</p> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 50:5-10</p> <ul style="list-style-type: none"> <li>• “The illustrated application 28 c is a software program that serves to communicate the watermark data from the device 12 to the router/server 14 through one or more communications links 32 (e.g., the internet). Application 28 c also receives information from the communication links 32 and presents same to the user (or otherwise uses same).”</li> </ul> <p>Rhoads at 50:27-60</p> <ul style="list-style-type: none"> <li>• “In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or</li> </ul>



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		<p>video, or software updates) and send it to the device 12 in response to the watermark.</p> <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 52:3-29</p> <ul style="list-style-type: none"> <li>• “[user] Sees the data/action associated with the object (e.g., views web page)”</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 4**

Claim	'529 Claim Recitation	Exemplary Citations in Reference
4	<p>The system of claim 1, wherein the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p>	<p>Rhoads discloses the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"> <li>• “In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</li> </ul>

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		<p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.”</p> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 20**

Claim	'529 Claim Recitation	Exemplary Citations in Reference
20	The system of claim 1, wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.	<p>Rhoads discloses the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.</p> <p>Rhoads at 10:22-30</p> <ul style="list-style-type: none"> <li>• “Some embodiments filter the image data at some point in the process to aid in ultimate Bedoop data extraction. One use of such filtering is to mitigate image data artifacts due to the particular optical sensor. For example, CCD arrays have regularly-spaced sensors that sample the optical image at uniformly spaced discrete points. This discrete sampling effects a transformation of the image data, leading to certain image artifacts. An appropriately configured filter can reduce some of these artifacts.”</li> </ul> <p>To the extent it is found that Rhoads does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Rhoads does not anticipate this claim, Rhoads renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Rhoads with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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### **Exhibit G-11**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Ehrhart was filed on July 13, 2001, claiming the priority date of July 13, 2001. Ehrhart published at least as of April 20, 2004, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Ehrhart anticipates asserted claims 4, 20 of the ’529 Patent. To the extent Ehrhart is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Ehrhart is found not to anticipate any asserted claims or claim elements of the ’529 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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 U.S. Patent No. 6,722,569 to Ehrhart et al. (“Ehrhart”)

**1. Claim 1**

Element	'529 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A system comprising:	<p>Ehrhart discloses a system.</p> <p>“The present invention relates to an optical reader that includes a color imaging assembly that generates color imaging data. An image analysis circuit determines if the acquired image should be characterized as a color photograph or as including a graphical symbol. A processing circuit processes the imaging data based on the image analysis circuit's determination of whether the image is a graphical symbol or a color photograph. The present invention allows a user to acquire and process both color images and graphical symbols, such as bar codes, text, OCR symbols or signatures. The optical reader of the present invention is also configured to associate an acquired image with at least one other acquired image.” Ehrhart at Abstract.</p>
[1A]	a camera that captures an image;	<p>Ehrhart discloses a camera that captures an image.</p> <p><i>Id.</i> at [1Pre].</p> <p>“The optical reader of the present invention automatically, or through manual Selection, determines whether a captured image is a color photographic image or, a color image that includes a graphical Symbol. Subsequently, the optical reader of the present invention processes the acquired imaging data in accordance with that determination. The optical reader of the present invention is operative to acquire and associate a plurality of acquired images. One aspect of the present invention is an optical reader.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>The optical reader includes a color imaging assembly for acquiring an image of an object, the color imaging assembly generating imaging data corresponding to the image. An image analysis circuit is coupled to the color imaging assembly. The image analysis circuit being configured to determine if the color imaging data includes at least one graphical Symbol. The image is classified as a graphical Symbol, or the image is classified as a color photograph if the color imaging data does not include at least one graphical Symbol. A processing circuit is coupled to the image analysis circuit. The processing circuit is operative to process the imaging data based on the determination.</p> <p>In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for converting the image of the object into color digital data corresponding to the image.” Ehrhart at 1:57-2:16.</p> <p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14, alphanumeric key pad 16, and display 60. In one embodiment, function keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG. 1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service;</p>	<p>Ehrhart discloses a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service.</p> <p><i>Id.</i> at [1Pre, 1A].</p> <p>“In another aspect, the present invention includes an optical reader for capturing an image of an object. The optical reader includes a color imaging assembly for capturing the image as color imaging data. A classification circuit is coupled to the color imaging assembly, the classification circuit being configured to process at least a portion of the color imaging data to thereby Select one of a plurality of classifications, whereby the image is classified as a color photographic image, or as</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>an image that includes at least one graphical Symbol. An automatic mode Selector is coupled to the classification circuit, the automatic mode Selector being configured to Select an optical reader mode in accordance with the Selected classification. A processor is coupled to the classification circuit, the processor being programmed to process the color imaging data in accordance with the optical reader mode Selected by the automatic mode Selector.” Ehrhart at 2:26-42.</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in Step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and Stored in Steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide Signature Verification Services. If processor 40 cannot detect a bar code Symbol, OCR symbols, text, or a signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is Stored in memory in Step 434.” Ehrhart at 10:5-</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>20.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	the service programmed to receive the data;	<p>Ehrhart discloses the service programmed to receive the data.</p> <p><i>Id.</i> at [1Pre, 1A, 1B].</p> <p>“LAN 1820 includes server 1822, computer 1824, database 1826, and a plurality of optical readers 10. Database 1826 is used to store associated images along with other data fields. For example, it would be rather useful to store additional information with the associated images shown in FIG. 13. One may want to associate the delivery means, route, driver, and other related information for subsequent analysis. Network 1810 allows reader 10, PAN 1850, and wireless system 1400 a way to store such data in database 1826. System analysts can access this information via personal computer 1802 connected to network 1810. In one embodiment, LAN 1820 includes an Internet website. In this embodiment, users are authenticated before gaining access to database 1826.” Ehrhart at 16:1-12.</p>

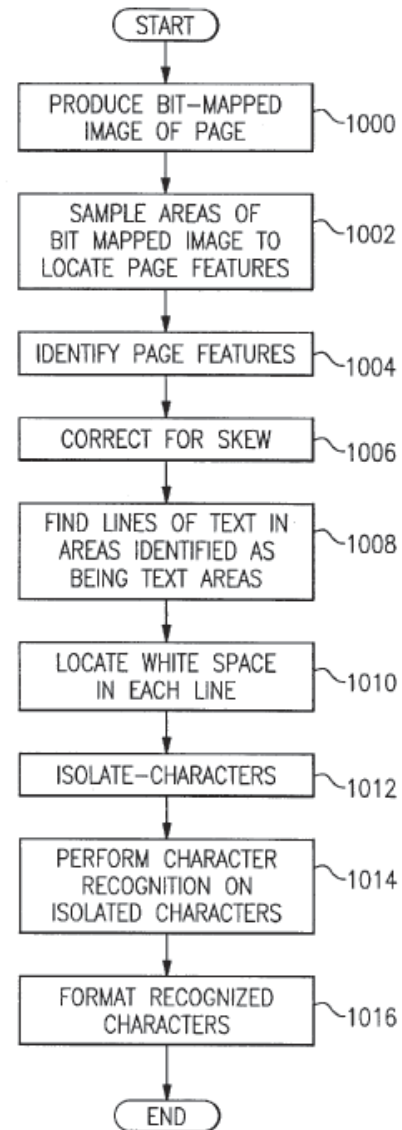
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>identify an object within the image:</p>	<p>Ehrhart discloses identify an object within the image.</p> <p><i>Id.</i> at [1Pre, 1A, 1B, 1C].</p> <p>“In accordance with the invention, the present invention for an optical reader includes a color imaging assembly for acquiring color imaging data. An image analysis circuit determines if the acquired image includes at least one graphical symbol. A processing circuit processes the imaging data based on the determination of whether the image includes at least one graphical symbol. The present invention allows a user to read graphical symbols, such as bar codes, text, OCR characters or signatures using a color imager. The color optical reader of the present invention is configured to automatically determine whether a color image includes a graphical symbol, or is merely a color photographic image. The optical reader of the present invention also is operative to associate one acquired image with at least one subsequently acquired image.” Ehrhart at 5:36-50.</p> <p>“In the embodiment depicted in FIG. 2, ASIC 44 is implemented using a programmable logic array (PLA) device. In a similar embodiment, ASIC 44 is</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>implemented using a field programmable gate array (FPGA) device. ASIC 44 is tasked with controlling the image acquisition process, and the storage of image data. As part of the image acquisition process, ASIC 44 performs various timing and control functions including control of light source 24, control of color imager 34, and control of external interface 56. It will be apparent to those of ordinary skill in the pertinent art that modifications and variations can be made to processor 40 of the present invention depending on the cost, availability, and performance of off-the-shelf microprocessors, and the type of color imager used. In one embodiment, microprocessor 42 and ASIC 44 are replaced by a single microprocessor 40. In one embodiment, microprocessor 40 is implemented using a single RISC processor. In yet another embodiment, microprocessor 40 is implemented using a RISC and DSP hybrid processor.” Ehrhart at 7:32-50.</p> <p>“In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In Step 1014, a character recognition algorithm is used in an attempt to recognize each individual character.” Ehrhart at 12:55-66.</p>

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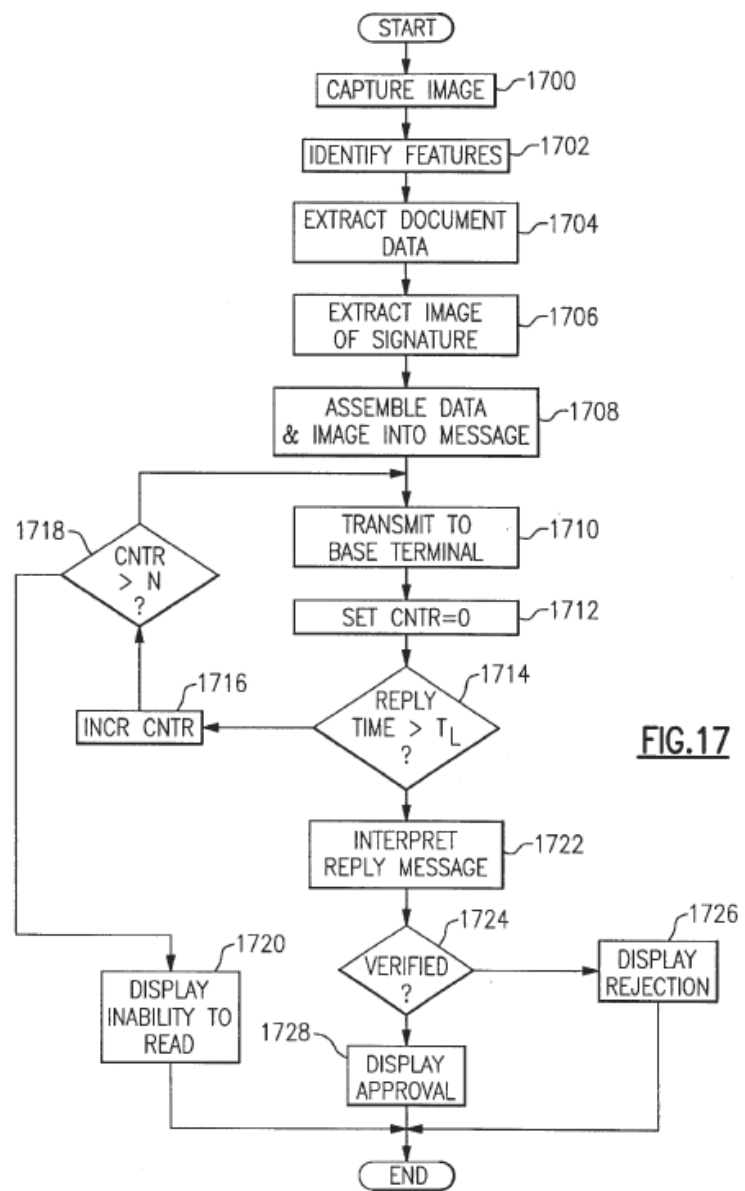


**FIG. 10**

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		Ehrhart at Fig. 10.

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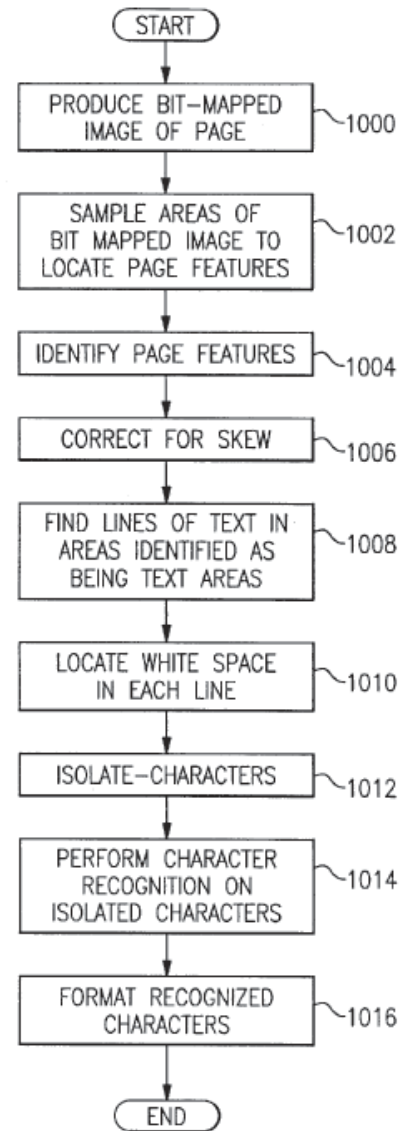
Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	distinguish an object present in the image from others using a database that stores data characteristics of target objects;	<p>Ehrhart discloses distinguish an object present in the image from others using a database that stores data characteristics of target objects.</p> <p><i>Id.</i> at [1Pre, 1A, 1B, 1C, 1D].</p> <p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>“If processor 40 does not locate a bar code symbol it moves onto step 420 and looks for OCR-A or OCR-B characters. If it finds these characters it performs optical character recognition in step 422. If it does not, processor evaluates the image for the presence of text. If text is located, the image is cropped, and the text is compressed and stored in steps 428 and 430. If the image does not include text, processor 40 evaluates the image for the presence of a signature. If one is present, the image is cropped, and the data is compressed and stored in steps 428 and 430. In another embodiment, optical reader 10 is networked, and processor 40 communicates with remote network resources to provide signature verification services. If processor 40 cannot detect a bar code symbol, OCR symbols, text, or a signature, the user is asked in step 432 if he desires to store the image. If he does, the color photographic image is stored in memory in step 434.” Ehrhart at 10:5-20.</p> <p>“In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In Step 1014, a character recognition algorithm is used in an attempt to recognize each individual character.” Ehrhart at 12:55-66.</p> <p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p>

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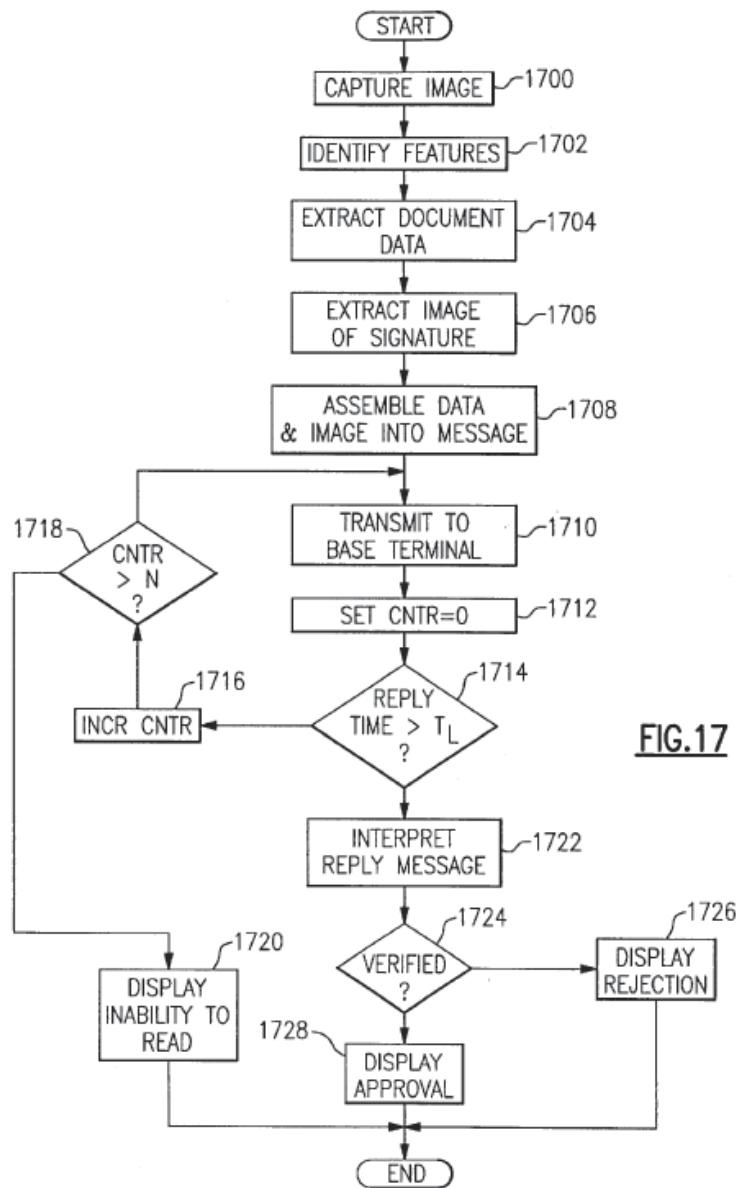


**FIG. 10**

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		Ehrhart at Fig. 10.

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**FIG. 17**

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	associate the object with information; and	<p>Ehrhart discloses associate the object with information.</p> <p><i>Id.</i> at [1Pre, 1A, 1B, 1C, 1D, 1E].</p> <p>“As embodied herein and depicted in FIG. 13, an example of image association in accordance with the present invention is disclosed. One or ordinary skill in the art will recognize that associated images 1300 can be disposed on paper, displayed electronically on display 60, or displayed electronically sing other electronic means, such as a computer monitor. In this example, the first image captured is color photograph 1302 which shows a damaged parcel. The second image captured is bar code 1304 affixed to the side of the damaged parcel. Processor 40 decodes bar code 1304 and associates decoded bar code data 1306 with color photograph 1302. In this example, the user elected to associate a third image, signature 1308. Thus, personnel viewing record 1300 may reasonably conclude that a damaged parcel was delivered</p>

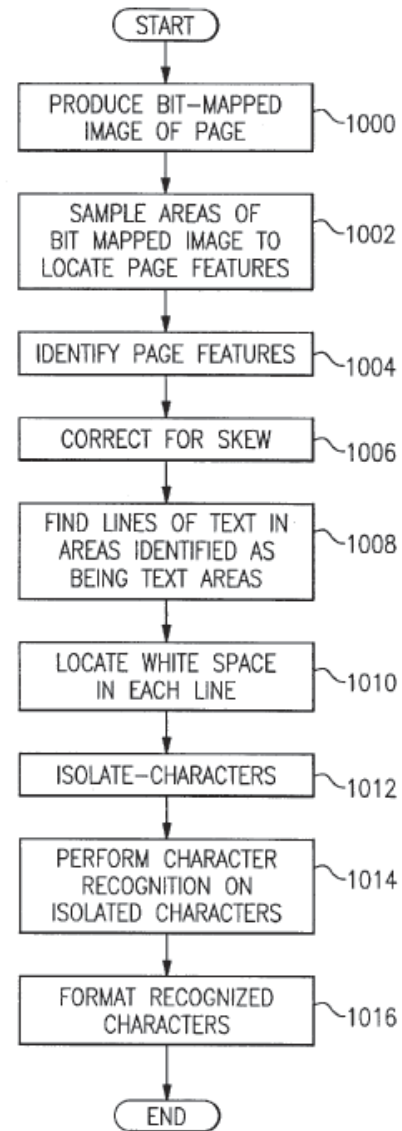
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>to Company XYZ, and that the person signing for the parcel delivery was someone named John W. Smith.” Ehrhart at 13:27-43.</p> <p>“In the Automatic imaging mode, processor 40 is programmed to analyze the color imaging data to determine if an acquired image includes a graphical symbol or is merely a color photographic image. If it makes the determination that the color image includes a graphical symbol, it further analyzes the acquired image and classifies it as a bar code, OCR symbol, text, or a signature. Based on the classification, optical reader 10 jumps to the appropriate routine in EROM 48. The semi-automatic mode is similar. Thus, in the automatic or semi-automatic modes, the bar code scanning mode, the OCR/text mode, the signature capture mode, the color photography mode, and the association mode are controlled by the application program, not by the user.” Ehrhart at 8:36-49.</p> <p>“In step 1004, processor 40 identifies the page features. Processor 40 analyzes the page and divides it into blank and non-blank portions. The non-blank portions are analyzed to distinguish text regions from non-text regions. After determining the layout of the page, processor 40 uses black-to-white transitions to determine degrees of skew. In step 1008, horizontal white spaces are identified to separate lines of text. In step 1010, vertical white spaces are identified within each line of text to thereby separate individual words and characters from each other. In Step 1014, a character recognition algorithm is used in an attempt to recognize each individual character.” Ehrhart at 12:55-66.</p> <p>“As embodied herein and depicted in FIG. 11, a flow chart showing a method for performing OCR in accordance with yet another embodiment of the present invention is disclosed. In step 1100, reader 10 produces a bit-mapped image of the page. Subsequently, processor 40 finds lines of text in the image, locates the white spaces in each line, and isolates the characters. In step 1108, processor 40 performs character recognition, either OCR-A or OCR-B, as desired. The decoded characters are stored in memory.” Ehrhart at 13:1-9.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference

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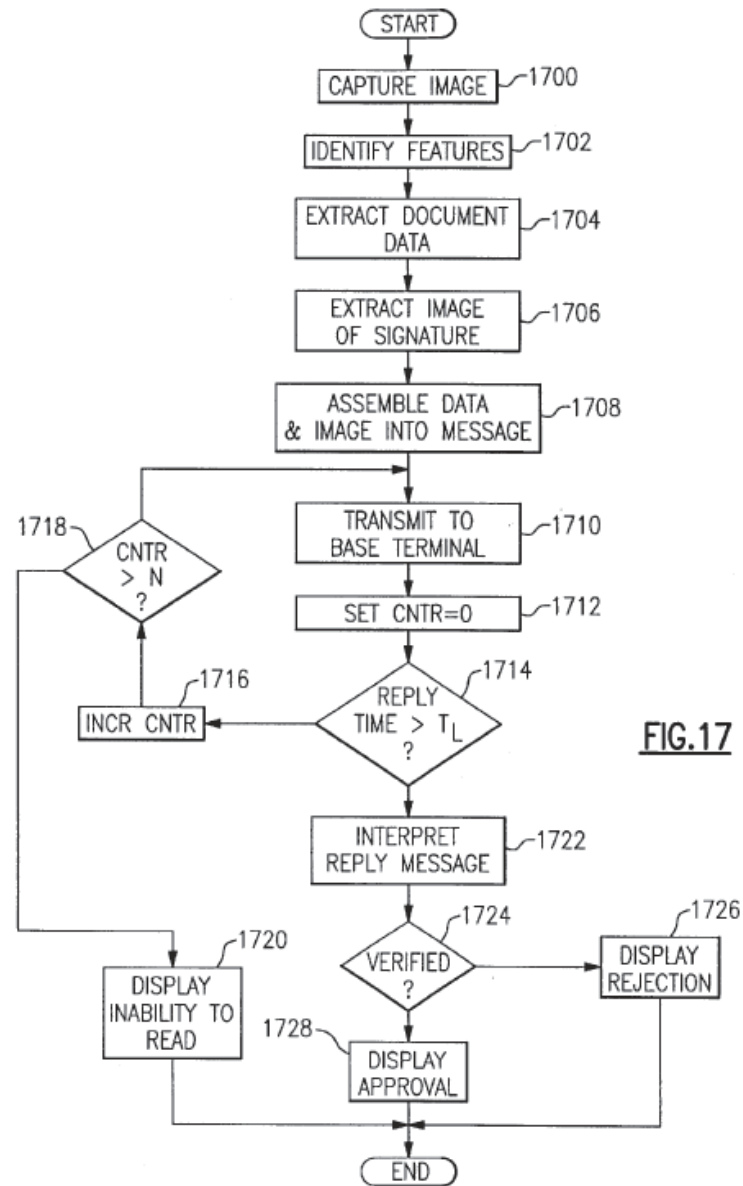
**FIG. 10**



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		Ehrhart at Fig. 10.

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**FIG. 17**

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Ehrhart at Fig. 17.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1G]	return the information to the network-enabled device; and	<p>Ehrhart discloses return the information to the network-enabled device.</p> <p><i>Id.</i> at [1Pre, 1A, 1B, 1C, 1D, 1E, 1F].</p> <p>“As embodied herein and depicted in FIG. 13, an example of image association in accordance with the present invention is disclosed. One of ordinary skill in the art will recognize that associated images 1300 can be disposed on paper, displayed electronically on display 60, or displayed electronically using other electronic means, such as a computer monitor. In this example, the first image captured is color photograph 1302 which shows a damaged parcel. The second image captured is bar code 1304 affixed to the side of the damaged parcel. Processor 40 decodes bar code 1304 and associates decoded bar code data 1306 with color photograph 1302. In this example, the user elected to associate a third image, signature 1308. Thus, personnel viewing record 1300 may reasonably conclude that a damaged parcel was delivered to Company XYZ, and that the person signing for the parcel delivery was someone named John W. Smith.” Ehrhart at 13:27-43.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1H]	<p>the network-enabled device further programmed to present the information related to the object to a user.</p>	<p>Ehrhart discloses the network-enabled device further programmed to present the information related to the object to a user.</p> <p><i>Id.</i> at [1Pre, 1A, 1B, 1C, 1D, 1E, 1F, 1G].</p> <p>“In some embodiments, processor 40 may display the acquired image on display 60 during this step.” Ehrhart at 9:35-38.</p> <p>“As embodied herein, and depicted in FIGS. 1A-1D, perspective views of the optical reader in accordance with various embodiments of the present invention are disclosed. FIG. 1A shows the underside of hand held wireless optical reader 10. FIG. 1B shows the top of the optical reader depicted in FIG. 1A. Optical reader 10 includes housing 100, antenna 102, window 104 and trigger 12. Window 104 accommodates illumination assembly 20 and imaging assembly 30. As shown in FIG. 1B, the top side of reader 10 includes function keys 14, alphanumeric key pad 16, and display 60. In one embodiment, function</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>keys 14 include an enter key and up and down cursor keys. FIG. 1C is also a hand held wireless optical reader 10. Reader 10 includes function keys 14, alphanumeric key pad 16, writing stylus 18, display 60, and signature block 62. Stylus 18 is employed by a user to write his signature in signature block 62. FIG. 1D shows yet another embodiment of optical reader 10 of the present invention. In this embodiment, reader 10 includes a gun-shaped housing 100. Display 60 and keypad 16 are disposed on a top portion of gun-shaped housing 100, whereas trigger 12 is disposed on the underside of the top portion of housing 100. Housing 100 also includes window 104 that accommodates illumination assembly 20 and imaging assembly 30. Wire 106 is disposed at the butt-end of housing 100. Wire 106 provides optical reader 10 with a hard wired communication link for external devices such as a host processor or other data collection devices.” Ehrhart at 5:51-6:10.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 4**

Claim	'529 Claim Recitation	Exemplary Citations in Reference
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4	<p>The system of claim 1, wherein the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p>	<p>Ehrhart discloses the system of claim 1, wherein the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p> <p>“The user may also click on OCR/Text icon 660. Clicking icon 660 provides the user with a check validation mode, a text scanning mode, or a bi-tonal image capture mode. The check validation mode is performed in conjunction with network services.” Ehrhart at 8:58-62.</p> <p>“In steps 1712 and 1714, processor 40 initializes a counter and begins waiting for a reply from the host computer. In steps 1714-1718, if the reply is not received within time limit TL, the counter CNTR is incremented and the message is re-transmitted. After several attempts, if CNTR&gt;N (N being an integer), processor 40 outputs a fault message. If the reply message is received within time limit TL, processor interprets the reply in step 1722. If the extracted data and the signature match information stored in the database accessible by the host computer, an approval message is displayed. If the extracted data and the signature do not match information stored in the database accessible by the host computer, a disapproval message is displayed. The dynamic signature verification embodiment is similar to the static embodiment described immediately above. In the dynamic version, the user provides his signature using stylus 18 and signature block 62, as shown in FIG. 1C. Signature block 62 provides processor 40 with the dynamic parameters recorded during signature. The dynamic parameters are transmitted to a host processor, as described above.” Ehrhart at 15:31-50.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s</p>
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		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 20**

<b>Claim</b>	<b>'529 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
20	<p>The system of claim 1, wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.</p>	<p>Ehrhart discloses the system of claim 1, wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.</p> <p>“The user selects the color photography mode by clicking on icon 664. This mode allows the user to select an automatic imaging mode wherein optical reader 10 makes the imaging adjustments(e.g., exposure, etc.) or a manual mode that allows the user to adjust imager settings as he pleases.” Ehrhart at 7:10-18.</p> <p>“The user Selects the color photography mode by clicking on icon 664. This mode allows the user to select an automatic imaging mode wherein optical reader 10 makes the imaging adjustments(e.g., exposure, etc.) or a manual mode that allows the user to adjust imager Settings as he pleases.” Ehrhart at 9:11-15.</p> <p>To the extent it is found that Ehrhart does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Ehrhart does not anticipate this claim, Ehrhart renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s</p>

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		Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Ehrhart with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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### **Exhibit G-18**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Krouse was filed on June 13, 1997, claiming the priority date of June 13, 1997. Krouse published at least as of August 1, 2000, and is available as prior art at least under 35 U.S.C. § 102(a).

As shown in the chart below, Krouse anticipates asserted claims 4, 20 of the ’529 Patent. To the extent Krouse is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Krouse is found not to anticipate any asserted claims or claim elements of the ’529 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

**1. Claim 1**

Element	'529 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A system comprising:	<p>Krouse discloses a system.</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li> </ul>
[1A]	a camera that captures an image;	<p>Krouse discloses a camera that captures an image.</p> <p><i>Id.</i> at [1Pre].</p> <p>Krouse at 1:6-12:</p> <ul style="list-style-type: none"> <li>• The present invention relates generally to financial transaction processing Systems and methods, and more. Specifically, to Such Systems and methods wherein at least one document containing financial transaction-related information is optically Scanned to generate at least one computer-</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>readable image from which the information maybe extracted for use in processing the transaction.</p> <p>Krouse at 6:4–14</p> <ul style="list-style-type: none"> <li>• “Each of the terminals 18, 20, 22 includes an optical scanner 34 for scanning negotiable instrument documents, (exemplified by check 110 shown in FIG. 6) tendered at point of sale in payment for goods or services provided by the merchant or retailer associated with that point of sale, to generate respective computer-readable scanned images of the documents. Preferably, scanner 34 comprises a conventional monotonal image scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor 40 to scan one or both sides of a document 110 placed in the scanner 34.”</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service;	<p>Krouse discloses a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service.</p> <p><i>Id.</i> at [1Pre-A].</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Krouse at 4:13–57</p> <ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 5:60–6:14</p> <ul style="list-style-type: none"> <li>• “As shown in FIG. 1, system <b>10</b> comprises at least one <b>18</b>, and preferably a plurality <b>18, 20, 22</b> of point of sale payment terminals. Each terminal <b>18, 20, 22</b> preferably is located in its own respective point of sale location <b>12, 14, 16</b> (e.g., at a merchant's or retailer's place of business, and/or at the location of third party transaction agent acting on behalf of the merchant or retailer). It should be understood that although three terminals <b>18, 20, 22</b> are shown as being comprised in system <b>10</b>, system <b>10</b> could be modified to include any number of such terminals without departing from this aspect of the present invention.</li> </ul> <p>Each of the terminals <b>18, 20, 22</b> includes an optical scanner <b>34</b> for scanning negotiable instrument documents, (exemplified by check <b>110</b> shown in FIG. 6) tendered at point of sale in payment for goods or services provided by the merchant or retailer associated with that point of sale, to generate respective computer-readable scanned images of the documents. Preferably, scanner <b>34</b> comprises a conventional monotonal image scanner having a resolution of at least 300 dots-per-inch and being adapted for being controlled by local controller/processor <b>40</b> to scan one or both sides of a document <b>110</b> placed in the scanner <b>34</b>.”</p> <p>Krouse at 7:7–31</p> <ul style="list-style-type: none"> <li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</p> <p>Krouse at 13:12 – 14:6</p> <ul style="list-style-type: none"> <li>• “ When the scanned image is first received by the generator 204, it is processed by an image de-skewing processor 210, such as Scanfix Image Processor available from TMS Sequoia, of Burlingame, Calif., which adjusts the scanned image data by rotating and/or translating the scanned image so as to cause two adjacent edges (e.g., the top and left side edges) of the scanned image (i.e., the edges of the scanned image generated from the top and left side edges of the document 400) to be aligned with the ordinate and abscissa of an orthogonal coordinate system whose center is chosen so as to coincide with the dark pixel of the scanned image closest to those two adjacent edges. Once the processor 210 has accomplished this processing of the scanned image data, the scanned image data is next processed by the noise eliminator 212, which processes the image data to</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>remove dark pixels (i.e., non-whitespace pixels) therefrom that were erroneously generated as a result of noise. The noise eliminator 212 accomplishes this by locating isolated groups of contiguous dark pixels in the scanned image data having respective sizes (i.e., respective numbers of pixels) smaller than three dark pixels; these isolated groups of contiguous dark pixels are then removed from the scanned image data and replaced with whitespace by the processor 212.</p> <ul style="list-style-type: none"> <li>• After being processed by the noise eliminator 212, the scanned image data is processed by the image enhancer processor 214, which processor 214 enhances the dark pixels remaining in the scanned image after processing of the scanned image data by the noise eliminator processor 212. Processor 214 accomplishes this by locating the dark pixels remaining in the scanned image after processing of the scanned image by the processor 212, and by extending by predetermined numbers of pixels (e.g., 5 pixels in each of the positive and negative ordinate directions, and 25 pixels in each of the positive and negative abscissa directions) each of these remaining dark pixels in both of the two mutually orthogonal directions of the coordinate system to which the scanned image was aligned by the de-skewing processor 210. That is, predetermined numbers of whitespace pixels surrounding and extending from the remaining dark pixels in the two mutually orthogonal directions of the coordinate system are replaced with dark pixels. Any resulting extension of the dark pixels that would extend beyond the edge of the scanned image is prevented from doing so by truncating the extension by a predetermined number of pixels sufficient to prevent the dark pixel extensions from coming within 5 pixels of the edges of the scanned image.</li> <li>• After being processed by the image enhancer 214, the result, enhanced scanned image is processed by dark pixel group locator processor 222. Locator processor 222 then generates respective imaginary rectangles around the respective groups of contiguous dark pixels such that the respective rectangles each include two sides are parallel to the ordinate</li> </ul>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>and two sides are parallel to the abscissa of the coordinate system to which the scanned image was aligned by the processor 210, and such that the respective rectangles include all of the respective dark pixels of each of the respective groups of contiguous dark pixels. The locator processor 222 then selects those imaginary rectangles, closest to the origin of the coordinate system, whose respective longitudinal dimensions exceed a predetermined threshold (e.g., 1 inch), and determines the respective coordinates of at least one predetermined vertex (e.g., the respective vertex having the minimal abscissal coordinate value and the maximal ordinate coordinate value for the respective rectangle) and dimensions of a predetermined number (e.g., no more than 25) of these selected imaginary rectangles. The respective vertex coordinates and dimensions of these imaginary rectangles are output by the locator processor 222 as recognition characteristics for the scanned document 400, which recognition characteristics are transmitted from the generator 204 to the recognition characteristic comparison processor 220.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	the service programmed to receive the data;	Krouse discloses the service programmed to receive the data.  <i>Id.</i> at [1Pre-B].



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Krouse at 7:7–31</p> <ul style="list-style-type: none"> <li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</li> </ul> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the</li> </ul>

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		<p>MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</p> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	identify an object within the image:	Krouse discloses identify an object within the image.

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at [1Pre-C].</p> <ul style="list-style-type: none"> <li>“Accordingly, in a first aspect of the present invention, a System and method are provided for processing an electronic financial transaction based upon visual information related to the transaction contained on a document tendered by a party to the transaction. One preferred embodiment of the System of this aspect of the present invention includes an optical Scanner for generating a computer-readable Scanned image of the document, and an optical character recognizer for generating, from the Scanned image, transaction data indicative of at least a portion of the visual information.”</li> </ul> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>“One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114, 116, 118</b> of printed digits separated by special control characters. Fields <b>114, 116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields</p>

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		<p><b>114, 116, 118)</b> in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>Krouse at 12:37-52:</p> <ul style="list-style-type: none"> <li>• “Processing of a financial transaction using System 200 begins by placing a bill document (Such as bill document 400 shown in FIG. 8A) to be processed into scanner 208 so as to permit at least one side 402 of the document 400 containing an optical character recognition line (OCR) 404 which contains numerical data 405 visually displaying information related to the transaction to be processed (e.g., amount due 406 and customer account number 408). It should be understood that although the functional components and operation of system 200 will be described in connection with processing of document 400, advantageously, System 200 can be used to Scan other types of billing documents (e.g., those illustrated in FIGS. 8B-8F), in accordance with this aspect of the present invention.”</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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[1E]	distinguish an object present in the image from others using a database that stores data characteristics of target objects;	<p>Krouse discloses distinguish an object present in the image from others using a database that stores data characteristics of target objects.</p> <p><i>Id.</i> at [1Pre-D].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li> </ul> <p>Krouse at 4:13–57</p> <ul style="list-style-type: none"> <li>• “Also, in a second aspect of the present invention, a system and method are provided for use in processing a financial transaction based at least in part upon visual data formed on a document. The visual data represents information related to the transaction and is in a particular format.</li> </ul> <p>One preferred embodiment of the system of the second aspect of the present invention includes an optical scanner for generating a scanned image of at least a portion of the document containing the visual</p>

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		<p>representation. An image characterization generator is provided for generating recognition characteristics from the scanned image, and a recognition characteristic comparator is provided for comparing the recognition characteristics to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats and for determining therefrom whether the particular format of the visual data on the scanned document matches one of the respective formats of the other documents. A field location generator is also provided for determining, based upon the one respective format when the particular format is determined to match the one respective format, location of a field in the scanned image to which optical character recognition (OCR) may be applied to generate therefrom the transaction-related information represented by the visual data. OCR is then applied by an image processor to this location to generate the visual data for use in processing the transaction.</p> <p>One preferred embodiment of the method according to the second aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 14:64–15:67</p>

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		<ul style="list-style-type: none"> <li>• “Processor <b>220</b> compares the recognition characteristics of the particular document <b>400</b> being processed with the sets of reference recognition characteristics stored in the archive <b>228</b>. More specifically, the vertex coordinates and dimensions of the imaginary rectangles generated by the generator <b>204</b> from the scanned image of the document <b>400</b> are compared with respective reference recognition characteristics (i.e., vertex coordinates and dimensions of imaginary rectangles) generated by the process used to generate the recognition characteristics from the scanned image of document <b>400</b>, to determine whether a match exists between the recognition characteristics from the scanned image of document <b>400</b> and any one of the sets of reference recognition characteristics stored in the database archive system <b>228</b>. Preferably, this is accomplished by first comparing the recognition characteristics from the scanned image of document <b>400</b> to the sets of reference characteristics, and unless the respective dimensions of at least three of the imaginary rectangles from the scanned image of document <b>400</b> match to within a predetermined error tolerance (e.g., 2 percent) of corresponding respective vertices and dimensions in a respective set of reference recognition characteristics stored in the system <b>228</b>, processor <b>220</b> signals that the format of the scanned document <b>400</b> does not match any of the formats of the reference documents from which the reference recognition characteristics stored in the database archive <b>228</b> were generated. If such a "no match" condition is determined by the processor <b>220</b> to exist, the bill document <b>400</b> may be sent to the reference characterization generator station to permit the human operator to determine whether to input the reference characteristics and other bill document identification information (i.e., the other types of information stored in association with each set of reference recognition characteristics previously stored in the database archive <b>228</b>) manually for storage in the archive system <b>228</b> as a new set of reference recognition characteristics to permit other bills having the same format as document <b>400</b> to be processable by terminal <b>202</b> in the future, or to process the bill payment transaction as a "one-of-a-kind" transaction (i.e., without storing such</li> </ul>

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		<p>recognition characteristics and information in the database archive <b>228</b> for future use by the processor <b>220</b>). Otherwise, if the predetermined match error tolerance conditions are found to exist, processor <b>220</b> selects those sets of reference recognition characteristics that are found to satisfy such conditions, and calculates the displacement differences that exist between each of the imaginary rectangles of the scanned image of the document <b>400</b> and those described in these selected sets of reference recognition characteristics (i.e., the displacements that must be applied to the imaginary rectangles of the scanned image of document <b>400</b> to accomplish a "best fit" match of same with the corresponding imaginary rectangles described in these selected sets of reference recognition characteristics). Such "best fit" match conditions are determined to exist for given corresponding rectangles of the recognition characteristics of the scanned image of the document <b>400</b> and a given respective set of reference recognition characteristics, when the absolute pixel displacement differences between the respective abscissa and ordinate coordinates of the vertices of the rectangles are within 40 pixels and 60 pixels of each other, respectively, and the respective lengths and widths of the rectangles are within 20 pixels and 2 pixels of each other, respectively. Once these absolute displacement differences have been calculated by the processor <b>220</b>, processor <b>220</b> "scores" the degree of best fit match condition that exists between the imaginary rectangles of the scanned image of the document <b>400</b> and those described in the aforesaid selected sets of reference recognition characteristics, whereby to determine which one of the aforesaid selected sets of reference recognition characteristics best matches the recognition characteristics of the scanned document <b>400</b>.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s</p>



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		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	<p>associate the object with information; and</p>	<p>Krouse discloses associate the object with information.</p> <p><i>Id.</i> at [1Pre-E].</p> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</li> </ul> <p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data</p>

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		<p>indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114, 116, 118</b> of printed digits separated by special control characters. Fields <b>114, 116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114, 116, 118</b> contained therein, recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data</p>

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		<p>indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>Krouse at 14:64–15:67</p> <ul style="list-style-type: none"> <li>• “Processor <b>220</b> compares the recognition characteristics of the particular document <b>400</b> being processed with the sets of reference recognition characteristics stored in the archive <b>228</b>. More specifically, the vertex coordinates and dimensions of the imaginary rectangles generated by the generator <b>204</b> from the scanned image of the document <b>400</b> are compared with respective reference recognition characteristics (i.e., vertex coordinates and dimensions of imaginary rectangles) generated by the process used to generate the recognition characteristics from the scanned image of document <b>400</b>, to determine whether a match exists between the recognition characteristics from the scanned image of document <b>400</b> and any one of the sets of reference recognition characteristics stored in the database archive system <b>228</b>. Preferably, this is accomplished by first comparing the recognition characteristics from the scanned image of document <b>400</b> to the sets of reference characteristics, and unless the respective dimensions of at least three of the imaginary rectangles from the scanned image of document <b>400</b> match to within a predetermined error tolerance (e.g., 2 percent) of corresponding respective vertices and dimensions in a respective set of reference recognition characteristics stored in the system <b>228</b>, processor <b>220</b> signals that the format of the scanned document <b>400</b> does not match any of the formats of the reference documents from which the reference recognition characteristics stored in the database archive <b>228</b> were generated. If such a "no match" condition is determined by the processor <b>220</b> to exist, the bill document <b>400</b> may be sent to the reference characterization generator station to permit the</li> </ul>

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		<p>human operator to determine whether to input the reference characteristics and other bill document identification information (i.e., the other types of information stored in association with each set of reference recognition characteristics previously stored in the database archive <b>228</b>) manually for storage in the archive system <b>228</b> as a new set of reference recognition characteristics to permit other bills having the same format as document <b>400</b> to be processable by terminal <b>202</b> in the future, or to process the bill payment transaction as a "one-of-a-kind" transaction (i.e., without storing such recognition characteristics and information in the database archive <b>228</b> for future use by the processor <b>220</b>). Otherwise, if the predetermined match error tolerance conditions are found to exist, processor <b>220</b> selects those sets of reference recognition characteristics that are found to satisfy such conditions, and calculates the displacement differences that exist between each of the imaginary rectangles of the scanned image of the document <b>400</b> and those described in these selected sets of reference recognition characteristics (i.e., the displacements that must be applied to the imaginary rectangles of the scanned image of document <b>400</b> to accomplish a "best fit" match of same with the corresponding imaginary rectangles described in these selected sets of reference recognition characteristics). Such "best fit" match conditions are determined to exist for given corresponding rectangles of the recognition characteristics of the scanned image of the document <b>400</b> and a given respective set of reference recognition characteristics, when the absolute pixel displacement differences between the respective abscissa and ordinate coordinates of the vertices of the rectangles are within 40 pixels and 60 pixels of each other, respectively, and the respective lengths and widths of the rectangles are within 20 pixels and 2 pixels of each other, respectively. Once these absolute displacement differences have been calculated by the processor <b>220</b>, processor <b>220</b> "scores" the degree of best fit match condition that exists between the imaginary rectangles of the scanned image of the document <b>400</b> and those described in the</p>

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		<p>aforesaid selected sets of reference recognition characteristics, whereby to determine which one of the aforesaid selected sets of reference recognition characteristics best matches the recognition characteristics of the scanned document <b>400</b>.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1G]	return the information to the network-enabled device; and	<p>Krouse discloses return the information to the network-enabled device.</p> <p><i>Id.</i> at [1Pre-1F].</p> <p>Krouse at 8:13–25</p> <ul style="list-style-type: none"> <li>• “Generator <b>38</b> utilizes the numeric transaction data, payee and payment amount data, transaction date and time data, and terminal identification number to generate, for each point of sale financial transaction processed by the terminal, a unique respective record of the transaction for being assented to by the party tendering the negotiable instrument document being processed by the terminal. For each such transaction, the generator <b>38</b> causes the unique respective record generated by the generator <b>38</b> to be printed out by printer <b>36</b> (which comprises, e.g., a conventional laser printer) as a respective hard copy transaction record. An example of one such hard copy transaction record <b>70</b> is shown in FIG. 4.”</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Krouse at 7:7–31</p> <ul style="list-style-type: none"> <li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</li> </ul> <p>Krouse at 8:44–64</p> <ul style="list-style-type: none"> <li>• “Each transaction record <b>70</b> also includes a portion <b>78</b> which specifies the date and time of processing of the transaction, a portion <b>76</b> specifying the terminal identification number of the terminal processing the transaction, and a transaction data section <b>82</b> specifying the numerical transaction data generated from the scanned image. Each transaction record <b>70</b> also contains a unique transaction identification number generated by the generator <b>38</b> by concatenating a 5-digit form of the terminal identification number to the time and date of the transaction in numerically expressed in</li> </ul>

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		<p>the form YYYYMMDDHHMM (wherein YYYY represents the year, the left most MM represents the month, DD represents the day of the month, HH represents the hour in said day, and the right most MM represents the minutes in said hour of the transaction) and to a system-wide, unique 5-digit daily transaction sequence number (which is reset system-wide, periodically, e.g., once per day), and a tendering party assent portion <b>84</b> for receiving a signature <b>72</b> from the tendering party or other authorized representative thereof for signifying assent by the tendering party to the terms and conditions specified in the record <b>70.</b>”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1H]	the network-enabled device further programmed to present the information related to the object to a user.	<p>Krouse discloses the network-enabled device further programmed to present the information related to the object to a user.</p> <p><i>Id.</i> at [1Pre-G].</p> <p>Krouse at 3:44–57</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least</li> </ul>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction.”</p> <p>Krouse at 8:13–25</p> <ul style="list-style-type: none"> <li>• “Generator <b>38</b> utilizes the numeric transaction data, payee and payment amount data, transaction date and time data, and terminal identification number to generate, for each point of sale financial transaction processed by the terminal, a unique respective record of the transaction for being assented to by the party tendering the negotiable instrument document being processed by the terminal. For each such transaction, the generator <b>38</b> causes the unique respective record generated by the generator <b>38</b> to be printed out by printer <b>36</b> (which comprises, e.g., a conventional laser printer) as a respective hard copy transaction record. An example of one such hard copy transaction record <b>70</b> is shown in FIG. 4.”</li> </ul> <p>Krouse at 7:7–31</p> <ul style="list-style-type: none"> <li>• “Once the aforesaid data (i.e., payment amount being tendered and payee) has been input via the device <b>30</b>, document <b>110</b> has been placed in the scanner <b>34</b>, and presence of the document <b>110</b> in the scanner <b>34</b> has been signalled to the terminal operator, the terminal operator continues processing the document <b>110</b> by commanding the processor <b>40</b> via the device <b>30</b> to initiate scanning of the document <b>110</b>. In response, the processor <b>40</b> issues commands to the scanner <b>34</b> to scan the document <b>110</b> placed therein, whereupon, the scanner <b>34</b> scans at least one entire side <b>112</b> of the draft <b>110</b> so as to generate a computer-readable scanned image of at least that entire side <b>112</b> of the draft document <b>110</b> (i.e., computer-readable data from which an appropriately provisioned</li> </ul>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>computer may generate a display image of the at least one scanned side <b>112</b> of the document <b>110</b>). The computer-readable scanned image data is then transmitted by the scanner <b>34</b> to the processor <b>40</b>; the processor <b>40</b> then transmits to the optical character recognizer <b>32</b> a copy of the scanned image data generated by the scanner <b>34</b> in order to permit the recognizer <b>32</b> to process same in the manner described below. A separate copy of the scanned image data is also transmitted to the storage system <b>42</b> where it is stored in association with the previously stored payment amount and payee data of the negotiable instrument being processed.”</p> <p>Krouse at 8:44–64</p> <ul style="list-style-type: none"> <li>• “Each transaction record <b>70</b> also includes a portion <b>78</b> which specifies the date and time of processing of the transaction, a portion <b>76</b> specifying the terminal identification number of the terminal processing the transaction, and a transaction data section <b>82</b> specifying the numerical transaction data generated from the scanned image. Each transaction record <b>70</b> also contains a unique transaction identification number generated by the generator <b>38</b> by concatenating a 5-digit form of the terminal identification number to the time and date of the transaction in numerically expressed in the form YYYYMMDDHHMM (wherein YYYY represents the year, the left most MM represents the month, DD represents the day of the month, HH represents the hour in said day, and the right most MM represents the minutes in said hour of the transaction) and to a system-wide, unique 5-digit daily transaction sequence number (which is reset system-wide, periodically, e.g., once per day), and a tendering party assent portion <b>84</b> for receiving a signature <b>72</b> from the tendering party or other authorized representative thereof for signifying assent by the tendering party to the terms and conditions specified in the record <b>70</b>.”</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 4**

Claim	'529 Claim Recitation	Exemplary Citations in Reference
4	<p>The system of claim 1, wherein the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p>	<p>Krouse discloses the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p> <p><i>Id.</i> at [1].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the</li> </ul>

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		<p>other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 13:12 – 14:6</p> <ul style="list-style-type: none"><li>• “ When the scanned image is first received by the generator 204, it is processed by an image de-skewing processor 210, such as Scanfix Image Processor available from TMS Sequoia, of Burlingame, Calif., which adjusts the scanned image data by rotating and/or translating the scanned image so as to cause two adjacent edges (e.g., the top and left side edges) of the scanned image (i.e., the edges of the scanned image generated from the top and left side edges of the document 400) to be aligned with the ordinate and abscissa of an orthogonal coordinate system whose center is chosen so as to coincide with the dark pixel of the scanned image closest to those two adjacent edges. Once the processor 210 has accomplished this processing of the scanned image data, the scanned image data is next processed by the noise eliminator 212, which processes the image data to remove dark pixels (i.e., non-whitespace pixels) therefrom that were erroneously generated as a result of noise. The noise eliminator 212 accomplishes this by locating isolated groups of contiguous dark pixels in the scanned image data having respective sizes (i.e., respective numbers of pixels) smaller than three dark pixels; these isolated groups of contiguous dark pixels are then removed from the scanned image data and replaced with whitespace by the processor 212.</li><li>• After being processed by the noise eliminator 212, the scanned image data is processed by the image enhancer processor 214, which processor 214 enhances the dark pixels remaining in the scanned image after processing of the scanned image data by the noise eliminator processor 212. Processor 214 accomplishes this by locating the dark</li></ul>
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		<p>pixels remaining in the scanned image after processing of the scanned image by the processor 212, and by extending by predetermined numbers of pixels (e.g., 5 pixels in each of the positive and negative ordinate directions, and 25 pixels in each of the positive and negative abscissa directions) each of these remaining dark pixels in both of the two mutually orthogonal directions of the coordinate system to which the scanned image was aligned by the de-skewing processor 210. That is, predetermined numbers of whitespace pixels surrounding and extending from the remaining dark pixels in the two mutually orthogonal directions of the coordinate system are replaced with dark pixels. Any resulting extension of the dark pixels that would extend beyond the edge of the scanned image is prevented from doing so by truncating the extension by a predetermined number of pixels sufficient to prevent the dark pixel extensions from coming within 5 pixels of the edges of the scanned image.</p> <ul style="list-style-type: none"><li>• After being processed by the image enhancer 214, the result, enhanced scanned image is processed by dark pixel group locator processor 222. Locator processor 222 then generates respective imaginary rectangles around the respective groups of contiguous dark pixels such that the respective rectangles each include two sides are parallel to the ordinate and two sides are parallel to the abscissa of the coordinate system to which the scanned image was aligned by the processor 210, and such that the respective rectangles include all of the respective dark pixels of each of the respective groups of contiguous dark pixels. The locator processor 222 then selects those imaginary rectangles, closest to the origin of the coordinate system, whose respective longitudinal dimensions exceed a predetermined threshold (e.g., 1 inch), and determines the respective coordinates of at least one predetermined vertex (e.g., the respective vertex having the minimal abscissal coordinate value and the maximal ordinate coordinate value for the respective rectangle) and dimensions of a predetermined number (e.g., no more than 25) of these selected imaginary rectangles. The respective vertex coordinates and dimensions of these imaginary rectangles are</li></ul>
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		<p>output by the locator processor 222 as recognition characteristics for the scanned document 400, which recognition characteristics are transmitted from the generator 204 to the recognition characteristic comparison processor 220.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 20**

Claim	'529 Claim Recitation	Exemplary Citations in Reference
20	The system of claim 1, wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.	<p>Krouse discloses the system of claim 1, wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.</p> <p><i>Id.</i> at [1].</p> <p>Krouse at 13:12–14:16</p> <ul style="list-style-type: none"> <li>• “When the scanned image is first received by the generator <b>204</b>, it is processed by an image de-skewing processor <b>210</b>, such as Scanfix Image Processor available from TMS Sequoia, of Burlingame, Calif., which adjusts the scanned image data by rotating and/or translating the scanned image so as to cause two adjacent edges (e.g., the top and left side edges)</li> </ul>

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		<p>of the scanned image (i.e., the edges of the scanned image generated from the top and left side edges of the document <b>400</b>) to be aligned with the ordinate and abscissa of an orthogonal coordinate system whose center is chosen so as to coincide with the dark pixel of the scanned image closest to those two adjacent edges. Once the processor <b>210</b> has accomplished this processing of the scanned image data, the scanned image data is next processed by the noise eliminator <b>212</b>, which processes the image data to remove dark pixels (i.e., non-whitespace pixels) therefrom that were erroneously generated as a result of noise. The noise eliminator <b>212</b> accomplishes this by locating isolated groups of contiguous dark pixels in the scanned image data having respective sizes (i.e., respective numbers of pixels) smaller than three dark pixels; these isolated groups of contiguous dark pixels are then removed from the scanned image data and replaced with whitespace by the processor <b>212</b>.</p> <p>After being processed by the noise eliminator <b>212</b>, the scanned image data is processed by the image enhancer processor <b>214</b>, which processor <b>214</b> enhances the dark pixels remaining in the scanned image after processing of the scanned image data by the noise eliminator processor <b>212</b>. Processor <b>214</b> accomplishes this by locating the dark pixels remaining in the scanned image after processing of the scanned image by the processor <b>212</b>, and by extending by predetermined numbers of pixels (e.g., 5 pixels in each of the positive and negative ordinate directions, and 25 pixels in each of the positive and negative abscissa directions) each of these remaining dark pixels in both of the two mutually orthogonal directions of the coordinate system to which the scanned image was aligned by the de-skewing processor 210. That is, predetermined numbers of whitespace pixels surrounding and extending from the remaining dark pixels in the two mutually orthogonal directions of the coordinate system are replaced with dark pixels. Any resulting extension of the dark pixels that would extend beyond the edge of the scanned image is prevented from doing so by truncating the extension by a predetermined number of pixels sufficient to</p>
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		<p>prevent the dark pixel extensions from coming within 5 pixels of the edges of the scanned image.</p> <p>After being processed by the image enhancer 214, the result, enhanced scanned image is processed by dark pixel group locator processor <b>222</b>. Locator processor <b>222</b> then generates respective imaginary rectangles around the respective groups of contiguous dark pixels such that the respective rectangles each include two sides are parallel to the ordinate and two sides are parallel to the abscissa of the coordinate system to which the scanned image was aligned by the processor <b>210</b>, and such that the respective rectangles include all of the respective dark pixels of each of the respective groups of contiguous dark pixels. The locator processor <b>222</b> then selects those imaginary rectangles, closest to the origin of the coordinate system, whose respective longitudinal dimensions exceed a predetermined threshold (e.g., 1 inch), and determines the respective coordinates of at least one predetermined vertex (e.g., the respective vertex having the minimal abscissal coordinate value and the maximal ordinate coordinate value for the respective rectangle) and dimensions of a predetermined number (e.g., no more than 25) of these selected imaginary rectangles. The respective vertex coordinates and dimensions of these imaginary rectangles are output by the locator processor <b>222</b> as recognition characteristics for the scanned document <b>400</b>, which recognition characteristics are transmitted from the generator <b>204</b> to the recognition characteristic comparison processor <b>220</b>.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the</p>
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		reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

### Exhibit G-23

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. A statement of reasons and good cause for each supplement in this chart is identified in the cover pleading.

QBIC was known or used by others in the United States and publicly used or on sale in the United States by November 5, 2000. *See generally* W. Niblack et al., *The QBIC Project: Querying Images By Content Using Color, Texture, and Shape*, SPIE Vol. 1908 (1993), pp. 173–187 (IBM0002390–404); M. Flickner et al., *Query by Image and Video Content: The QBIC System (“QBIC”)*, IEEE Sept. 1995, pp. 23–32 (IBM0000893–902); W. Niblack et al., *Updates to the QBIC System*, SPIE Vol. 3312 (1997), pp. 150–161 (IBM 0002419–430); and *Query By Image Content QBIC Demonstration Program*, IBM Research, Sept. 1998 (IBM000747). QBIC is available as prior art at least under 35 U.S.C. § 102(a), (b), and (g), having been known or used by others in the United States and publicly used or on sale in the United States by at least 1995 and certainly by November 5, 2000, including, for example, at <http://libra.uc.davis.edu> through the Art History Department at U.C. Davis; at [www.thinker.org/imagebase/indox-2 .htm3](http://www.thinker.org/imagebase/indox-2.htm3) through the Fine Arts Museum of San Francisco; through demos at <http://www.qbic.almaden.ibm.com>; and through IBM’s commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. *See generally* Deposition of IBM Corporate Representative Myron Flickner, *Nantworks, LLC and Nant Holdings IP, LLC v. Bank of America Corporation and Bank of America, N.A.*, 2:20-cv-07872-GW-PVC (C.D.C.A. 2020) (“Flickner 8/29/23 Depo”) at e.g., 32–33, 39–40, 44, 62–63, 66–67, 72–74, 103–107, 110–112, 127, 163–174, 183–189, 191–195, 215, 219–220, 241, 307–309, 311–317, Exs. 3–13; *see also* Deposition of IBM Corporate Representative Myron Flickner, *Network-1 Technologies, Inc., v. Google LLC and Youtube LLC*, 1:14-cv-09558-PGG (S.D.N.Y. 2019) (“Flickner Depo”), including, e.g., at 13, 14, 15–18, 29–30, 34, 36, 37, 43–46, 48, 58, 60, 61–62, 67–69, 72, 74–76, 84–86, 88–89, 98–100, 102, 106, 113, 125, 135, 152–154, 160–161, 170–172, 180–181, 194, 198–201, 203–205, 215–216, 220–221, and Exs. 1–16.

As shown in the chart below, QBIC anticipates asserted claims 4 and 20 of the ’529 Patent. The disclosures/citations for each element incorporate the disclosures citations of the proceeding limitations. To the extent QBIC is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent QBIC is found not to anticipate any asserted claims or claim elements of the ’529 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified in the cited references and/or in the cover pleading of BofA’s Final Invalidity Contentions. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are

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interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid. The following chart incorporates by reference the analysis from Exhibit G-21 for each limitation.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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1. Claim 1 (Non-Asserted)

Element	'529 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A system comprising:	<p>QBIC discloses a system.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390:</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images' content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>QBIC Demo (IBM000747):</p>  <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>to the QBIC system).</p> <p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>

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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <p style="text-align: right;">Page 62</p>
		<p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p>

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		<p>10 Q. Say it returned the stills, could you use</p> <p>11 those stills to point you to a video?</p> <p>12 A. Yeah.</p> <p>13 Q. And how would you do that?</p> <p>14 A. Well, the -- each -- each key frame</p> <p>15 typically represents a frame in the video. So</p> <p>16 there's a -- the key frame is -- is one frame of</p> <p>17 the video so you just seek to that point.</p> <p>18 Q. So if I'm understanding this right, you</p> <p>19 could take a query video, the system would extract</p> <p>20 frames, which would then extract features from it,</p> <p>21 and then the system would return either shot clips</p> <p>22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>Flickner 8/29/23 Depo at 42:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>4 Q. So let's just start at a high level. Tell 5 me generally what is QBIC? 6 A. QBIC was a technology -- stands for query 7 by image content. It was a way of extracting 8 features of various types, putting those features in 9 a database and then searching the database to get 10 images that looked visually similar or semantically 11 similar. 12 Q. And when you say "semantically similar," 13 what do you mean? 14 A. You could query based on semantics. You 15 could ask for what does a microphone look like and 16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206:</p>

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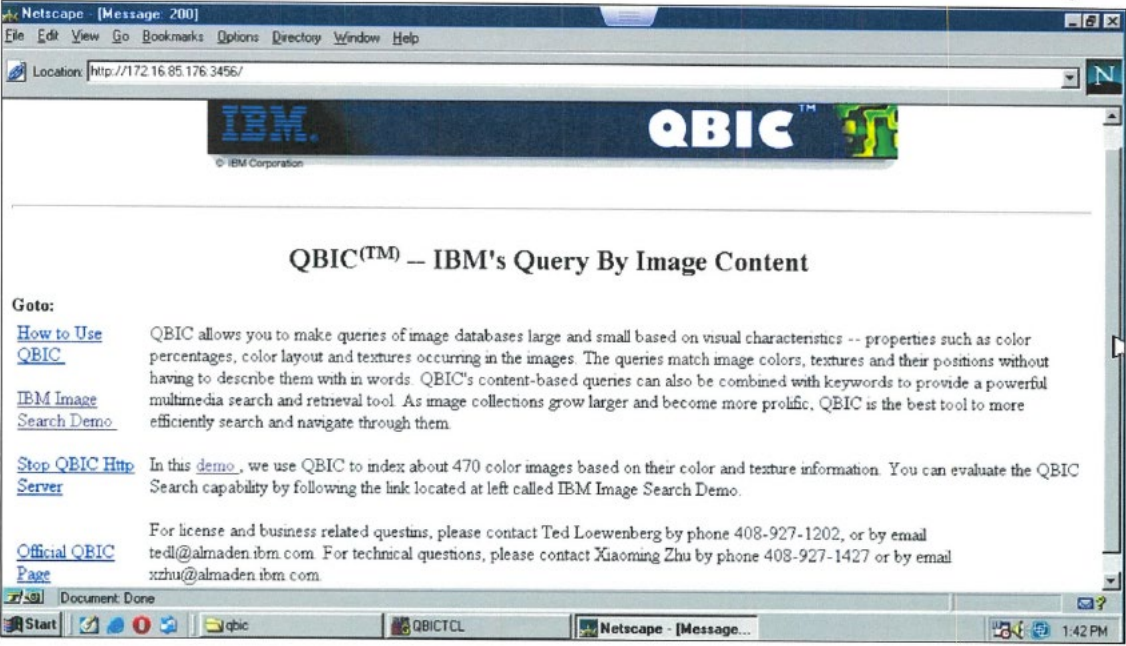
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		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.</p> <p>Flickner 8/29/23 Depo at Ex. 5:</p>



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		 <p>The QBIC system was implemented in IBM commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. <i>See, e.g.</i>, Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.</p>
[1A]	a camera that captures an image;	QBIC uses still images and video (frames) for query and database population:

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		<p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.                      For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.                      Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects-for example, a car moving across the screen.                      Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and 15-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p>

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		<p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions-which we call objects-in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images</p>

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		<p>are to the source.                      You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.”  <i>Id.</i> at pp. 20–21.</p> <p>Flickner Depo at 88:                      7 Q. (By Mr. Dang) Suppose you search for a                      8 set of features or you search using a query image                      9 in this demonstration, what would the system do?                      10 MS. HAYDEN: Objection. Foundation.                      11 THE DEPONENT: The system would                      12 compute -- in the query image case, the system                      13 would compute the features on that -- that image                      14 and then compute the distance associated with each                      15 one of the images in the database.</p> <p>Flickner Depo at 89-90:</p>

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		<p>11 Q. Was that used to the QBIC system publicly                      12 available anywhere?                      13 A. You mean was the Fine Arts demo                      14 available?                      15 Q. Yes.                      16 A. I think it was on our site, but I can't                      17 remember for...                      18 Q. How did their system work to identify art                      19 prints?                      20 A. Art what?                      21 Q. How would one identify an art print using                      22 their system?                      2 THE DEPONENT: Well, you had a picture --                      3 you could take a picture of a painting and then you                      4 could use that as a query content. And you could,                      5 for example, determine its -- its heritage or its                      6 lineage.                      7 Q. (By Mr. Dang) So you could identify                      8 image about -- or you could identify information                      9 about the painting using the system?                      10 A. Right.</p> <p>Flickner Depo at 39-40:                      17 Q. Okay. So you would take -- you would use                      18 a histogram methodology to extract key frames from                      19 the video; is that what -- is that right?                      20 A. That's one way to do it.                      21 Q. Okay. And then what would you do with                      22 those key frames?</p>

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		<p>1 A. You just populate image database using</p> <p>2 those images.</p> <p>3 Q. Okay. Could you take as -- as you did in</p> <p>4 the query by image search system, could you just</p> <p>5 search a video using this system?</p> <p>6 A. You could search for a key frame and that</p> <p>7 could point you to a video.</p> <p>8 Q. As an input into the system, could you</p> <p>9 search -- could you input a whole video and then</p> <p>10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which</p> <p>15 it did so, as you mentioned, was -- would it</p> <p>16 extract key frames from the video, extract features</p> <p>17 from those key frames, and then search those</p> <p>18 features; is that right?</p> <p>19 A. Correct.</p> <p>Flickner Depo at 54-55:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <hr/> <p style="text-align: right;">Page 54</p> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.</p> <p>QBIC could integrate with a camera, such as a portable camera; a user could take an image using a portable camera and submit that image to the QBIC system for query.</p> <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system):</p>

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		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>



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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p>
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. Say it returned the stills, could you use</p> <p>11 those stills to point you to a video?</p> <p>12 A. Yeah.</p> <p>13 Q. And how would you do that?</p> <p>14 A. Well, the -- each -- each key frame</p> <p>15 typically represents a frame in the video. So</p> <p>16 there's a -- the key frame is -- is one frame of</p> <p>17 the video so you just seek to that point.</p> <p>18 Q. So if I'm understanding this right, you</p> <p>19 could take a query video, the system would extract</p> <p>20 frames, which would then extract features from it,</p> <p>21 and then the system would return either shot clips</p> <p>22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>Flickner 8/29/23 Depo at 34:</p>

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		<p>6 Earlier you talked about both still images                      7 and video were part of your responsibilities for                      8 these architecture interfaces; correct?                      9 A. Correct.                      10 Q. Okay. If I refer to "images," do you                      11 understand that is including both a still image or,                      12 for example, a frame of a video image?                      13 A. Sure.                      14 Q. Okay. So when I say "image," I'm                      15 including both in my questions from now on out.                      16 A. Okay.                      17 Q. Okay?                      18 A. Okay.</p> <p><i>Id.</i> at 53:</p> <p>4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      0 also add the image to the database, preparing a                      1 reduced thumbnail and adding any available text                      2 information to the database.                      3 A. Yep.                      4 Q. Is that correct?                      5 A. Yep.</p>

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		<p><i>Id.</i> at 60–61:</p> <p>13 Q. Okay. Did you do that type of                      14 segmentation to differentiate foreground objects                      15 from the background in this database population                      16 step?                      17 A. We did research prototypes of it. I don't                      18 know what all went out.                      19 Q. You don't know whether those made it into                      20 a commercial product?                      21 A. I would say they probably didn't.                      22 Q. Okay. Were they in the -- were they used                      23 in the -- in demo applications that you referred to?                      24 A. They might have been.                      25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                      2 with those objects? Were they stored, for example,                      3 as a separate image or were they somehow linked to                      4 or associated with the image from which they were                      5 extracted?                      6 A. Typically they were linked.                      7 Q. They were linked to the source image?                      8 A. Yeah.</p> <p><i>Id.</i> at 32–33:</p>

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		<p>22 Q. The question was, any of the commercial</p> <p>23 repositories that you went to source images, do you</p> <p>24 know if any of them captured the still images or</p> <p>25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p><i>Id.</i> at 74–75:</p>

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			<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114:</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202:</p>

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		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300:                  6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to QBIC.</p> <p><i>Id.</i> at 312:</p>




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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 512</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p>




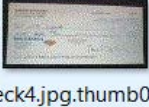


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Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>QBIC Demo (IBM000747) – showing compatibility with images captured by a mobile phone camera</p>  <p>The screenshot shows the QBIC demo interface. At the top, there is an IBM logo and the QBIC trademark. Below the logo, there is a navigation bar with buttons for 'Usage', 'Get Info', 'Color Histogram', 'Layout', 'Texture', and 'Special Hybrid'. The main content area displays a grid of image thumbnails, each with a set of interactive buttons labeled 'I', 'C', 'L', 'T', 'S'. The interface also includes links for 'How to Use QBIC', 'Back To Start Page', and 'Goto: Custom Color % Query, Custom Paint Query, Random Images, Official QBIC Page'. At the bottom, there is a 'Query was:' section with an example query and a 'Query Type: Color Layout'.</p>

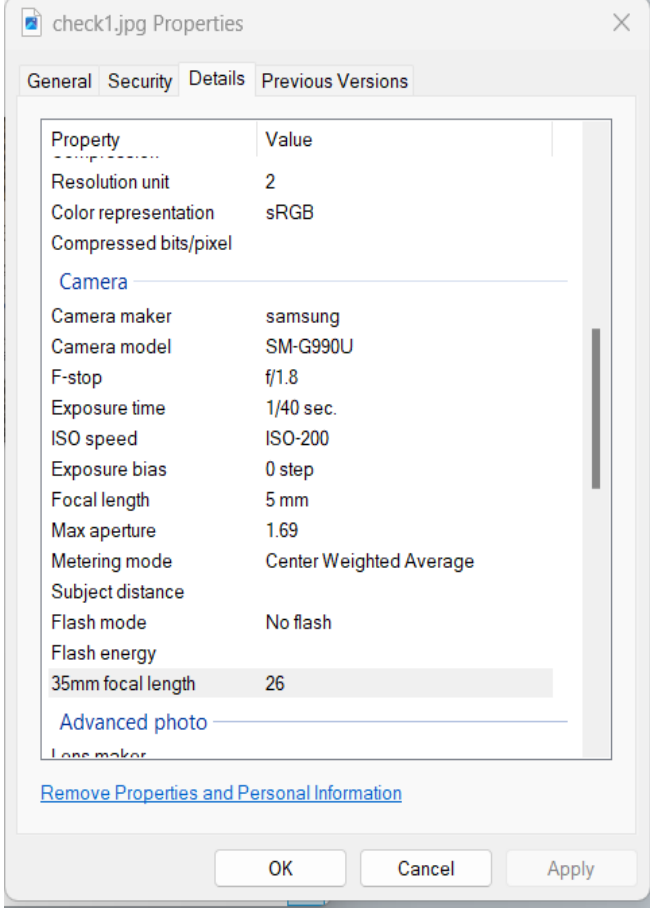
*Nantworks, LLC v. Bank of America Corporation*  
Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>check1.jpg.thumb0.jpg</p>  <p>check2_orig.jpg.thumb0.jpg</p>  <p>check3.jpg.thumb0.jpg</p>  <p>check4.jpg.thumb0.jpg</p>  <p>check5.jpg.thumb0.jpg</p>  <p>check5_rotate_crop_fix.jpg.thumb0.jpg</p>

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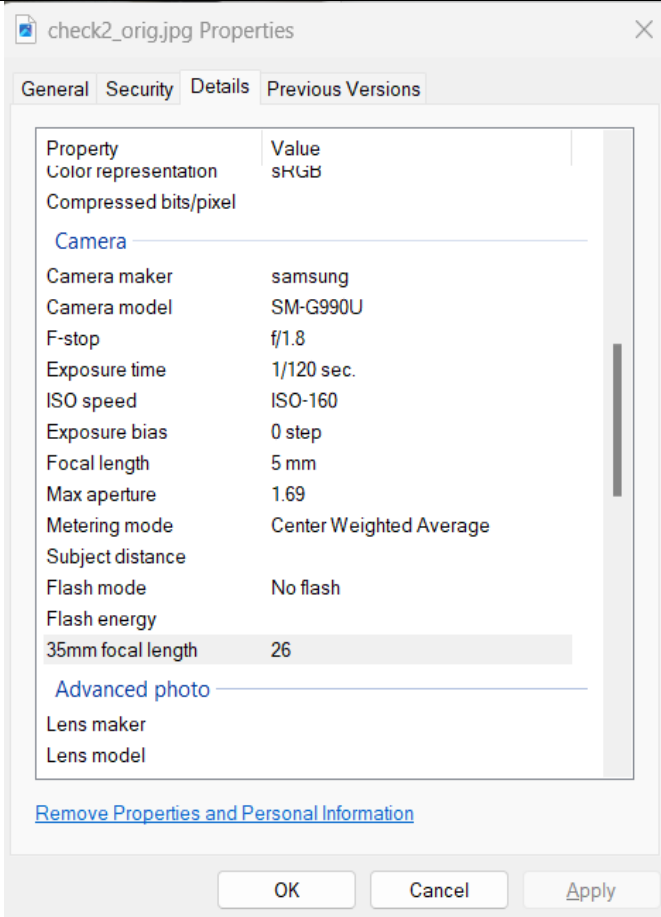
Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

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		 <p>The screenshot shows the 'check1.jpg Properties' dialog box with the 'Details' tab selected. It displays a list of properties and their values:</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Resolution unit</td> <td>2</td> </tr> <tr> <td>Color representation</td> <td>sRGB</td> </tr> <tr> <td>Compressed bits/pixel</td> <td></td> </tr> <tr> <td colspan="2"><b>Camera</b></td> </tr> <tr> <td>Camera maker</td> <td>samsung</td> </tr> <tr> <td>Camera model</td> <td>SM-G990U</td> </tr> <tr> <td>F-stop</td> <td>f/1.8</td> </tr> <tr> <td>Exposure time</td> <td>1/40 sec.</td> </tr> <tr> <td>ISO speed</td> <td>ISO-200</td> </tr> <tr> <td>Exposure bias</td> <td>0 step</td> </tr> <tr> <td>Focal length</td> <td>5 mm</td> </tr> <tr> <td>Max aperture</td> <td>1.69</td> </tr> <tr> <td>Metering mode</td> <td>Center Weighted Average</td> </tr> <tr> <td>Subject distance</td> <td></td> </tr> <tr> <td>Flash mode</td> <td>No flash</td> </tr> <tr> <td>Flash energy</td> <td></td> </tr> <tr> <td>35mm focal length</td> <td>26</td> </tr> <tr> <td colspan="2"><b>Advanced photo</b></td> </tr> <tr> <td>Lens maker</td> <td></td> </tr> </tbody> </table> <p>At the bottom of the dialog, there is a link: <a href="#">Remove Properties and Personal Information</a>. Buttons for 'OK', 'Cancel', and 'Apply' are also visible.</p>	Property	Value	Resolution unit	2	Color representation	sRGB	Compressed bits/pixel		<b>Camera</b>		Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/40 sec.	ISO speed	ISO-200	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26	<b>Advanced photo</b>		Lens maker	
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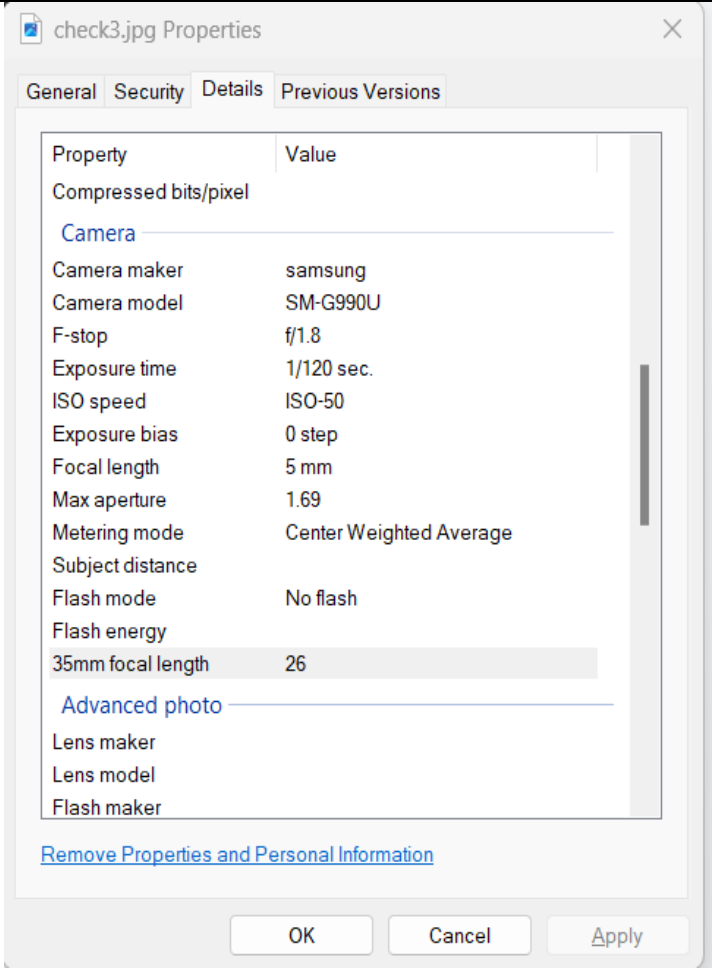
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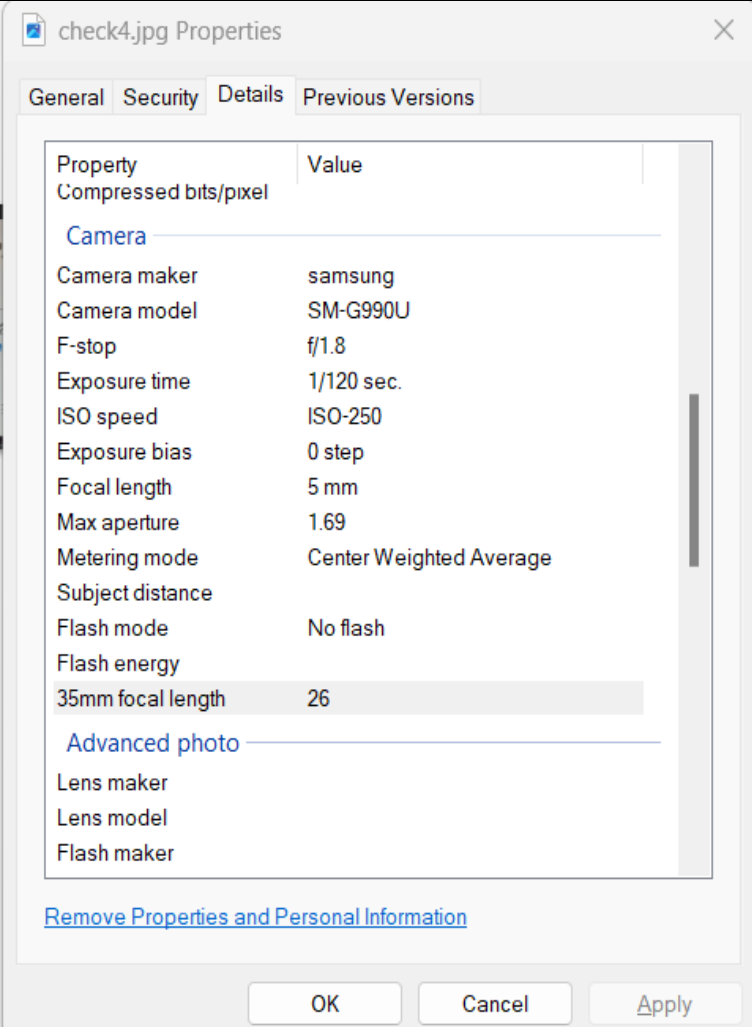
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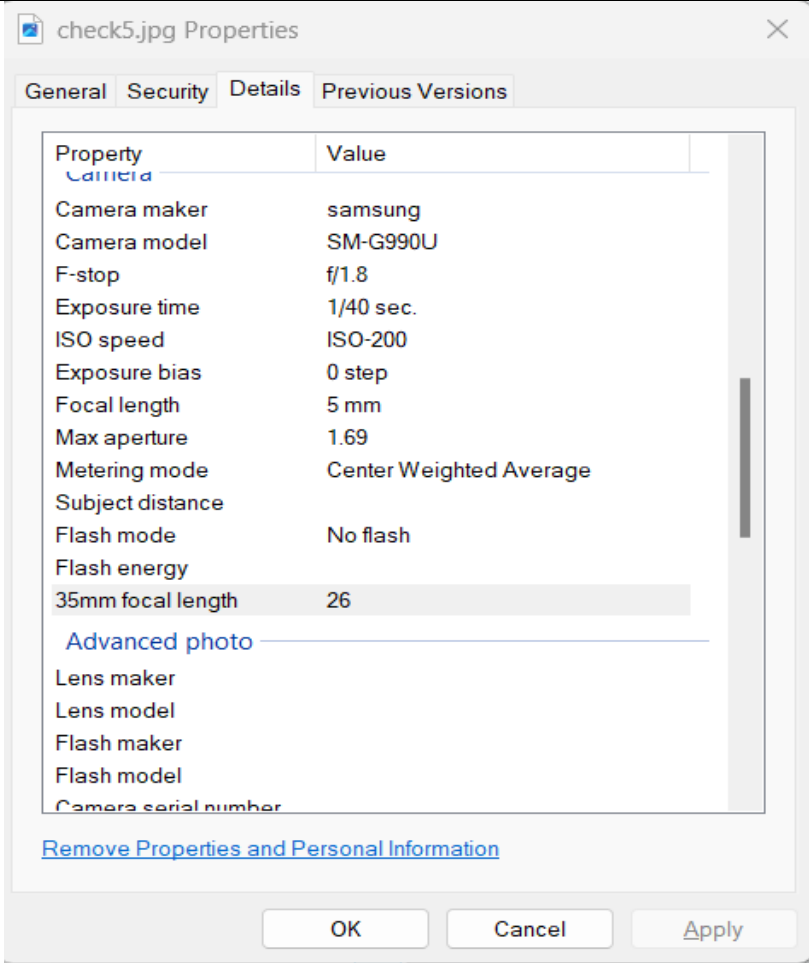
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		 <p>The screenshot shows the 'check4.jpg Properties' dialog box with the 'Details' tab selected. It displays a list of camera-related properties and their values:</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Compressed bits/pixel</td> <td></td> </tr> <tr> <td colspan="2"><b>Camera</b></td> </tr> <tr> <td>Camera maker</td> <td>samsung</td> </tr> <tr> <td>Camera model</td> <td>SM-G990U</td> </tr> <tr> <td>F-stop</td> <td>f/1.8</td> </tr> <tr> <td>Exposure time</td> <td>1/120 sec.</td> </tr> <tr> <td>ISO speed</td> <td>ISO-250</td> </tr> <tr> <td>Exposure bias</td> <td>0 step</td> </tr> <tr> <td>Focal length</td> <td>5 mm</td> </tr> <tr> <td>Max aperture</td> <td>1.69</td> </tr> <tr> <td>Metering mode</td> <td>Center Weighted Average</td> </tr> <tr> <td>Subject distance</td> <td></td> </tr> <tr> <td>Flash mode</td> <td>No flash</td> </tr> <tr> <td>Flash energy</td> <td></td> </tr> <tr> <td>35mm focal length</td> <td>26</td> </tr> <tr> <td colspan="2"><b>Advanced photo</b></td> </tr> <tr> <td>Lens maker</td> <td></td> </tr> <tr> <td>Lens model</td> <td></td> </tr> <tr> <td>Flash maker</td> <td></td> </tr> </tbody> </table> <p>At the bottom of the dialog, there is a link: <a href="#">Remove Properties and Personal Information</a>. Buttons for 'OK', 'Cancel', and 'Apply' are also visible.</p>	Property	Value	Compressed bits/pixel		<b>Camera</b>		Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/120 sec.	ISO speed	ISO-250	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26	<b>Advanced photo</b>		Lens maker		Lens model		Flash maker	
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		 <p>The screenshot shows the 'check5.jpg Properties' dialog box with the 'Details' tab selected. The 'Camera' section is expanded, showing the following properties and values:</p> <table border="1"> <thead> <tr> <th>Property</th> <th>Value</th> </tr> </thead> <tbody> <tr><td>Camera maker</td><td>samsung</td></tr> <tr><td>Camera model</td><td>SM-G990U</td></tr> <tr><td>F-stop</td><td>f/1.8</td></tr> <tr><td>Exposure time</td><td>1/40 sec.</td></tr> <tr><td>ISO speed</td><td>ISO-200</td></tr> <tr><td>Exposure bias</td><td>0 step</td></tr> <tr><td>Focal length</td><td>5 mm</td></tr> <tr><td>Max aperture</td><td>1.69</td></tr> <tr><td>Metering mode</td><td>Center Weighted Average</td></tr> <tr><td>Subject distance</td><td></td></tr> <tr><td>Flash mode</td><td>No flash</td></tr> <tr><td>Flash energy</td><td></td></tr> <tr><td>35mm focal length</td><td>26</td></tr> </tbody> </table> <p>Below the 'Advanced photo' section, the following properties are listed but not expanded:</p> <ul style="list-style-type: none"> <li>Lens maker</li> <li>Lens model</li> <li>Flash maker</li> <li>Flash model</li> <li>Camera serial number</li> </ul> <p>At the bottom of the dialog, there is a link 'Remove Properties and Personal Information' and three buttons: 'OK', 'Cancel', and 'Apply'.</p>	Property	Value	Camera maker	samsung	Camera model	SM-G990U	F-stop	f/1.8	Exposure time	1/40 sec.	ISO speed	ISO-200	Exposure bias	0 step	Focal length	5 mm	Max aperture	1.69	Metering mode	Center Weighted Average	Subject distance		Flash mode	No flash	Flash energy		35mm focal length	26
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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this</p>																												



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		<p>claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	<p>a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service;</p>	<p>QBIC discloses a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404)</p> <p>IBM0002390 at 2390:</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images’ content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>IBM0002390 at 2391:</p> <p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p>

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		<p>IBM0002390 at 2391-92:</p> <p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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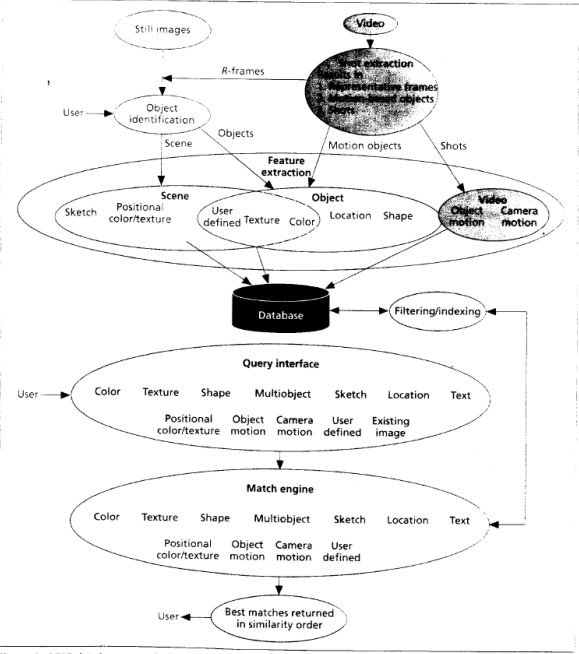
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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <i>m</i> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}</math>, <math>M_{[2,3]} \times M_{[3,2]}</math>, <math>M_{[3,3]}</math>, <math>M_{[3,4]} \times M_{[4,3]}</math>, <math>M_{[4,4]}</math>, <math>M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <i>w</i> the width of the image in pixels and <i>h</i> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2392-93</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population</p>

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		<p>(the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>  <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p> <p><i>Id.</i> at Fig. 2.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures</p>

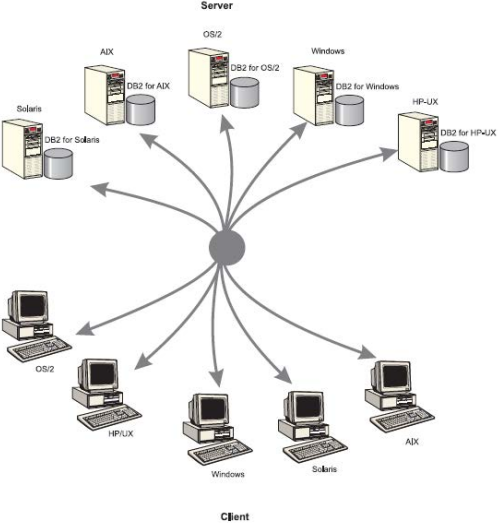
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		<p>similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>

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		 <p>The diagram, labeled 'Figure 6. DB2 extender platforms', illustrates a central 'Server' at the top connected to various 'Client' platforms at the bottom. The server is connected to several DB2 extender boxes for different operating systems: Solaris (DB2 for Solaris), AIX (DB2 for AIX), OS/2 (DB2 for OS/2), Windows (DB2 for Windows), and HP-UX (DB2 for HP-UX). Below the server, there are several client computer icons, each labeled with an operating system: OS/2, HP-UX, Windows, Solaris, and AIX. Arrows point from the central server to each of these extender boxes and client icons.</p> <p><i>Id.</i> at p. 12 (Fig. 6).</p> <p>“The DB2 Extenders run in the DB2 client/server environment. This environment consists of a database server and one or more remote database clients. The DB2 extender services run on the server. Before you can access them, you have to start them.” <i>Id.</i> at p. 47.</p> <p>Flickner Depo at 21:</p>

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		<p>1 Q. And you mentioned that you would extract                  2 features from the images?                  3 A. We did.                  4 Q. How would you do that?                  5 A. We ran algorithms on the pixels of the                  6 image and from that we created a feature.                  7 Q. What sort of features would you extract                  8 from the images?                  9 A. A QBIC system did color, shape and                  10 texture.                  11 Q. Okay. So let's take color.                  12 How would you, say, extract a color                  13 feature from an image?                  14 A. We typically would compute -- compute a                  15 color histogram.                  16 Q. And what's a color histogram?                  17 A. It's a measure of -- it's an estimate of                  18 the probability density of a color being in an                  19 image.                  20 Q. So you would take an image and extract                  21 that color histogram from it?                  22 A. Yup.</p> <p>Flickner Depo at 212-213:</p>

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		<p>7 Q. So comparing your -- the understanding of              8 CueVideo that you've described so far and this              9 manual, would you -- would you defer to the              10 description of the product in this manual as              11 opposed to your own recollection?              12 Please -- please feel free to review the              13 document.              14 A. Okay.              15 MR. DANG: Objection. Lacks foundation.              16 Q. (By Ms. Hayden) Let's go through the --              17 let's go through a couple specific questions about              18 the document, and then I can re-ask -- re-ask my              19 question.              20 If you can turn to page -- the page --              21 page 9 or the page that's Bates-stamped 100044.              22 There's -- there's a point that's numbered point 2.</p> <p style="text-align: right;">Page 212</p> <hr/> <p>1 Point 1 is the "Preprocessing." And then point 2              2 is the generation of shot boundary index and              3 speech -- speech index.              4 For the -- I know that there was some              5 description of a video system in one of the              6 articles we discussed, the -- the one that you              7 had -- had been the first author on.              8 Is it your -- from this description, is              9 the shot boundary index similar to what was              10 described in that article?              11 MR. DANG: Objection. Lacks foundation.              12 THE DEPONENT: Yes.              13</p> <p>Flickner Depo at 72-73:</p>



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		<p>21 Q. Did MediaMiner support any indexing                  22 structures for the image database?</p> <p style="text-align: right;">Page 72</p> <hr/> <p>1 MS. HAYDEN: Objection. Foundation.                  2 THE DEPONENT: I don't remember.                  3 Q. (By Mr. Dang) Turn to page 735 at the                  4 bottom, the Bates number ending in 735.                  5 You see on the third bullet on this page                  6 it says "Indexing of images as an automatic                  7 preprocessing step."                  8 What does that mean?                  9 A. When you create the database, you build                  10 the indexes.                  11 Q. What indexes could you incorporate?                  12 A. Any -- any index your scheme has                  13 supported.                  14 Q. Could you incorporate a clustered index?                  15 A. You could.                  16 Q. Could you incorporate specifically that                  17 clustering index that was mentioned in the 1998                  18 paper?                  19 MS. HAYDEN: Objection. Calls for                  20 speculation.                  21 THE DEPONENT: You could.                  22</p> <p>Flickner Depo at 214-215:</p>

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		<p>4 Q. What do you mean by the images of shot                      5 boundaries were indexed?                      6 A. Each -- each shot -- the shot -- the shot                      7 boundary detection is trying to extract key frames                      8 or break the video into small subsec --                      9 subsections -- hang on. Let me think here a                      10 second.                      11 So the shot boundary here is different                      12 than key framing. So I'll -- I'll retract what I                      13 said earlier. This -- while similar, they're not                      14 the same.                      15 Q. What are the differences?                      16 A. Shot boundaries are typically detected at                      17 fade to black, and key frames are supposed to be a                      18 representative still image of the video segment.                      19 Q. How would a shot boundary index allow one                      20 to query a video by content?                      21 A. It gives you semantical information as                      22 related to what the -- that -- that -- that is a --</p> <p style="text-align: right;">Page 214</p> <hr/> <p>1 a reasonable amount of return video. It's -- it's                      2 breaking it into small snippets.                      3 Q. Does it extract features from the key                      4 frames?                      5 A. If there are key frames extracted, it --                      6 it will reference key frames.</p> <p>Flickner Depo at 22-25:</p>

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		<p>1 Q. Okay. And what would you do with the                  2 image after you hit and extracted the color                  3 histogram from it?                  4 A. Nothing.                  5 Q. Would those features be stored in any                  6 database or --                  7 A. Yes.                  8 Q. Okay. And let's do -- what about                  9 texture, could you extract texture features from an                  10 image?                  11 A. We did.                  12 Q. And how would you do that?                  13 A. I don't remember exact features we were                  14 using. There were -- we published some papers on                  15 them.                  16 Q. Okay. Was there any reasoning behind                  17 picking the features that you chose?                  18 A. Yes.                  19 Q. And what was that reasoning?                  20 A. We wanted to make it so that the results                  21 were perceptually good.                  22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>	<p>1 want to look for all of the images that have a red                  2 color in it or some sort red color histogram; is                  3 that right?                  4 A. Well, you -- you take specific -- you                  5 search for a red color. You'd compute the                  6 histogram and then basically match the histogram,                  7 which would give you images that had more colors in                  8 the reds. This is not -- it's not a unique thing.                  9 Q. Were you always searching for a                  10 particular feature, or could you just search some                  11 sort of example image?                  12 A. We could search an example image.                  13 Q. And how would that process work?                  14 A. Just extract the features from it.                  15 Q. So let's break that down.                  16 So you would submit an example image to                  17 the -- to the system, right?                  18 A. Uh-huh.                  19 Q. And then how do the -- how -- how does                  20 the system select which features to extract?                  21 A. It would compute them all, typically, or                  22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
		<p>1 A. That people would get -- would agree that                  2 this is a better match, that the ordering was                  3 reasonable and...                  4 Q. So by that, do you mean that people would                  5 view the results returned as the closest or close                  6 matches to your -- to your image?                  7 A. It was -- it would satisfy their query.                  8 Q. Okay. So -- so you would have this set                  9 of features in your database.                  10 How would you search for those features?                  11 A. Typically, we -- initially, we did linear                  12 scan where you just actually evaluate the -- the                  13 distance metric against all the features.                  14 Q. So in linear scan, you would compare some                  15 sort of search term against all the features in the                  16 database?                  17 A. Well, it depends on which features you're                  18 using. You didn't have to use all the features.                  19 You could use just color features or just texture                  20 features or just...                  21 Q. So to make sure I'm understanding this                  22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>	<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>

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		<p><b>Flickner Depo at 88-89:</b></p> <p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.              16 Q. (By Mr. Dang) Were there any              17 circumstances under which the system would not              18 compute the distance for every image in the              19 database during a search?              20 A. If there was a text filter on it, we              21 didn't.              22 Q. Did the Fine Arts Museum of San Francisco</p> <hr/> <p style="text-align: right;">Page 88</p> <p>1 similarly use the QBIC system?              2 A. They did.              3 Q. When did they use the QBIC system?              4 A. It was in the '90s, if I recall right.              5 Q. How did they use the QBIC system?              6 A. Similar to the way Davis did, as I              7 recall.              8 Q. What sorts of images were they including              9 in their database?              10 A. Paintings.</p> <p><b>Flickner Depo at 91-92:</b></p>

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		<p>13 Q. And could you, in general terms, describe                      14 what Virage was?                      15 A. It was a content-based retrieval system                      16 tailored to secure surveillance information.                      17 Q. And you went to their website; was there                      18 something on their website, say, a demonstration?                      19 A. I don't remember.                      20 Q. Was their system commercially available                      21 during the 1990s?                      22 A. Yes.</p> <p>1 Q. How did their content-based retrieval                      2 system work?                      3 A. It was similar to QBIC.                      4 Q. Could you, say, extract features from a                      5 query image?                      6 A. Yes.                      7 Q. And could you search those features into                      8 some sort of reference database?                      9 A. Yes.</p> <p><i>See also</i> Flickner Depo at 54-55.                      Flickner 8/29/23 Depo at 79–80:</p>

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		<p>16 Q. Well, for example, if, for example, you --</p> <p>17 the image was sourced from a camera and there was a</p> <p>18 noise from the image sensor on the image, were there</p> <p>19 any methodologies used by IBM in the QBIC system to</p> <p>20 reduce that noise or grain in the image?</p> <p>21 A. I don't recall.</p> <p>22 Q. What about -- and, again, I'm talking</p> <p>23 about preprocessing steps, before you're actually</p> <p>24 extracting features.</p> <p>25 Were there any methodologies to enhance</p> <p style="text-align: right;">Page 79</p> <p>1 the contrast of the image?</p> <p>2 A. I don't remember.</p> <p>3 Q. What about resizing the image?</p> <p>4 A. We did -- we probably supported that on</p> <p>5 import.</p> <p>6 Q. Say again?</p> <p>7 A. We supported that on -- most likely we</p> <p>8 supported that on import, on read.</p> <p>9 So the read, you request a particular</p> <p>10 size.</p> <p>11 Q. You're going to have to repeat it. I</p> <p>12 didn't understand you.</p> <p>13 MR. STRAUSSMAN: And speak up.</p> <p>14 THE WITNESS: So resizing would be done</p> <p>15 typically when you import the image into the system.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. Okay. So if you're importing the image</p> <p>18 into the database, is that what you're talking</p> <p>19 about?</p> <p>20 A. Correct.</p> <p>21 Q. Okay. And at that point you would resize</p> <p>22 the image to reduce the size?</p>

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		<p>1 How would you resize the image on</p> <p>2 importation?</p> <p>3 A. You would request a particular size of</p> <p>4 image and then use that to populate the database.</p> <p>5 Q. So if the source images that you were</p> <p>6 acquiring were say too big for purposes of QBIC, on</p> <p>7 importation you could resize those to get them to</p> <p>8 the size that are -- meet the -- meet the</p> <p>9 requirements of the QBIC system?</p> <p>10 A. Yes.</p> <p>11 Q. Was that done as a matter of course in the</p> <p>12 QBIC system?</p> <p>13 MR. HANSEN: Objection; vague and ambiguous.</p> <p>14 THE WITNESS: As I recall, yes.</p> <p>15 BY MR. EDWARDS:</p> <p>16 Q. Was it an automatic process?</p> <p>17 A. As I recall, yes.</p> <p>18 Q. So if a user were to import source images</p> <p>19 into the database, when the user did that, the QBIC</p> <p>20 system would automatically resize it to fit the</p> <p>21 requirement of the QBIC system?</p> <p>22 A. Make sure it's in the range that the QBIC</p> <p>23 system could handle.</p> <p>24 Q. That's a "yes"?</p> <p>25 A. That's a "yes."</p> <p><i>Id.</i> at 80–81:</p>

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		<p>6 Q. How about converting the images to binary?</p> <p>7 A. Threshold. There probably was a threshold</p> <p>8 control.</p> <p>9 Q. And what do you mean by "threshold</p> <p>10 control"?</p> <p>11 A. Just change the value of the threshold.</p> <p>12 You make a binary decision, is a pixel bigger than</p> <p>13 a -- is a pixel bigger than a particular number or</p> <p>14 is it smaller and you put a 01 based on that.</p> <p>15 Q. And that would have been done prior to</p> <p>16 feature extraction?</p> <p>17 A. For some features it would be done that</p> <p>18 way.</p> <p>19 Q. So, for example, for shape, was it</p> <p>20 required to convert the image to binary before you</p> <p>21 did your shape analysis?</p> <p>22 A. No.</p> <p>23 Q. Were there any other features that, as</p> <p>24 part of the -- as part of the extraction process,</p> <p>25 the image had to be converted to binary before?</p>



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		<p>2           Were there any features that required the                      3 image to be converted to binary before the features                      4 were extracted?                      5       A. Some features required a binary image,                      6 yeah.                      7       Q. Which ones?                      8       A. Some of the texture features.                      9       Q. And when you say "some of the texture                      10 features," do you -- do you recall which ones?                      11       A. No.                      12       Q. Let's put a pin in that because we're                      13 going to get to it.                      14           What about gray scale? Were any images                      15 converted to gray scale before features were                      16 extracted?                      17       A. Yes.                      18       Q. Which -- for which features?                      19       A. For shape, for texture.                      20       Q. Any others?                      21       A. Color wouldn't make any difference.                      22           That's all I can think of.                      23       Q. At least for shape and texture?                      24       A. Yeah.</p> <p><i>Id.</i> at 94–97:                      18       Q. So that's why I ask is it the first step                      19 in calculating shape to convert the image to binary?                      20       A. Yes.</p> <p><i>Id.</i> at 101–102:</p>

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		<p>3           Okay. So first sketch used something</p> <p>4 called an edge map of each image?</p> <p>5           A. Yeah.</p> <p>6           Q. What is an edge map?</p> <p>7           A. It's an estimate of the edges, the major</p> <p>8 edges of the image.</p> <p>9           Q. Okay. Sort of the outline; is that fair?</p> <p>10          A. The outline is slightly different, but</p> <p>11 outlines would be closed, whereas sketch would --</p> <p>12 you didn't have to always do closed objects, you</p> <p>13 could do -- you could draw a circle or you could</p> <p>14 also draw a U.</p> <p>15          The circle would find sun-like objects and</p> <p>16 the U would find things that had a dominant curve --</p> <p>17 turn to it.</p> <p>18          Q. So you could draw -- so, for example, you</p> <p>19 could draw a flower --</p> <p>20          A. Right.</p> <p>21          Q. -- have the circle part for the flower and</p> <p>22 then for the stem it would just be a line?</p> <p>23          And that's where you're saying --</p> <p>24          A. Right.</p> <p>25          Q. -- it doesn't necessarily -- it's broader</p>

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		<p>1 than outline?</p> <p>2 A. Right.</p> <p>3 Q. Understood. Okay.</p> <p>4 And so the steps are you would convert the</p> <p>5 image to binary to calculate the sketch feature;</p> <p>6 right?</p> <p>7 A. No, you're inputting . . . I'm not sure</p> <p>8 how we did database population. Give me a minute.</p> <p>9 Yeah, it was done on a binary image.</p> <p>10 Q. Okay. So you convert the image to binary</p> <p>11 image; right?</p> <p>12 A. Right, using a Canny edge operator.</p> <p>13 Q. Okay. And then that gives you a binary</p> <p>14 edge map?</p> <p>15 A. Right.</p> <p>16 Q. All right. And then you reduce the size</p> <p>17 of that binary edge map?</p> <p>18 A. Right.</p> <p><i>Id.</i> at 140–141:</p>

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		<p>23 Q. So if I needed to resize the image we                      24 would need to do that -- the system would do that                      25 before features are extracted from the image query?</p> <hr/> <p style="text-align: right;">Page 141</p> <p>1 A. Yes.                      2 Q. And for certain things, like you said, for                      3 like texture and shape, for example, you had to                      4 convert the image to binary, as an example, that                      5 would need to be done for the image query -- the                      6 image query image as well; correct?                      7 A. Correct.</p> <p><i>Id.</i> at 164–165:</p>

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		<p>14 Q. All right. Let's flip forward to 2429.                      15 And is 2429 a screenshot of a trademark                      16 demo that was also available in the Almaden --                      17 excuse me -- almaden.ibm website?                      18 A. Yes.                      19 Q. Okay. And that demo looks like the                      20 trademark query is based on shape; is that right?                      21 A. It uses shape as one similarity feature.                      22 Q. Right. So the trademarks are converted to                      23 a binary image, like we talked before -- talked                      24 about before, and then they're -- the matching                      25 process is done based on those binary images?</p> <p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.                      2 Q. Okay. And here we're showing the query                      3 image is a -- is a heart -- a heart pattern with                      4 Love's next to it. It's in the top part of the                      5 screenshot.                      6 A. Yep.</p> <p><i>Id.</i> at 82:                      12 Q. Let's put a pin in that because we're                      13 going to get to it.                      14 What about gray scale? Were any images                      15 converted to gray scale before features were                      16 extracted?                      17 A. Yes.                      18 Q. Which -- for which features?                      19 A. For shape, for texture.</p>

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		<p><i>Id.</i> at 83-85:</p> <p>22 Q. Okay. If you look at that second sentence 23 there -- well, I'll read the -- I'll read the first 24 two sentences, first two full sentences. It says, 25 "As a result, we have devoted considerable effort to</p>

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		<p style="text-align: right;">Page 84</p> <p>1 developing tools to aid in this step. In recent                  2 work, we have successfully used fully automatic                  3 unsupervised segmentation methods along with a                  4 foreground/background model to identify objects in a                  5 restricted class of images."                  6 Did I read that correctly?                  7 A. Yep.                  8 Q. And can you interpret that for me? What                  9 is -- how did -- how were segmentation methods used                  10 there?                  11 A. This is work by Harpreet Sawhney, and he                  12 had algorithms for doing segmentation. So given an                  13 input image, identify which pixels belong to which                  14 class. So this is a cup, this is a table this is a                  15 phone. It's a three-class problem.                  16 And you write algorithms that determine                  17 what the characteristics of a cup are, what the                  18 characteristics of a table is, what the                  19 characteristics of a phone cover is. And you                  20 populate those in the database.                  21 Q. And how are those populated in a database?                  22 Are those associated with the underlying image?                  23 A. Yes.                  24 Q. And that could be done for both a query                  25 image and a database image?</p> <hr/> <p style="text-align: right;">Page 85</p> <p>1 A. It's done for both.</p>

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		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9       A. Correct.              10       Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13       A. That weren't described in the articles?              14 No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11       A. Yeah. We call them features.              12       Q. Features. Okay.              13           So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16       A. For example.              17       Q. Any other ones you can think of?              18       A. Nothing comes to mind.              19       Q. But when you refer to features they at              20 least include those four; is that correct?              21       A. Yes. Well, at least includes, yeah.</p>



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		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	<p>the service programmed to receive the data; identify an object within the image:</p>	<p>QBIC discloses the service programmed to receive the data; identify an object within the image.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at IBM0002390 at 2390</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images’ content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>IBM0002390 at 2391:</p>

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		<p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391-92</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2392-93</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>



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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2/Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <i>m</i> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}</math>, <math>M_{[2,3]} \times M_{[3,2]}</math>, <math>M_{[3,3]}</math>, <math>M_{[3,4]} \times M_{[4,3]}</math>, <math>M_{[4,4]}</math>, <math>M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <i>w</i> the width of the image in pixels and <i>h</i> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>

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		<p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.</p> <p>For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen.</p> <p>Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“DATABASE POPULATION</b></p> <p>In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like ‘baby on beach,’ can be associated with an outlined object or with the scene as a whole.</p> <p><b>Object-outlining tools</b></p> <p>Ideally, object identification would be automatic, but this is generally difficult. The alternative—manual identification—is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised</p>

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		<p>segmentation methods along with a foreground/background model to identify objects in a restricted class of images. The images, typical of museums and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.</p> <p>We also provide semiautomatic tools for identifying objects. One is an enhanced flood-fill technique. Flood-fill methods, found in most photo-editing programs, start from a single object pixel and repeatedly add adjacent pixels whose values are within some given threshold of the original pixel. Selecting the threshold, which must change from image to image and object to object, is tedious. We automatically calculate a dynamic threshold by having the user click on background as well as object points. For reasonably uniform objects that are distinct from the background, this operation allows fast object identification without manually adjusting a threshold. The example in Figure 3 shows an object, a fox, identified by using only a few clicks.</p> <p>We designed another outlining tool to help users track object edges. This tool takes a user-drawn curve and automatically aligns it with nearby image edges. Based on the ‘snakes’ concept developed in recent computer vision research, the tool finds the curve that maximizes the image gradient magnitude along the curve.</p> <p>The spline snake formulation we use allows for smooth solutions to the resulting nonlinear minimization problem. The computation is done at interactive speeds so that, as the user draws a curve, it is ‘rubber-banded’ to lie along object boundaries. . . .</p> <p><b>Video data</b></p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by</p>

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		<p>visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“ A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.                      You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created. A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b>                      The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b>                      Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white</p>

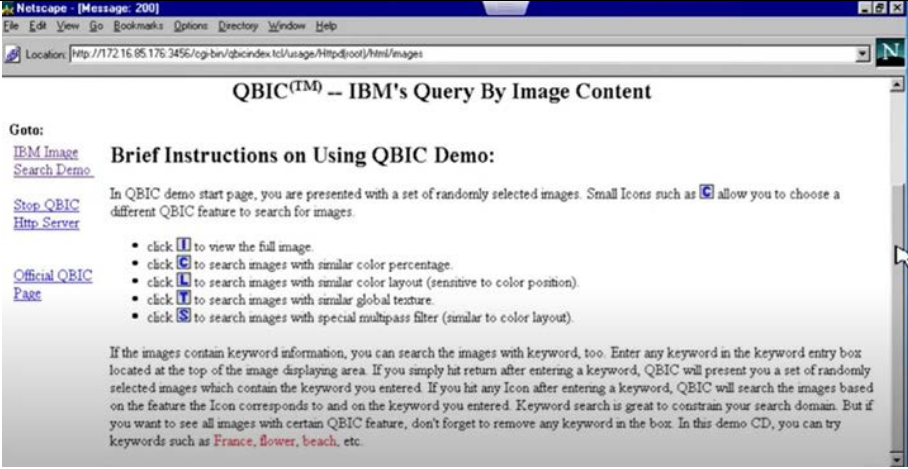
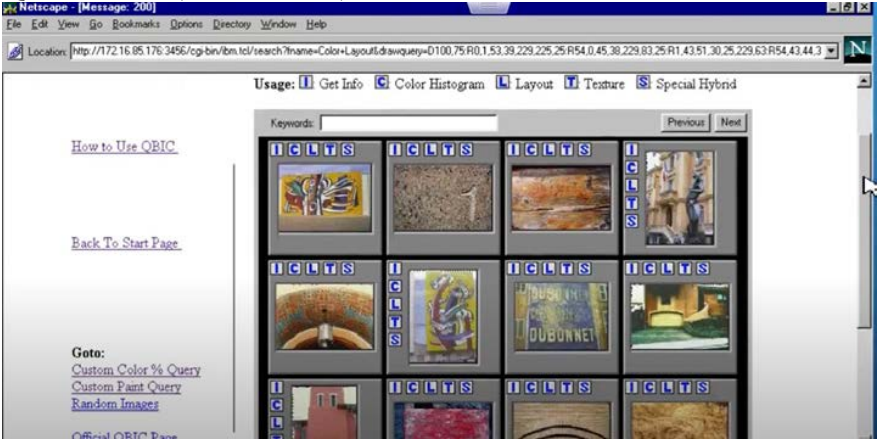
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		<p>pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b>                      The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b>                      Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.”  <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p>

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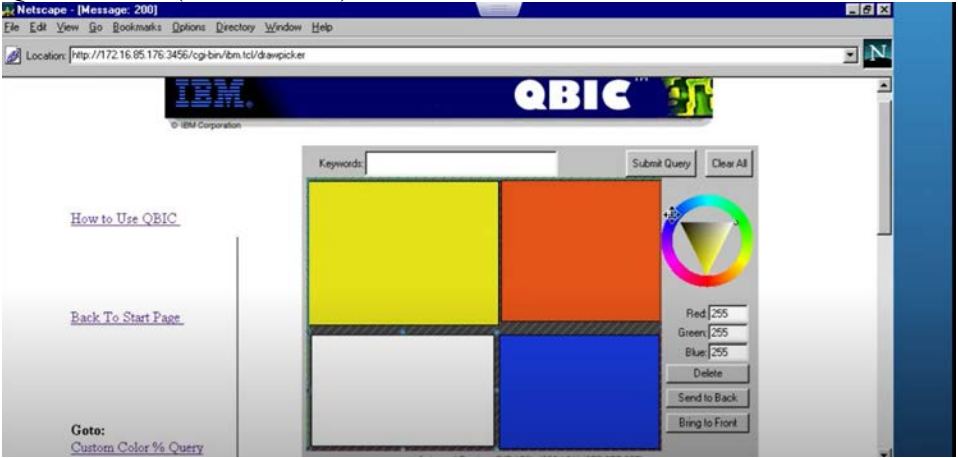
Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><b>QBIC Demo (IBM000747):</b></p>  <p><b>QBIC Demo (IBM000747):</b></p>



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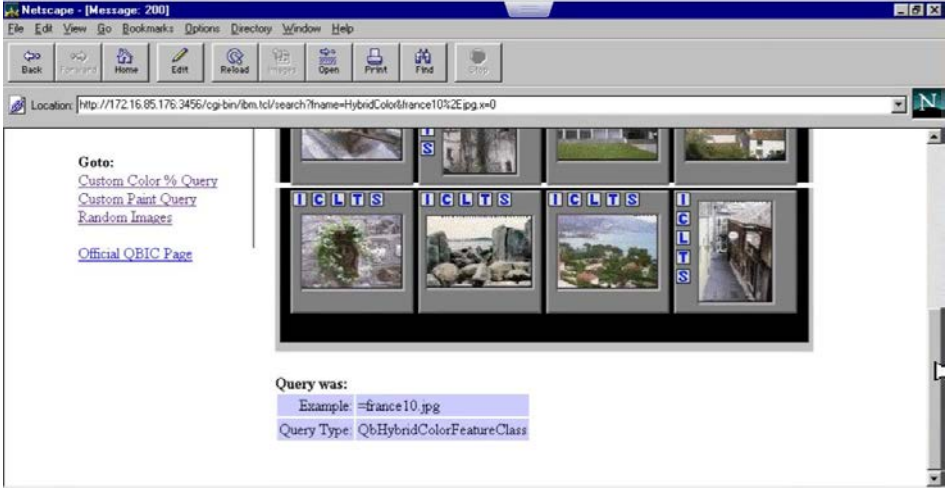
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		 <p>The screenshot shows the QBIC web interface in a Netscape browser window. The URL is <a href="http://172.16.85.176:3456/cgi-bin/ibm.tcl/histpicker">http://172.16.85.176:3456/cgi-bin/ibm.tcl/histpicker</a>. The page features the IBM logo and the text "QBIC™". Below the logo is a "Keywords:" input field and "Submit Query" and "Clear All" buttons. A central painting area shows a grid with a vertical green bar on the left and a shaded gray area. To the right of the painting area is a color wheel and three input fields for "Red: 50", "Green: 131", and "Blue: 50". Below the painting area, the text reads: "9% (255,255,255) 8% (59,131,59) 4% (106,182,106)". Further down, instructions state: "To specify your color histogram query, 'paint' a graphical representation of your pattern of colors and approximate percentages that you want. First select a percentage by clicking in the painting area to block off a rectangle of the desired size (percentage of the full area). All new regions are painted white, initially. Then select a color from the color wheel to paint your rectangle. You can also click in the painting area to remove a region."</p>
		<p>QBIC Demo (IBM000747):</p>  <p>The screenshot shows the QBIC web interface in a Netscape browser window. The URL is <a href="http://172.16.85.176:3456/cgi-bin/ibm.tcl/drawpicker">http://172.16.85.176:3456/cgi-bin/ibm.tcl/drawpicker</a>. The page features the IBM logo and the text "QBIC™". Below the logo is a "Keywords:" input field and "Submit Query" and "Clear All" buttons. A central painting area shows a grid divided into four colored blocks: yellow (top-left), orange (top-right), white (bottom-left), and blue (bottom-right). To the right of the painting area is a color wheel and three input fields for "Red: 255", "Green: 255", and "Blue: 255". Below the painting area, there are buttons for "Delete", "Send to Back", and "Bring to Front". At the bottom left, there is a "Goto:" field with the text "Custom Color % Query".</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>QBIC Demo (IBM000747):</p>  <p>Flickner Depo at 25-26:</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by research point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that                  1 right?                  2 A. That's correct.                  3 Q. Okay. And once it determined matches,                  4 what would the system do next?                  5 A. It would display them, display the image.                  6 Typically, in thumbnail form.                  7 Q. Okay. How many matches would it display?                  8 A. On the order of 20, 30. You -- you could                  9 get more. It's really an ordering of the whole                  10 database.                  11 Q. Okay. And could you vary the amounts of                  12 matches that it would return?                  13 A. Yeah.                  14 Q. Okay. And how would you vary the amount                  15 of matches?                  16 A. I think it was like a configuration                  17 related to the X Windows application that has                  18 scroll bars on it, and you can assess like how many                  19 elements you wanted into it. This is pre-Web.</p>

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		<p>Flickner Depo at 62-63:</p> <p>21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>Page 62</p> <p>1 A. They could, yeah.</p> <p>Flickner Depo at 78-79:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>6 Q. How would the Db2 universal search a                      7 query image using QBIC technology?                      8 A. You would create a -- create a manager                      9 QB- -- or create a QBIC catalog.                      10 Q. What's a QBIC catalog?                      11 A. It's an instance of a table that has a                      12 bunch of images in it.                      13 Q. And forgive me, what's an instance of a                      14 table?                      15 A. You create a table -- create a database,                      16 and then in the database you create a table and you                      17 have maybe like a file name, and then the actual                      18 image bits into it.                      19 Q. And how would you search for images using                      20 that table?                      21 A. You could search -- you could use                      22 whatever you wanted to for the -- the SQL query</p> <p style="text-align: right;">Page 78</p> <hr/> <p>1 to -- to filter, and then that would give you a                      2 list of results. And then you'd rank all of those                      3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 201:</p>

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		<p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p> <p>Flickner Depo at 159:</p> <p>10 Q. Would either version of the stamps demo</p> <p>11 allow a user to submit an unknown image as the</p> <p>12 query and ask the system to find images similar to</p> <p>13 that query image?</p> <p>14 A. I suspect it did.</p> <p>15 Q. Why do you suspect that?</p> <p>16 A. Because that's one of the nice things you</p> <p>17 can do with QBIC.</p>

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		<p>Flickner Depo at 209-210:</p> <p><sup>13</sup> Q. Okay. Let me ask -- let me ask that  <sup>14</sup> question using -- using an example.  <sup>15</sup> Say I had a file that -- that was a  <sup>16</sup> snippet of a Star Wars movie.  <sup>17</sup> Could the CueVideo system take that  <sup>18</sup> snippet of the -- of a Star Wars movie and indicate  <sup>19</sup> to the user what Star Wars movie that snippet is  <sup>20</sup> from?  <sup>21</sup> A. Most likely, yes.  <sup>22</sup> Q. And how do you know that?</p> <p><sup>1</sup> A. Based on my knowledge in content-based  <sup>2</sup> imagery -- content-based retrieval, in general,  <sup>3</sup> that would be one of the first things you would try  <sup>4</sup> to implement in a video search system.</p> <p>Flickner Depo at 75-76:</p> <p><sup>11</sup> Q. What's a Db2 universal extender?  <sup>12</sup> A. It's the extension of Db2 for other media  <sup>13</sup> types, for other types of data.  <sup>14</sup> Q. What do you mean by extension?  <sup>15</sup> Would it add functionality to the Db2  <sup>16</sup> database?  <sup>17</sup> A. Correct.  <sup>18</sup> Q. Is one of those added functionalities the  <sup>19</sup> image extender?  <sup>20</sup> A. Most likely.  <sup>21</sup> Q. What's an image extender?  <sup>22</sup> A. It's ability to image queries or</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>1 similarity queries on image data -- on image                  2 datasets.                  3 Q. Did the image extender incorporate QBIC                  4 technology?                  5 A. I believe it did.                  6 Q. Did the image extender allow a user of                  7 the Db2 universal database to search images by                  8 their content?                  9 A. I believe it did.</p> <p><i>See also</i> Flickner Depo at 21, 22-25, 54-55, 89-90.</p> <p>Flickner 8/29/23 Depo at 55–61:</p> <p>16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>

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		<p>1 would do this? 2 A. Or an annotator, yeah. 3 Q. Okay. And how would they do that? 4 A. They could do it manually or they could 5 use tools to help identify objects. 6 Q. And manually how would that work? 7 A. You look at the image and specify what 8 objects are in the image. 9 Q. And how would they specify it? 10 A. Typing in a text phrase. 11 Q. Okay. So if it was an image of a dog, 12 they could type in "dog," for example? 13 A. Yeah, exactly. 14 Q. What if there were multiple objects in the 15 image, was there a way for the user to outline or 16 demarcate those objects? 17 A. Yes. 18 Q. How would they do that? 19 A. They could just put "German Shepherd" and 20 "Retriever" to determine the type of dogs. So they 21 could do it using annotations of text -- 22 Q. Was there a way -- 23 A. -- or they could use extracting tools 24 where you could outline the object more accurately. 25 Q. So you could outline the edges of the</p> <hr/> <p style="text-align: right;">Page 57</p> <p>1 shape of the object? 2 A. Right. 3 Q. And you could do that with a manual -- the 4 user could do that with a manual tool? 5 A. Yeah.</p>	
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		<p>6 Q. Were there automatic tools that did --</p> <p>7 that did things like look for objects? So, for</p> <p>8 example, were there automatic tools that QBIC used,</p> <p>9 like edge detection or segmentation, that extracted</p> <p>10 object --</p> <p>11 A. You could --</p> <p>12 Q. -- shapes?</p> <p>13 A. You could use edge detection.</p> <p>14 Q. Okay. Did QBIC use edge detection?</p> <p>15 A. Yes, in certain aspects.</p> <p>16 Q. In what aspects?</p> <p>17 A. So on the annotation tool, if you compute</p> <p>18 gradients, you can make a better prediction of</p> <p>19 helping the person annotate.</p> <p>20 So it's very tedious to go through and</p> <p>21 annotate everything. Whereas if you have a tool,</p> <p>22 it'll tell you where it thinks the boundaries are.</p> <p>23 And you could speed up annotation quite a bit doing</p> <p>24 that.</p> <p>25 Q. So this tool that you're referring to, a</p>



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		<p style="text-align: right;">Page 58</p> <p>1 user would provide a rough outline of the object and                  2 then the tool would essentially conform that outline                  3 better to the actual object in the image?                  4 A. That was one way to do it. The other way                  5 to do it is to have the next prediction of the                  6 outline to be driven by the tool with the user                  7 input.                  8 Q. And what was the -- I assume an algorithm                  9 did that?                  10 A. Yeah.                  11 Q. Do you know the -- what algorithm was                  12 used?                  13 A. We were doing a lot of stuff with splines                  14 at the time.                  15 (Reporter seeks clarification.)                  16 A. Splines. S-p-l-i-n-e-s.                  17 Q. Okay. And what are splines?                  18 A. Splines are curves, mathematical                  19 representation of curves -- or a mathematical                  20 representation of curves.                  21 Q. And so was also any automatic tools, like                  22 Canny edge detection or any other edge detection                  23 used that didn't require assistance from the user?                  24 A. There were -- yeah, there were some that                  25 were more automatic. Some tools were more</p>	<p style="text-align: right;">Page 60</p> <p>1 that was --                  2 (Reporter seeks clarification.)                  3 A. Simple convolution filter that was used                  4 for edge detection. Sobel was an advanced version                  5 of it.                  6 Q. And what about segmentation, do you know                  7 what segmentation is?                  8 A. Yeah.                  9 Q. Okay. Segmentation, as I understand it,                  10 essentially separates foreground objects from the                  11 background. Is that a high level of explaining it?                  12 A. That's a two-class segmentation, yeah.                  13 Q. Okay. Did you do that type of                  14 segmentation to differentiate foreground objects                  15 from the background in this database population                  16 step?                  17 A. We did research prototypes of it. I don't                  18 know what all went out.                  19 Q. You don't know whether those made it into                  20 a commercial product?                  21 A. I would say they probably didn't.                  22 Q. Okay. Were they in the -- were they used                  23 in the -- in demo applications that you referred to?                  24 A. They might have been.                  25 Q. Okay. And so let's say that objects were</p>
		<p style="text-align: right;">Page 59</p> <p>1 automatic.                  2 Q. And those were in the form of algorithms?                  3 A. Yeah.                  4 Q. Do you recall any of the algorithms, the                  5 names?                  6 A. We did various edge detection stuff.                  7 Q. Okay.                  8 (Reporter seeks clarification.)                  9 A. Just various types. There were things                  10 like Sobel operators that we used --                  11 (Reporter seeks clarification.)                  12 A. Sobel.                  13 Q. How do you spell Sobel?                  14 A. S-o-b-e-l, I think.                  15 Q. Okay.                  16 A. That's one form of an edge detector.                  17 Q. Any others that you can recall?                  18 A. This is kind of image processing 101.                  19 There were Gabor filters.                  20 (Reporter seeks clarification.)                  21 Q. How do you spell that?                  22 A. G-a-b-o-r.                  23 There was . . . it's been so long. I                  24 don't remember what they call it. Very simple                  25 filters, but there's a simple convolution filter</p>	<p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                  2 with those objects? Were they stored, for example,                  3 as a separate image or were they somehow linked to                  4 or associated with the image from which they were                  5 extracted?                  6 A. Typically they were linked.                  7 Q. They were linked to the source image?                  8 A. Yeah.                  9 Q. Okay. And this was done in the database?                  10 A. Could be done in the database.                  11 Q. How was it done?                  12 A. It was probably done in a text database or                  13 some sort of key index pair database. So database                  14 has a lot of different meanings.                  15 MR. HANSEN: Text database.                  16 BY MR. EDWARDS:                  17 Q. And, Mr. Flickner, you said probably done                  18 in a text database, is that what you said?                  19 A. Yeah.                  20 MR. STRAUSSMAN: Make sure to speak up.                  21 THE WITNESS: Okay.                  22 BY MR. EDWARDS:                  23 Q. Or some sort of key index database, is                  24 that the other one?                  25 A. Yes.</p>

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		<p><i>Id.</i> at 83 – 85:</p> <p>22 Q. Okay. If you look at that second sentence                  23 there -- well, I'll read the -- I'll read the first                  24 two sentences, first two full sentences. It says,                  25 "As a result, we have devoted considerable effort to</p> <p>1 developing tools to aid in this step. In recent                  2 work, we have successfully used fully automatic                  3 unsupervised segmentation methods along with a                  4 foreground/background model to identify objects in a                  5 restricted class of images."</p> <p>6 Did I read that correctly?                  7 A. Yep.</p> <p>8 Q. And can you interpret that for me? What                  9 is -- how did -- how were segmentation methods used                  10 there?</p> <p>11 A. This is work by Harpreet Sawhney, and he                  12 had algorithms for doing segmentation. So given an                  13 input image, identify which pixels belong to which                  14 class. So this is a cup, this is a table this is a                  15 phone. It's a three-class problem.</p> <p>16 And you write algorithms that determine                  17 what the characteristics of a cup are, what the                  18 characteristics of a table is, what the                  19 characteristics of a phone cover is. And you                  20 populate those in the database.</p> <p>21 Q. And how are those populated in a database?                  22 Are those associated with the underlying image?</p> <p>23 A. Yes.</p> <p>24 Q. And that could be done for both a query                  25 image and a database image?</p> <hr/> <p>1 A. It's done for both.</p> <p style="text-align: right;">Page 85</p>

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		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9       A. Correct.              10       Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13       A. That weren't described in the articles?              14 No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11       A. Yeah. We call them features.              12       Q. Features. Okay.              13           So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16       A. For example.              17       Q. Any other ones you can think of?              18       A. Nothing comes to mind.              19       Q. But when you refer to features they at              20 least include those four; is that correct?              21       A. Yes. Well, at least includes, yeah.</p>

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		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 312-313:</p>

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		<p>21 Q. For every implementation of QBIC, if an                      22 input image has an object and the object has colors,                      23 the color histogram feature would match those stored                      24 image that include objects with similar colors;                      25 correct?</p> <hr/> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>



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		<p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>distinguish an object present in the image from others using a database that stores data characteristics of target objects;</p>	<p>QBIC discloses distinguish an object present in the image from others using a database that stores data characteristics of target objects.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images’ content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor with a texture like this one”), photo-journalism (“Give me images that have blue at the top and red at the bottom”), and many others in art, fashion, cataloging, retailing, and industry. Key issues include derivation and computation of attributes of images and objects that provide useful query functionality, retrieval methods based on similarity as opposed to exact match, query by image example or user drawn image, the user interfaces, query refinement and navigation, high dimensional database indexing, and automatic and semi-automatic database population. We currently have a prototype system written in X/Motif and C running on an RS/6000 that allows a variety of queries, and a test database of over 1000 images and 1000 objects populated from commercially available photo clip art images. In this paper we present the main algorithms for color texture, shape and sketch query that we use, show example query results, and discuss future directions.</p> <p>IBM0002390 at 2391</p>

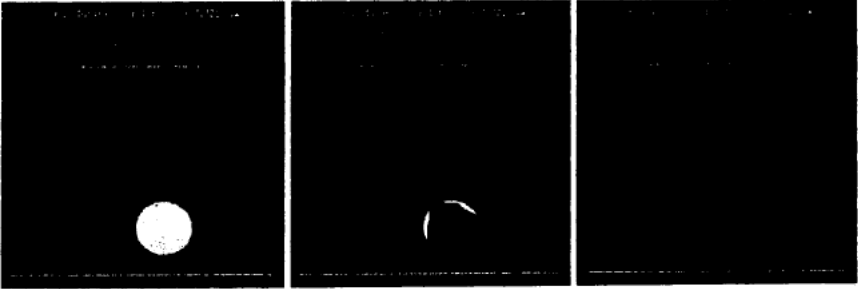
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		<p style="text-align: center;"><b>2. Operational Steps</b></p> <p>There are three logical steps in a QBIC application: database population, feature calculation, and image query.</p> <p>IBM0002390 at 2391-92</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p>

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		<p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p> <p>IBM0002390 at 2392-93</p>

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		<p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <i>MTM</i> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of <math>(2^8)^3 = 16M</math> colors, we quantize color space to 256 levels. Following [8], we initially quantize each axis in <math>R, G, B</math> to 16 levels, giving a color space of 4096 cells. We then compute the <i>MTM</i> coordinates of the center of each cell, and perform a standard, greedy, minimum sum of squares clustering [9] (pp. 235), to obtain the best 256 colors. Each color is actually the center of a “super-cell” in color space, where these supercells form a partition of the space. The image or object histogram is the normalized count of the number of pixels that fall in each of the supercells. As part of the clustering, we also compute a 4096 element table that maps any <math>(R, G, B)</math> triple to its supercell number. To compute an image or object color histogram, we take the <math>(R, G, B)</math> for each pixel, look up its cell number in the table, and increment the corresponding histogram bucket. As a final step, the histogram is normalized so that its sum is unity.</p> <p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p>

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		<p>object), and is a measure of the “peakedness” of the distribution of gradient directions in the image. There is a wide variety of texture features described in the machine vision literature, but many were inappropriate for our application due to their computational complexity or their assumptions about the homogeneity of the images being analyzed. In fact, even though the methods in [10] were the most successful published method we tried, we found that we could improve the performance in our application by modifying them to be more robust with respect to different sized and non-homogeneous images. We also modified the methods to make them more computationally feasible for the size of application we were designing for. See [11] for more details on our exact implementation.</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p>Currently, our shape features are based on a combination of heuristic shape features area, circularity, eccentricity, major axis orientation and a set of algebraic moment invariants. All shapes are assumed to be non-occluded planar shapes allowing for each shape to be represented as a binary image.</p> <p>The area is computed as the number of pixels set in the binary image. Circularity is computed as <math>perimeter^2 / Area</math> where <i>perimeter</i> is computed using bit-quad information [14]. The second order covariance matrix is computed using just the boundary pixels. From this covariance matrix the major axis orientation is the direction of the largest eigenvector. Similarly, eccentricity is computed as the ratio of the smallest eigenvalue to the largest eigenvalue [15].</p> <p>The algebraic moment invariants are computed from the first <i>m</i> central moments and are given as the eigenvalues of predefined matrices, <math>M_{[j,k]}</math>, whose elements are scaled factors of the central moments [16]. Using the notation of [16] we use moments up to degree 8 and the eigenvalues of the matrices <math>M_{[2,2]}</math>, <math>M_{[2,3]} \times M_{[3,2]}</math>, <math>M_{[3,3]}</math>, <math>M_{[3,4]} \times M_{[4,3]}</math>, <math>M_{[4,4]}</math>, <math>M_{[4,5]} \times M_{[5,4]}</math> for a total of 18 features invariant to affine transformations.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <i>w</i> the width of the image in pixels and <i>h</i> its height, we partition the image into blocks of size <math>w/64 \times h/64</math>, and if any pixel in a partition of the full size edge image is an edge pixel, the corresponding pixel in the reduced edge map is set to an edge pixel. Finally, we thin this reduced image. This gives the reduced edge map or “image abstraction” ([17]) on which the retrieval by sketch is performed.</p> <p>IBM0002390 at 2393-95:</p>

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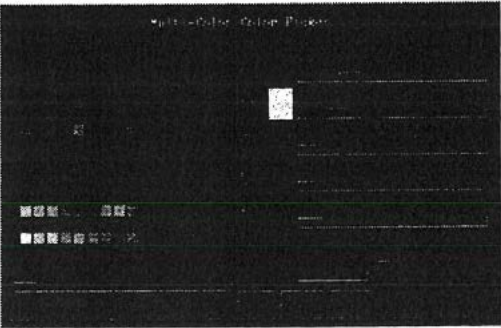
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		<p><b>2.3. Image query</b></p> <p>Once the set of features for objects and images has been computed, queries may be run. In one scenario, a query may be initiated by a user in an interactive session by specifying an object or set of object attributes and requesting images with objects “like the query object”. For example, images can be requested that contain objects whose color is similar to the color of an indicated object, or to the color selected from a color picker.</p> <p>In addition, QBIC supports “full scene” queries, or queries based on the global set of color and texture features occurring in an image. These queries avoid the need for outlining objects, simplifying the data entry. Images can be retrieved that are globally similar, in terms of color and/or texture, to a given image. Also, using a menu-based color or texture picker, a user can select a set of colors and textures and request images containing them in selected proportions.</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>



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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Based on our experience, we also found it useful for the user to be able to request images with <math>x\%</math> of color 1, <math>y\%</math> of color 2, etc. where both the percentages and the colors are explicitly specified by the user. This allows searches such as for a beach scene (25% white (for the sand) and 50% blue (for the sky and water)), and for many scenes for which the user has seen before, and for which he/she can remember approximate color percentages. The color picker that allows this type of query is shown in Figure 2.</p>  <p>Figure 2: Multi-Color Color Picker with two selected colors. The palette on the left displays the set of selectable colors. Once a color is selected, it appears in a box on the right, and the amount of the color can be specified by the sliders. In this case, 25% light blue and 15% white have been selected.</p> <p><i>Texture:</i> Texture distance is computed as weighted Euclidean distance in the three dimensional texture space. The most common weighting factors are the inverse variances for each component, computed over the</p>

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		<p>samples in the databases.</p> <p><i>Shape:</i> The matching on the shape features is done as weighted Euclidean distance where the weights are the inverse variances for each features. Any subset of the features can be selected, enabling queries that are sensitive/insensitive to selected shape properties, in particular, to object size and object orientation. Since similar moments do not guarantee similar shapes we sometimes see perceptually different matches. This fact is leading us to examine more perceptual shape measures such as curvature and turning angle.</p> <p><i>Sketch:</i> In the full scene matching we call “query by sketch”, a user roughly draws a set of dominant lines or edges in a drawing area. Images from the database with a similar set of edges are retrieved. The method, based on [17, 18], works by matching the user drawn edges to automatically extracted edges from the images in the database. The main steps of the algorithm are: (1) reduce the user sketch, which is a binary image, to size 64 by 64; (2) partition this into an 8 by 8 set of blocks, each block being 8 by 8 pixels; (3) for each image in the database, correlate each block of the sketch with a corresponding search area of size 16 x 16 in the database image; (4) compute a score for each database image as the sum of the correlation scores of each local block. The correlation in step (3) is done as a “logical binary” correlation, with specific values given on a pixel by pixel basis to edge-edge match between the user sketch and database image, edge-no edge match, no edge-no edge match, etc. Because each 8 by 8 block is spatially correlated separately, the method allows for some spatial warping between the sketch and database images.</p> <p>IBM0002390 at 2395</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “ Find all images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <i>R*</i>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>QBIC (Query by Image Content) at 1</p>



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		<p>Query by example using <i>color histograms</i></p> <ul style="list-style-type: none"> <li>Example image:                             <div> </div> </li> <li>One of the colour histograms for the example image is shown in Fig. 28.1.                             <div> </div> </li> </ul> <p><b>Colour Histogram of Image</b></p> <ul style="list-style-type: none"> <li>Store a histogram vector for each image in the database,                      compare images using mean squared difference,                      return images sorted by this metric.</li> </ul> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from</p>

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		<p>the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.</p> <p>For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen.</p> <p>Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color queries return items with matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p>

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		<p>Figure 7 shows a histogram query on still images and a color query on video r-frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right.</p> <p>Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture (pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object).</p> <p>An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects and features to implement logical And semantics.</p> <p>.....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods that identify objects automatically as in the museum image example, fast and easy-to-use</p>


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		<p>semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.</p> <p><b>INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION.</b> Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at pp. 7–8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to</p>

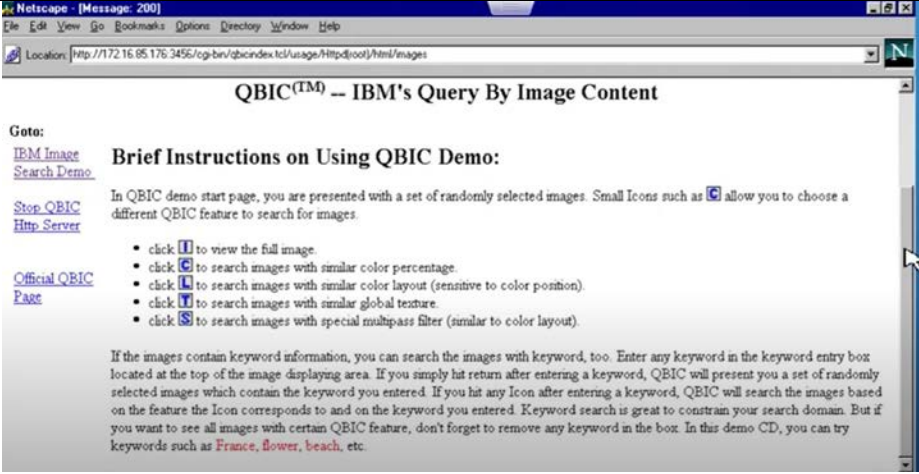
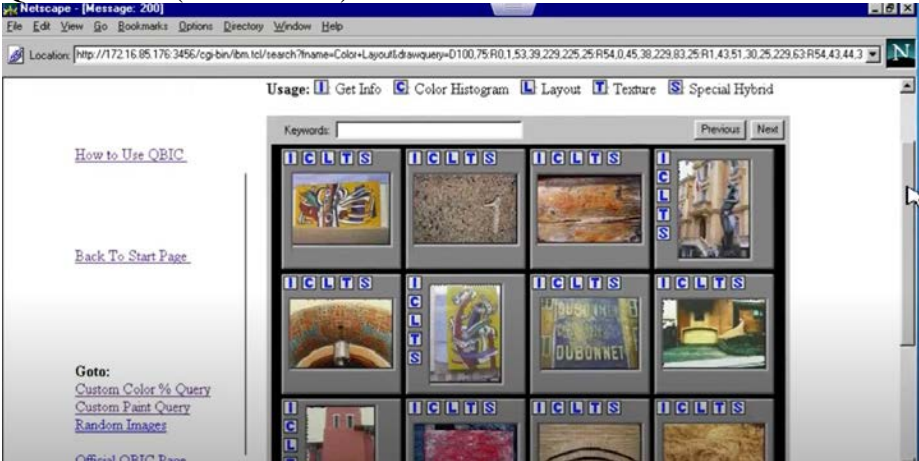
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		<p>the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>QBIC Demo (IBM000747):</p>  <p>QBIC Demo (IBM000747):</p>


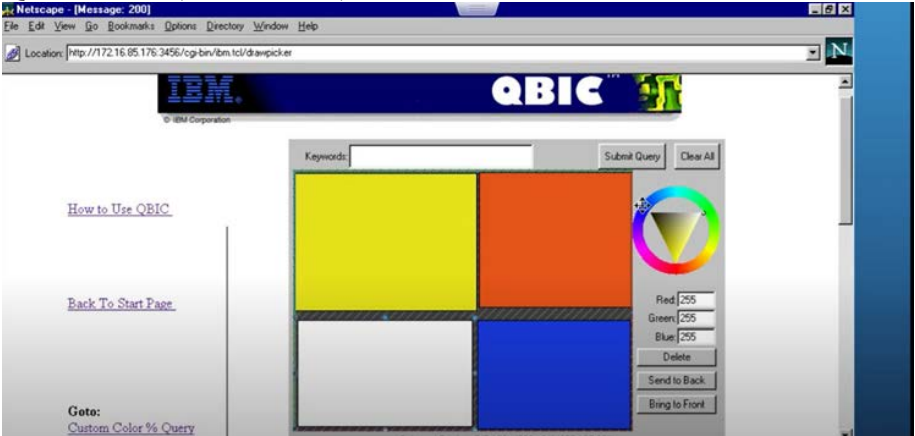
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><b>QBIC Demo (IBM000747):</b></p> 

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		<p><b>QBIC Demo (IBM000747):</b></p>  <p><b>Flickner Depo at 20:</b></p> <p>3 Q. Okay. And the steps that -- at least as</p> <p>4 I understand it -- is you'd have database</p> <p>5 population, feature calculation and image query; is</p> <p>6 that right?</p> <p>7 A. Uh-huh. Yes.</p> <p>8 Q. So let's -- let's start with database</p> <p>9 population.</p> <p>10 What was the database population step?</p> <p>11 A. It's a process of taking a set of images,</p> <p>12 and then putting them in -- into the database and</p> <p>13 the extracting the features and putting the</p> <p>14 features in the database.</p>



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		<p>20 Q. And how large were these database                      21 structures?                      22 A. In the order of 15,000 images.</p> <p>Flickner Depo at 18:                      14 A. Well, we did stuff with the San Francisco                      15 Museum, the stamps database, trademark database.                      16 So we did some of the stuff with Davis --                      17 Q. Okay.                      18 A. -- UC Davis. I remember we talked to a                      19 couple people at Davis.                      20 Q. So was this an active area of research in                      21 the 1990s?                      22 A. Yeah.</p> <p>Flickner Depo at 36:                      10 Q. So underlying this paper, you mentioned                      11 you did more work on the shape side of things; is                      12 that right?                      13 A. I did.                      14 Q. And what would that work have entailed?                      15 A. We wanted to query by shape.                      16 Q. Okay. And how would that have worked?                      17 A. We created features related to the shape                      18 of a -- the object of -- as it populated the                      19 database, and then we would query against those                      20 features.</p>

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		Flickner Depo 38-41:	
		<p>1 project at this time?                  2 A. I don't know that.                  3 Q. Okay. Would reviewing -- let's see.                  4 Let's turn to page -- let's turn to page -- this                  5 one is Bates-stamped, so the page ending in                  6 Network1_007316.                  7 Would reviewing this page refresh your                  8 recollection as to whether --                  9 A. Yes.                  10 Q. Okay. Perfect. Feel free.                  11 MR. DeCLERCK: Just give him a chance to                  12 finish his question before you respond.                  13 MR. DANG: Thank you.                  14 THE DEPONENT: Is there a question                  15 standing?                  16 Q. (By Mr. Dang) Sure. Yeah.                  17 So was there any video search                  18 functionality included as part of the QBIC system                  19 at this time?                  20 A. Evidently, yes.                  21 Q. Okay. And how did that video search                  22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using                  2 those images.                  3 Q. Okay. Could you take as -- as you did in                  4 the query by image search system, could you just                  5 search a video using this system?                  6 A. You could search for a key frame and that                  7 could point you to a video.                  8 Q. As an input into the system, could you                  9 search -- could you input a whole video and then                  10 the system would extract the key frames and then --                  11 A. Yes.                  12 Q. -- search that using that?                  13 A. If I recall correctly, yes.                  14 Q. Okay. And the way -- the method by which                  15 it did so, as you mentioned, was -- would it                  16 extract key frames from the video, extract features                  17 from those key frames, and then search those                  18 features; is that right?                  19 A. Correct.                  20 Q. Okay. Other than the use of shots and                  21 key frames, is there any difference between the                  22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>
		<p>1 A. You detect shots in -- transitions in                  2 video and then treat -- treat those as still images                  3 in the QBIC system.                  4 Q. So to break that down, you -- what do you                  5 mean by detecting shots?                  6 A. You try to find some key frame in a video                  7 sequence or multiple key frames in a video                  8 sequence, to give you a summarization of the video.                  9 Q. And how would you detect those key                  10 frames?                  11 A. There were algorithms to do it. I didn't                  12 personally work on any of those algorithms.                  13 Q. Are you otherwise aware of any of those                  14 algorithms?                  15 A. Well, they used histogram methodologies.                  16 I remember that.                  17 Q. Okay. So you would take -- you would use                  18 a histogram methodology to extract key frames from                  19 the video; is that what -- is that right?                  20 A. That's one way to do it.                  21 Q. Okay. And then what would you do with                  22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?                  2 A. There may have been.                  3 Q. Can you think of any now?                  4 A. No.                  5 Q. When you searched for -- or when you                  6 searched a video using this system, what would                  7 the -- or what would the system return?                  8 A. I don't remember if we returned the                  9 stills or a small -- small video clip.                  10 Q. Say it returned the stills, could you use                  11 those stills to point you to a video?                  12 A. Yeah.                  13 Q. And how would you do that?                  14 A. Well, the -- each -- each key frame                  15 typically represents a frame in the video. So                  16 there's a -- the key frame is -- is one frame of                  17 the video so you just seek to that point.                  18 Q. So if I'm understanding this right, you                  19 could take a query video, the system would extract                  20 frames, which would then extract features from it,                  21 and then the system would return either shot clips                  22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>

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		<p>Flickner Depo at 142:</p> <p>1 Q. Do you recall what type of indexing was                  2 used in the database associated with the 1998 demo                  3 version?                  4 A. Most likely, it was just a linear index.                  5 Q. And what do you mean by linear index?                  6 A. You just -- you -- you compute the                  7 features on every record in the database -- you                  8 compare the features against every record in the                  9 database.</p> <p>Flickner Depo at 168-169:</p> <p>16 Q. What do you mean that it lets you access                  17 the -- the neighbors to your query point?                  18 A. So your incoming query -- say it's an                  19 image -- you compute a feature vector. And then                  20 you compute some orthogonal transform of the                  21 feature vector such as a wave transform or                  22 wavelets. There's a variety --</p> <p style="text-align: right;">Page 168</p> <hr/> <p>1 MR. DeCLERCK: Slow down, please.                  2 THE DEPONENT: Wavelets, other types of                  3 features that do dimensionality reduction. And                  4 then you put the reduced dimensionality feature                  5 vector into the database, and then the database                  6 queries and R*-tree to be able to get points nearby                  7 to the -- in the lower dimensional space.</p>

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		<p>Flickner Depo at 181:</p> <p>5           A. I do not recall the -- the UI parts of</p> <p>6           it.</p> <p>7           Q. And earlier you -- you mentioned a query</p> <p>8           engine.</p> <p>9                     What did you mean by that phrase?</p> <p>10          A. The architecture QBIC was client server.</p> <p>11          There were -- there's an API to query the database,</p> <p>12          and there was a GUI then to display and control</p> <p>13          through the creation of the queries.</p> <p>14                 The GUI evolved because when we started,</p> <p>15          there was no Web. This would have been even</p> <p>16          pre-1990. So all the original versions used the</p> <p>17          X Window system. But as the Web came online, we --</p> <p>18          we migrated the -- the GUI part to the Web.</p> <p>Flickner Depo at 48-49:</p> <p>4           Q. What feature extraction methods did the</p> <p>5           UC Davis implementation of QBIC rely on?</p> <p>6           A. It was similar to the other texture,</p> <p>7           shape, color and layout.</p> <p><i>See also</i> Flickner Depo at 22-25, 25-26, 54-55,75-76, 78-79, 88-89, 91-92, 159, 201-202, 209-210.</p> <p>Flickner 8/29/23 Depo at 33-37:</p>

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		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and  2 then you could send that sketch in and you'd get  3 images of a sun in the trees.  4 Q. And if I refer to images, can I -- let  5 me -- let me back up.  6 Earlier you talked about both still images  7 and video were part of your responsibilities for  8 these architecture interfaces; correct?  9 A. Correct.  10 Q. Okay. If I refer to "images," do you  11 understand that is including both a still image or,  12 for example, a frame of a video image?  13 A. Sure.  14 Q. Okay. So when I say "image," I'm  15 including both in my questions from now on out.  16 A. Okay.  17 Q. Okay?  18 A. Okay.  19 Q. In terms of running analytics, that would  20 include both extracting these characteristics from a  21 query image and from an image that you're storing in  22 a database; correct?  23 A. Can you rephrase.  24 Q. Yes. So the comparison that you're doing  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.  2 When you refer to features, does it  3 include at least color, texture, shape and sketch?  4 A. Or a subset thereof.  5 (Reporter seeks clarification.)  6 A. Or a subset thereof.  7 So you could do just color queries, you  8 could do just shape queries, you could do just --  9 you didn't need to have all the feature sets in  10 all -- in every query.  11 Q. Understood. But would a user have the  12 option to query at least those four features?  13 A. Yes.  14 Q. Okay.  15 A. For their QBIC system, that's true.  16 Q. And then I believe the last area you  17 indicated you were responsible for was architecture  18 interface for saving images; is that right?  19 A. Correct.  20 Q. And what did that entail?  21 A. It's both saving images and saving  22 features. That was to define the API, so you would  23 give it a feature, and it would write the feature in  24 a database or into a file.  25 Q. Would that also include saving any</p>	
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're  2 querying image 1 to determine if there are images in  3 the database that have similar features; is that  4 right?  5 A. Correct.  6 Q. Okay. And the analytics that you're  7 talking about, where you extract these characters  8 from the image, that is -- those run on both the  9 query image and the images that are stored in the  10 database; is that right?  11 A. Yeah. We call them features.  12 Q. Features. Okay.  13 So when you say "features," you're talking  14 about the features that we talked about before:  15 Color, texture, shape, sketch?  16 A. For example.  17 Q. Any other ones you can think of?  18 A. Nothing comes to mind.  19 Q. But when you refer to features they at  20 least include those four; is that correct?  21 A. Yes. Well, at least includes, yeah.  22 Q. Is that correct? I'm sorry, I didn't --  23 you trailed off, so I -- that's why I reasked it.  24 A. Yeah.  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example  2 like any text description about the image?  3 A. Yeah. Text is just another feature here.  4 Q. Text is another feature?  5 A. Yeah.  6 Q. I understand when the images were saved,  7 thumbnails were saved of those images; is that  8 correct?  9 A. Typically, yeah.  10 Q. And was that a part of your  11 responsibilities, to architect the interface for  12 saving images?  13 A. Saving . . . hmm. Can you rephrase.  14 Q. What's -- what was confusing about my  15 question?  16 A. I just need you to repeat it.  17 Q. Oh. One of the areas you mentioned that  18 you were responsible for was to architect the  19 interface for saving images.  20 My question is, as part of that  21 responsibility, did that include architecting the  22 features related to saving thumbnails associated  23 with those images?  24 A. The thumbnail is an extracted feature.  25 Q. Okay. So is that a "yes"?</p>	

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		<p><i>Id.</i> at 52–53:</p> <p>12 Q. Underneath there's a sentence that says,                      13 "There are three logical steps in a QBIC                      14 application: Database population, feature                      15 calculation, and image query."                      16 Do you see that?                      17 A. Yeah.                      18 Q. You agree with that?                      19 A. Yeah.                      20 Q. All right. Well, let's talk about the                      21 first step, database population.                      22 What is database population?                      23 A. It's taking a set of images, extracting                      24 the features and putting them in a database.                      25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that                      2 in the database as well?                      3 A. Could be.                      4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      10 also add the image to the database, preparing a                      11 reduced thumbnail and adding any available text                      12 information to the database.                      13 A. Yep.                      14 Q. Is that correct?                      15 A. Yep.</p> <p><i>Id.</i> at 77–78:</p>

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		<p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99:</p> <p>20 Q. So for each of color, texture, shape,</p> <p>21 sketch, there are algorithms that are performing</p> <p>22 some mathematical computation to calculate those</p> <p>23 features; is that right?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's talk about the color</p>



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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two                  2 different color computations that are done. One is                  3 average color, the other is color histogram; is that                  4 right?                  5 A. There certainly are those two.                  6 Q. Say again.                  7 A. There certainly are those two.                  8 Q. Okay. And for average color, let's talk                  9 about that first, it says [as read], "We compute the                  10 average," and it lists four things, "(R, G, B), (Y,                  11 i, q), (L, a, b), and MTM coordinates of each object                  12 and image."                  13 You see that?                  14 A. Yep.                  15 Q. So does that mean that it does -- every                  16 time it -- if it computes average color, it computes                  17 all four of those things? Or are those optional,                  18 meaning that it can compute one as opposed -- or                  19 some combination of those four?                  20 A. Some combination of those four.                  21 Q. Okay. Are there different algorithms for                  22 each of those four or is it the same algorithm?                  23 A. RGB, Yiq and LAB are all linear                  24 transformations.                  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed                  2 over time going forward from 1993?                  3 A. Most likely they did.                  4 Q. Do you recall any details for how they may                  5 have changed?                  6 A. No.                  7 Q. Do you know if functionality was added to                  8 compute average color?                  9 A. No.                  10 Q. Do you -- do you recall any other                  11 algorithms or methodologies that were used besides                  12 the four that are listed here?                  13 A. No.                  14 Q. Okay. Second methodology to compute color                  15 is referred to as color histogram here; is that                  16 correct?                  17 A. Yes.                  18 Q. And so at a high level can you explain to                  19 me what a color histogram is?                  20 A. A histogram is a count of each value. And                  21 so, for example, if you have 1, 2, 3 as a value and                  22 you say 1, 2, 3 again, the histogram would say 2                  23 because there are two 1s, two 2s, and two 3s. So                  24 it's a count of the number of values across the                  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my                  2 head.                  3 Q. That's something different from a linear                  4 transformation?                  5 A. It might be a different linear                  6 transformation. I don't recall.                  7 Q. Okay. So for average color, the                  8 algorithms will compute that based on some                  9 combination of those four methodologies?                  10 A. Yes.                  11 Q. Okay. Do you know if those methodologies                  12 evolved over time? So this -- so, for example, this                  13 argu- -- excuse me -- article was written in 1993.                  14 Do you know if the way in which QBIC computed                  15 average color changed over time or did it stay the                  16 same?                  17 MR. STRAUSSMAN: Objection; compound.                  18 MR. EDWARDS: Let me rephrase.                  19 THE WITNESS: I don't recall.                  20 MR. EDWARDS: Let me rephrase.                  21 BY MR. EDWARDS:                  22 Q. So this article was written in 1993, and                  23 it lists four methodologies for computing average                  24 color features.                  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?                  2 A. Pixels, color.                  3 Q. So is it measuring the probability                  4 density --                  5 A. It's a --                  6 Q. -- of a color being in an image?                  7 A. It's a PDF estimator.                  8 Q. And what does PDF stand for?                  9 A. Probability density function.                  10 Q. Okay. Once the color histogram is                  11 computed, is it normalized after that?                  12 A. Yes, it was normalized.                  13 Q. And why did you normalize the color                  14 histogram?                  15 A. Because different images would have                  16 different color balances.                  17 (Reporter seeks clarification.)                  18 A. Balances, yeah.                  19 Q. Is a -- is a reason why you normalize the                  20 color histogram in -- for stored images -- well,                  21 strike that.                  22 Did you -- did you normalize color                  23 histograms when you extract -- strike that.                  24 When you calculated the color histogram                  25 features from a query image and a stored image, is</p>

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>

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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or          2 more of these features than the other?          3 A. Yes.          4 Q. Which one?          5 A. Shape.          6 Q. Okay.          7 (Witness reviews document.)          8 A. So one thing I can state is originally I          9 couldn't remember the name of the edge operator --          10 and the name is Canny, the Canny edge operator --          11 when we were talking about finding edges.          12 Q. Okay. So this -- the paragraph on          13 IBM 2393 refreshed your memory that shape          14 calculation used Canny edge detection?          15 A. No, that's sketch.          16 Q. Oh, I'm sorry.          17 A. I'm just stating that originally I was          18 asked a question about standard edge operators. I          19 couldn't remember the name. The name was Canny.          20 Q. Canny. And Canny is used in the sketch          21 calculation?          22 A. Yeah, it's used in the sketch calculation.          23 Q. Understood. Okay. Let's go back to          24 shape.          25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.          2 Q. Can you say the name of the word again?          3 A. I think it's called perround.          4 Q. Per round?          5 A. Yeah.          6 Q. Those -- are those two words, p-e-r,          7 r-o-u-n-d?          8 A. P-e-r -- one word.          9 Q. Okay. Perround, one word.          10 A. It's basically the perimeter squared over          11 area.          12 (Reporter seeks clarification.)          13 A. Perimeter squared over area.          14 (Reporter seeks clarification.)          15 A. Length of the -- over area.          16 Q. Okay. So let's step back a little bit.          17 So it says -- the second paragraph says [as read],          18 "Our shape features are based on a combination of          19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features          20 area, circularity, eccentricity, major access          21 orientation and a set of algebraic moment          22 invariants," i-n-v-a-r-i-a-n-t-s.          23 Did I read that correctly?          24 A. Um-hum.          25 Q. Okay. For circularity, that is computed</p>
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.          2 To calculate the shape feature in a query          3 image or a stored database image, is the first step          4 to convert that image into a binary image?          5 A. I don't think so.          6 Q. So if you look at the second paragraph --          7 and the reason why I ask is -- it's the second          8 sentence in the second paragraph under "Shape          9 features." It says [as read], "All shapes are          10 assumed to be non-occluded planar shapes allowing          11 for each shape to be represented as a binary image."          12 See that?          13 A. Yeah.          14 Q. And then the next sentence says [as read],          15 "The area is computed as the number of pixels set in          16 the binary image."          17 A. Right.          18 Q. So that's why I ask is it the first step          19 in calculating shape to convert the image to binary?          20 A. Yes.          21 Q. And then once you convert it to binary          22 image, then what do you do next in order to          23 calculate the shape?          24 A. You're computing something called          25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?          2 A. Right.          3 Q. All right. Area is the number of pixels          4 in the binary image?          5 A. In the binary blob.          6 Q. In the binary what?          7 A. Blob.          8 Q. Blob. And when you say "blob," what does          9 that refer to?          10 A. The outline of the object that you're          11 doing a shape query on.          12 Q. And so are each of these, area,          13 circularity, eccentricity, major axis orientation          14 and algebraic moment invariants, are those each          15 different algorithms or is it all the same          16 algorithm?          17 A. It's different algorithms.          18 Q. Okay. And since you worked on the shape          19 feature the most, do you recall any other details          20 that are not disclosed in this paragraph?          21 A. Well, this evolved and we ended up doing          22 an implementation of something that's not in here.          23 Q. Okay. And what was that implementation?          24 A. Something called turning angle per round,          25 turning angle, which is -- it looks at the tangent</p>

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		<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So</p> <p>2 you're computing the turning angle. You're</p> <p>3 computing this angle that represents a shape in a</p> <p>4 very interesting way.</p> <p>5 They don't seem to be very good for</p> <p>6 human -- so if you asked a human whether these two</p> <p>7 shapes are similar, they would say "yes," but under</p> <p>8 that feature set.</p> <p>9 Q. And you call that something per round?</p> <p>10 What was the name of it? Started with a T.</p> <p>11 Turrent?</p> <p>12 A. Turning angle.</p> <p>13 Q. Oh, turning angle.</p> <p>14 A. Yeah.</p> <p>15 Q. Well, it said -- your answer -- you did</p> <p>16 say turning angle, but you said something called</p> <p>17 something per round, and it started with a T. I</p> <p>18 thought you said turrent, but maybe I misunderstood.</p> <p>19 MR. STRAUSSMAN: Tangent?</p> <p>20 THE WITNESS: Tangent angle, yeah.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Okay. So something called tangent per</p> <p>23 round, is that what you would call it, this --</p> <p>24 A. No.</p> <p>25 Q. -- this implementation?</p>	
		<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle.</p> <p>2 Q. Okay. So the name of the new</p> <p>3 implementation you're talking about for shape</p> <p>4 calculation is called turning angle?</p> <p>5 A. It used turning angle as a major feature.</p> <p>6 Q. Okay. Was there any other name it went</p> <p>7 by?</p> <p>8 A. I don't recall.</p> <p>9 Q. All right. And that was -- that</p> <p>10 methodology was implemented to calculate shape on a</p> <p>11 query image and an image stored in the database post</p> <p>12 this article?</p> <p>13 A. Yes.</p> <p>14 Q. Was that the -- did that -- did that</p> <p>15 implementation, the turning angle, did that replace</p> <p>16 the methodology in this article or was it</p> <p>17 supplementing the metho- --</p> <p>18 A. Supplementing.</p> <p>19 Q. Okay. Other than turning angle, were</p> <p>20 there any other methodologies used after this</p> <p>21 article?</p> <p>22 A. Not that I recall.</p> <p>23 Q. Okay. Okay. Let's go sketch features, if</p> <p>24 you take a look at that and then let me know when</p> <p>25 you're done reading it.</p>	

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Element	'529 Claim Recitation	Exemplary Citations in Reference				
		<p><i>Id.</i> at 119–128:</p> <table border="0"> <tr> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p> </td> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p> </td> </tr> </table>	<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. 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 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then          2 you're looking for blue water, white sand.          3 BY MR. EDWARDS:          4 Q. Do you recall what the methodologies          5 used -- that were used to calculate the orientation          6 of those colors in the image?          7 MR. HANSEN: Objection; lacks foundation.          8 THE WITNESS: There's no orientation per se.          9 It's just position.          10 BY MR. EDWARDS:          11 Q. Well, then position. Do you recall what          12 the methodologies are to calculate the position?          13 MR. HANSEN: Same objection.          14 THE WITNESS: Position is something the user          15 inputs.          16 BY MR. EDWARDS:          17 Q. Something you use what?          18 A. The user had to input.          19 Q. Okay. And then let's move on to the next          20 one, T. It says, "Click T to search images with          21 similar global texture."          22 A. Yeah.          23 Q. Do you recall, in your work on the QBIC          24 project, a feature called global texture that could          25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?          2 A. G-a-b-o-r.          3 Q. So switch over and look at the second page          4 of this Exhibit 6.          5 So -- well, first back -- go back to -- go          6 back to the first page. If you see on the left-hand          7 side it says, "Goto: IBM Image Search Demo," and a          8 little finger there is clicking it.          9 You see it's in red?          10 A. Yeah.          11 Q. Okay. So that's clicking on that link.          12 And then the second page is going to the IBM image          13 search demo.          14 A. Okay.          15 Q. Okay? On the second page it is showing          16 thumbnails with the different icons that we just          17 walked through, I, C, L, T, S, on each of those          18 icons.          19 Do you see that?          20 A. Yep.          21 Q. Do you recognize this as a similar layout          22 to the QBIC demos you hosted in the '90s?          23 A. I don't.          24 Q. You don't?          25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .          2 Q. Say again?          3 A. I missed one of your words. A feature          4 called what?          5 Q. I said do you recall in your work on the          6 QBIC project a feature called global texture that          7 was extracted from the image?          8 A. Yes.          9 Q. Okay. Is that -- is that akin to texture          10 that we looked at earlier?          11 A. Yes.          12 Q. Okay. And the last one is S. It's,          13 "Search images with special multipass filter."          14 Do you recall, in your work on the QBIC          15 project, being able to calculate a feature called          16 multipass filter?          17 A. Probably Gabor functions.          18 Q. Say again?          19 A. Gabor functions.          20 Q. One more time and louder.          21 A. Gabor functions.          22 Q. Gabor functions. Okay. What are Gabor          23 functions?          24 A. Gabor functions are a way of producing          25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM          2 website that was the AIX operating system in          3 Exhibit 3, that did not have a similar thumbnail          4 layout like this?          5 A. A thumbnail, yes. I don't recall it had          6 the buttons, the I, C, L, T, S.          7 Q. You don't recall it had all the buttons or          8 some of the buttons?          9 A. All the buttons.          10 Q. Okay. So you don't recall that it had any          11 buttons?          12 A. I don't -- yeah. I don't recall.          13 Q. It could have, it couldn't have, you just          14 don't remember?          15 A. I just don't remember, yeah.          16 Q. Okay. But the one that you hosted on          17 IBM's website, it did have thumbnails in a similar          18 format here?          19 A. Yeah, it had thumbnails.          20 Q. And these thumbnails represent the images          21 that are stored in the database?          22 A. Yes.          23 Q. Okay. Here, the 470 images would be          24 reflected at least -- one, two, three, four, five,          25 six, seven -- eight of them right here in this</p>



*Nantworks, LLC v. Bank of America Corporation*

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Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

Element	'529 Claim Recitation	Exemplary Citations in Reference				
		<table border="1"> <tr> <td> <p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p> </td> <td> <p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p> </td> </tr> <tr> <td> <p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p> </td> <td> <p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p> </td> </tr> </table> <p><i>Id.</i> at 135 – 136:</p>	<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>	<p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on</p> <p>2 that image in the top left corner, what happens, in</p> <p>3 the second page?</p> <p>4 A. The database returned the top 10 -- or it</p> <p>5 ordered the images and it returned the top K based</p> <p>6 on the vector distance or the feature distance</p> <p>7 related to what was computed and stored in the</p> <p>8 database and what's recorded. This is an N database</p> <p>9 image. It represents -- it always matches itself</p> <p>10 perfectly.</p> <p>11 Q. Okay. So in the -- in the demo that you</p> <p>12 hosted on IBM's website in the '90s, did it have a</p> <p>13 similar functionality where you could click on the</p> <p>14 thumbnail and it would -- it would return matches?</p> <p>15 A. Yeah.</p> <p>16 Q. And what would you click on on the one on</p> <p>17 the website?</p> <p>18 A. I don't remember exactly how the user</p> <p>19 interface worked.</p> <p>20 Q. But you could have -- you could click</p> <p>21 something akin to color histogram --</p> <p>22 A. Yes.</p> <p>23 Q. -- or texture or things like that?</p> <p>24 A. Yes.</p> <p>25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to</p> <p>2 mark it as Exhibit 8.</p> <p>3 (Deposition Exhibit 8 was marked.)</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And, again, Mr. Flickner, I'll represent</p> <p>6 this is a screenshot from the QBIC demo on the CD</p> <p>7 IBM 747 produced by your counsel.</p> <p>8 A. Okay.</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>
<p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. And the second page are the results</p> <p>24 of that color histogram query from the first page.</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?</p> <p>2 A. Yes.</p> <p>3 Q. Okay. So the querying image is the top</p> <p>4 left image; is that right?</p> <p>5 A. I think so, yeah.</p> <p>6 Q. Well, go back to the first page.</p> <p>7 A. It's the match, yeah.</p> <p>8 Q. So you click C on that first image, and</p> <p>9 when you -- when you do that, that image that's</p> <p>10 being queried for color histogram remains in the top</p> <p>11 left box; is that right?</p> <p>12 A. Yeah.</p> <p>13 Q. And then the image that's immediately to</p> <p>14 the right of that, is that the best match out of the</p> <p>15 images in the database?</p> <p>16 A. That would -- yes.</p> <p>17 Q. And then the image immediately to the</p> <p>18 right of that one is the second best match?</p> <p>19 A. Yes.</p> <p>20 Q. And so on and so forth?</p> <p>21 A. Yes.</p> <p>22 Q. And when we say "match" we're talking</p> <p>23 about in terms of the color histogram features?</p> <p>24 A. Yeah.</p> <p>25 Q. Okay. Okay. Last one.</p>					
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p><i>Id.</i> at 139–165:</p>



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		<p>5 Q. And for the image that you use as a base</p> <p>6 for the query, the things we all talked about in</p> <p>7 terms of feature extraction for average color, color</p> <p>8 histogram, shape, texture, sketch, all of those</p> <p>9 things, the same algorithms would be used in order</p> <p>10 to extract those features from the image query?</p> <p>11 A. They're different algorithms. You would</p> <p>12 use an algorithm.</p> <p>13 Q. I'm sorry. Say that again?</p> <p>14 A. The algorithms are different between the</p> <p>15 shape features and the color features and sketch</p> <p>16 features.</p> <p>17 Q. Yeah. Understood. What I'm trying --</p> <p>18 what I'm trying to understand is, the process that</p> <p>19 we talked about before, when you populate the</p> <p>20 database and you extract the features from the</p> <p>21 images that are stored in the database.</p> <p>22 You know, we went through all those</p> <p>23 different algorithms that are used for shape, color,</p> <p>24 both average color and histogram, texture and</p> <p>25 sketch.</p>

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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>

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		<p style="text-align: right;">Page 142</p> <p>1 QBIC system would uncompress it?  2 A. Yep.  3 Q. And then it would extract whatever feature  4 you want from that uncompressed image?  5 A. Correct.  6 Q. And then those extracted features from the  7 uncompressed JPEG image are used in the matching  8 process?  9 A. Correct.  10 Q. Okay. And you were using -- you were  11 doing this for JPEG image -- or the QBIC system was  12 doing this for JPEG images in the -- in the '90s?  13 A. Yes.  14 Q. Okay. So once the system -- now, we're  15 only talking about image-based queries, image using  16 as input for the queries.  17 Once you submit an image for the query, if  18 it's a -- you do your preprocessing that need to be  19 done. Features are extracted. So now we've got  20 just the extracted features, whatever those are.  21 What happens with those extracted features  22 next?  23 A. They're put in the database and then  24 potentially there are indexes built that help you do  25 fast search against those features.</p>	<p style="text-align: right;">Page 144</p> <p>1 that does a comparison for say texture?  2 A. You say the matching algorithm?  3 Q. Correct.  4 A. Yes, they could be different.  5 Q. Well, let's talk about them. We can get  6 into detail here.  7 Well, before we -- before we get there, so  8 how does the QBIC system display the results of  9 matches to the user?  10 A. Typically just thumbnails in a window in  11 multiple ordered hits.  12 Q. Okay. And it displays them in the order  13 by which they're most similar. So the, you know,  14 best match to the next best match to the next best  15 match, so on and so forth?  16 A. Correct.  17 Q. Okay. And you said the system determines  18 similarity based on some distance measure between  19 the extracted features in the image query versus the  20 stored image?  21 A. The features of the stored image.  22 Q. But it's a -- it's some sort of distance  23 measure?  24 A. Yes.  25 Q. Okay. So let's go back to Exhibit 2.</p>
		<p style="text-align: right;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm  2 talking about for a query, so I'm taking an image  3 and submitting it to a system as a query.  4 A. Query by example.  5 Q. Query by example. Okay. Once those  6 features extracted for that image, what happens next  7 in the process?  8 A. You take the feature vector and you  9 present it to the database and say return the best  10 matches to this feature vector.  11 Q. Okay. So the system would compare -- the  12 QBIC system would compare the features that are  13 calculated from the input image to stored calculated  14 features of the images in the database and come up  15 with a match?  16 A. Yes.  17 Q. Okay. And those matches would be sorted  18 or arranged in order of most similar?  19 A. Yes.  20 Q. And would algorithms do these comparisons?  21 A. Yes.  22 Q. Would it be a different algorithm for each  23 of the features? So, for example, would there be an  24 algorithm that does the comparison for color  25 histogram and then there's a different algorithm</p>	<p style="text-align: right;">Page 145</p> <p>1 So if you turn to page IBM 2393 and  2 rolling over to IBM 2395, that's a discussion on the  3 image query. And so what I want to do -- I have a  4 couple high-level questions, but then I want to walk  5 through each one. Color starts on 2394, then  6 texture and then shape and sketch are on 2395.  7 So in terms of the -- in terms of the  8 distance measure, Mr. Flickner, if -- I know you  9 said that the results are termed based on those that  10 are most similar but it could come up with something  11 that's an exact match; is that right?  12 A. It's possible.  13 Q. Like the distance measure, the result  14 would be zero if it was an exact match; right?  15 A. Typically you'd get that only if you had  16 the query image the same as a result image.  17 Q. Right. But that's a possibility?  18 A. Yeah.  19 Q. Okay. So let's take a look at color --  20 it's on -- starting at the top of 2394. You know,  21 take your time and read that and then I want to ask  22 you some questions about it.  23 (Witness reviews document.)  24 A. Okay.  25 Q. Okay. So let's first start with average</p>

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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between                  2 the query image and the database image using                  3 weighted Euclidean distance; is that right?                  4 A. Yep.                  5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.                  6 And can you just tell us at a high level                  7 what -- if you can -- what Euclidean distance is?                  8 A. So if you have multiple features or                  9 multiple scaler features, you have to ask the                  10 question I'm trying to build a distance from that                  11 vector to a query vector.                  12 And as you build that -- the distance, you                  13 have -- you may want to weight different elements of                  14 the vector differently. And we found out that using                  15 variance normalization, where weights of the                  16 variance of the feature, gave good aesthetic                  17 results.                  18 (Reporter seeks clarification.)                  19 A. Aesthetic results.                  20 Q. And I apologize, I couldn't hear what you                  21 said. You said, "And we found out that using                  22 variance" . . .                  23 A. So you normalize each feature with its                  24 variance.                  25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)                  2 Q. Well, let me ask my -- let me get my                  3 question out first.                  4 So we talked about the features for                  5 average color before are RGB, Yiq, LAB and MTM.                  6 A. Correct.                  7 Q. And so, for example, for the RGB, you're                  8 saying that you would take the R and you would                  9 divide it by the variants of red and green, for                  10 example --                  11 A. Just variants of red.                  12 Q. Okay. And so you could do the same for                  13 the others, for Yiq or LAB?                  14 A. Exactly.                  15 Q. Okay. You do that for both the image                  16 input query and the stored image; correct?                  17 A. Correct.                  18 Q. And then you're calculating the distance                  19 between them, so determining how similar they are                  20 based on the distance?                  21 A. Yeah, or vector distance.                  22 Q. Understood.                  23 A. Two vectors of differences --                  24 (Reporter seeks clarification.)                  25 A. Two vectors with a distance calculation on</p>
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.                  2 Q. With its variance.                  3 A. And then compute the average.                  4 Q. Okay.                  5 A. Or, I'm sorry, compute the weighted sum.                  6 So red divided by the variants of red, plus green                  7 divided by the variants of green --                  8 (Reporter seeks clarification.)                  9 A. Red divided by the variants of red, green                  10 divided by the variants of green, L divided by the                  11 variants of L, that's how you combine the various                  12 features.                  13 Q. Understand. And L represents what?                  14 A. Luminance.                  15 Q. Okay. And this is -- you're talking                  16 specifically with respect to average color?                  17 A. Well, the variance normalization is well                  18 known in terms of multidimensional feature merging.                  19 Q. But for average color, you wouldn't use                  20 luminance, right, as a -- as a variant?                  21 A. Luminance would just -- you wouldn't use                  22 just luminance. You could use luminance . . .                  23 Q. Well, so the color features we talked                  24 about before would be RGB, Yiq, LAB --                  25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.                  2 Q. You're going to have to repeat that and be                  3 just a little bit louder, Mr. Flickner. Sorry.                  4 A. That's all right. Let me get my thoughts                  5 together.                  6 So we have multiple dimensional features.                  7 It's not unusual to take each dimension and                  8 normalize it by the variance because that gives                  9 you -- what that does is if you have tight variances                  10 you divide it by, you get bigger numbers. So you                  11 have more information close by.                  12 Q. What was the word you said before "close                  13 by"?                  14 A. I don't remember.                  15 THE REPORTER: Information?                  16 THE WITNESS: Information close by?                  17 BY MR. EDWARDS:                  18 Q. Okay. Okay. So now let's talk about                  19 color histograms.                  20 A. Okay.                  21 Q. Okay? Well, stop. Let's go back to                  22 average color. So is there -- you described the                  23 weighted Euclidean distance that's calculated                  24 between the query image and the database image for                  25 average color.</p>

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall          2 that's not disclosed in the paragraph at IBM 2394?          3 A. Not that I recall.          4 Q. Okay. Do you recall whether this distance          5 methodology changed after this article or it stayed          6 the same?          7 A. It changed.          8 Q. Are you certain or do you know?          9 A. I'm not certain, but I'm pretty certain.          10 Q. And how did it change?          11 A. Different features were shaped like an          12 inch in color. The algorithm evolved. It wasn't          13 static.          14 Q. And how did it evolve?          15 A. I don't recall all the details.          16 Q. Do you recall whether it supplemented the          17 weighted Euclidean distance or replaced it?          18 A. I don't recall.          19 Q. Is it fair to say there was always some          20 distance measurement to determine similarity for          21 average color in the QBIC system?          22 A. There's some measurement, yeah.          23 Q. Okay. Let's talk about color histogram.          24 So in order to determine the similarity          25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was          2 determined by weighted Euclidean distance; is that          3 right?          4 MR. HANSEN: Same objection.          5 THE WITNESS: Correct.          6 BY MR. EDWARDS:          7 Q. And how did -- how was that weighted          8 Euclidean distance determined?          9 A. It was inverse variance.          10 (Reporter seeks clarification.)          11 A. Variance.          12 Q. And it was inverse variance for components          13 like coarseness, contrast and directionality?          14 A. Correct.          15 Q. Okay. And do you recall if that          16 methodology changed or stayed the same after this          17 article for the QBIC system?          18 A. Most likely it evolved.          19 Q. Do you know for sure?          20 A. No.          21 Q. Do you recall any details?          22 A. No.          23 Q. All right. Let's talk about shape next.          24 The similarity between the query image and          25 the database image also used weighted Euclidean</p>
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines          2 distance between normalized histograms?          3 A. Correct.          4 Q. Do you recall any details of how that          5 worked?          6 A. Not off the top of my head.          7 Q. Do you recall whether that methodology          8 evolved for matching color histograms after this          9 article?          10 A. Not that I recall.          11 Q. Okay. All right. Let's talk about          12 texture next. And I don't know if you've read that,          13 but that's at the bottom of 2394 and it goes to just          14 barely at the top of 2395.          15 (Witness reviews document.)          16 A. Okay.          17 Q. So for texture, the similarity is          18 determined by the distance or the weighted Euclidean          19 distance between the query object and -- the query          20 object image and the database object image; is that          21 right?          22 MR. HANSEN: Objection; vague and ambiguous.          23 THE WITNESS: Can you repeat.          24 BY MR. EDWARDS:          25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?          2 A. Correct.          3 Q. And do you recall how that worked?          4 A. There's computing moments. And we used          5 the shape measure, which I mentioned earlier,          6 curvature and turning angle.          7 (Reporter seeks clarification.)          8 A. Curvature and turning angle.          9 Q. And the curvature and turning angle would          10 be compared between the image query and the database          11 image; correct?          12 A. Correct.          13 Q. And do you recall if that methodology          14 changed after this article came out in '93?          15 A. Yes, it did.          16 Q. How so?          17 A. Well, in the IEEE computer paper, we          18 described a different way of doing shape measures.          19 And they included the moment calculations.          20 Q. And you use the moment calculations to          21 determine a distance between the image query and          22 the -- and the database image?          23 A. Yes.          24 Q. Sorry?          25 A. Yeah. Yes.</p>

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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?</p> <p>2 A. Given a binary blob, certain high-level</p> <p>3 moments and then you create -- compute the</p> <p>4 eigenvectors of certain matrices that are created --</p> <p>5 (Reporter seeks clarification.)</p> <p>6 A. Eigenvectors, e-i-g-e -- i-n -- to compute</p> <p>7 the eigenvectors of certain matrices. And that</p> <p>8 would give you translation and rotation and</p> <p>9 variance.</p> <p>10 Q. And so after the Exhibit 3 1995 IEEE</p> <p>11 article, did that methodology change to compute the</p> <p>12 distance for shape?</p> <p>13 A. I don't recall.</p> <p>14 Q. So the methodology for shape that you just</p> <p>15 described using moment calculations, that is</p> <p>16 different from what is described in the 1993 article</p> <p>17 for weighted Euclidean distance?</p> <p>18 A. We still might have used weighted</p> <p>19 Euclidean distance when the underlying features are</p> <p>20 different.</p> <p>21 Q. Understood.</p> <p>22 And the underlying features are different</p> <p>23 in the sense that in the 1995 article you're using</p> <p>24 what features?</p> <p>25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment</p> <p>2 invariants.</p> <p>3 (Witness reviews document.)</p> <p>4 A. Is there any other papers that we have</p> <p>5 here?</p> <p>6 Q. Nope.</p> <p>7 A. Everything else is screenshots?</p> <p>8 MR. STRAUSSMAN: I don't think you introduced</p> <p>9 any other papers.</p> <p>10 THE WITNESS: I saw it earlier today.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. Why don't we do it this way. In terms of</p> <p>13 the feature calculations that were -- for shape on</p> <p>14 page IBM 900 of Exhibit 3 versus page --</p> <p>15 A. So if you look at 2393.</p> <p>16 Q. What page are you directing me to?</p> <p>17 A. 2393.</p> <p>18 Q. Okay.</p> <p>19 A. So it talks about the moment invariants as</p> <p>20 well.</p> <p>21 Q. Okay.</p> <p>22 A. These are those matrices that you compute</p> <p>23 eigenvectors of.</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. Matrices that you compute eigenvectors of.</p>
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)</p> <p>2 Q. I think the page you may be looking for is</p> <p>3 IBM 900 on the left side.</p> <p>4 (Witness reviews document.)</p> <p>5 A. What else do we have here?</p> <p>6 Q. So if you'll look at -- if you'll -- if</p> <p>7 you'll compare page IBM 900 from Exhibit 3 to page</p> <p>8 IBM 2393 from Exhibit 2, those are the descriptions</p> <p>9 in both articles about the features that are</p> <p>10 calculated.</p> <p>11 A. I'm trying to remember what --</p> <p>12 MR. STRAUSSMAN: Can you direct him a little</p> <p>13 closer?</p> <p>14 BY MR. EDWARDS:</p> <p>15 Q. Can I show you? Do you mind?</p> <p>16 I believe this is what you're looking for.</p> <p>17 So if you look right here (indicating).</p> <p>18 (Witness reviews document.)</p> <p>19 A. That's the same as this one (indicating).</p> <p>20 We had another -- there's another discussion about</p> <p>21 moments.</p> <p>22 Q. So if you look at -- under "Shape</p> <p>23 features" at 2393, right there, where you're looking</p> <p>24 at --</p> <p>25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment</p> <p>2 invariants in the 1993 SPIE article?</p> <p>3 A. Correct.</p> <p>4 Q. Right. And then if you go to the IEEE</p> <p>5 article that you primarily co-authored, on page 900,</p> <p>6 it refers to shape queries using area, circularity,</p> <p>7 eccentricity, major-axis direction and features</p> <p>8 derived from the object moments.</p> <p>9 A. Right.</p> <p>10 Q. Is that the same thing as algebraic moment</p> <p>11 invariants?</p> <p>12 A. Right.</p> <p>13 Q. So it looks like the methodologies are the</p> <p>14 same for the features that are extracted between the</p> <p>15 papers; is that right?</p> <p>16 A. I thought one paper had algebraic moments</p> <p>17 and one had turning angle. Maybe they both had</p> <p>18 turning angle.</p> <p>19 (Reporter seeks clarification.)</p> <p>20 A. Turning angle. Algebraic moments.</p> <p>21 Turning angles.</p> <p>22 Q. The 1993 paper refers to algebraic moment</p> <p>23 invariants. The IEEE paper, on IBM 900, refers to</p> <p>24 features derived from object moments.</p> <p>25 Are those the same thing?</p>

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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.</p> <p>2 Q. Okay. And so turning angles, which you've</p> <p>3 previously testified on, do you think that</p> <p>4 calculating shape features based on turning angles</p> <p>5 came after these papers?</p> <p>6 A. No. They're mentioned in these papers.</p> <p>7 Q. Okay. So they're included in these</p> <p>8 papers?</p> <p>9 A. Yes.</p> <p>10 Q. And so any distance measurement using</p> <p>11 weighted Euclidean distance would have taken into</p> <p>12 account turning angles?</p> <p>13 A. As a feature, yeah. Yes.</p> <p>14 Q. For both -- for both papers?</p> <p>15 A. For both papers.</p> <p>16 Q. Okay. Let's talk about sketch, which</p> <p>17 is -- if you'll just stick with 2395, which is</p> <p>18 Exhibit 2.</p> <p>19 MR. STRAUSSMAN: Can you direct him?</p> <p>20 THE WITNESS: I found it.</p> <p>21 MR. STRAUSSMAN: Okay.</p> <p>22 (Witness reviews document.)</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Let me know when you're finished reading</p> <p>25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the</p> <p>2 best matches based on order of similarity?</p> <p>3 A. Um-hum.</p> <p>4 Q. Does iterated query refinement mean that I</p> <p>5 can further refine that query to search for things</p> <p>6 like shape, like a -- you know, some shape in --</p> <p>7 in the query image, like a logo or an icon, and that</p> <p>8 will further refine the results to give me things</p> <p>9 that have that similar shape inside the results of</p> <p>10 the color histogram?</p> <p>11 A. Yes.</p> <p>12 Q. And then I can -- I can keep doing that, I</p> <p>13 can further even refine that result by using a</p> <p>14 keyword, for example?</p> <p>15 A. Yes. Or you could do it all at once.</p> <p>16 Q. Okay. So the results of the query -- so</p> <p>17 we talked about before that the results of the</p> <p>18 queries display thumbnails of the database images</p> <p>19 based on similarity of which they match; correct?</p> <p>20 A. Correct.</p> <p>21 Q. And then those thumbnails can provide</p> <p>22 links to the original image or, if it was an</p> <p>23 r-frame, it could be -- you could provide a link to</p> <p>24 the video; correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.</p> <p>2 Q. For sketch, the similarity between the</p> <p>3 query image and the database image uses an algorithm</p> <p>4 that performs logical binary correlation of the</p> <p>5 binary image?</p> <p>6 A. Yes.</p> <p>7 Q. Are there any other details you recall for</p> <p>8 the sketch comparison beyond what's disclosed in</p> <p>9 this paragraph on IBM 2395?</p> <p>10 A. Not that I recall.</p> <p>11 Q. Do you recall the methodology for</p> <p>12 determining similarity of the input image and the</p> <p>13 database image for sketch changing after this</p> <p>14 article?</p> <p>15 A. Not that I recall.</p> <p>16 Q. So if you go to the next page,</p> <p>17 Mr. Flickner, which is 2396, the Section 4.2 talks</p> <p>18 about performing queries.</p> <p>19 A. Um-hum.</p> <p>20 Q. And in the last sentence it refers to</p> <p>21 something called iterated query refinement.</p> <p>22 A. Yes.</p> <p>23 Q. And what does that refer to?</p> <p>24 A. It's a way you can refine the query.</p> <p>25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links</p> <p>2 to information about the image that was associated</p> <p>3 with the image in the database?</p> <p>4 A. Yes.</p> <p>5 Q. And, again, that can be that -- whatever</p> <p>6 information that the user inputted or was associated</p> <p>7 with the image from the source?</p> <p>8 A. Yes.</p> <p>9 Q. Could the results also display a matching</p> <p>10 score so the user could see how well the particular</p> <p>11 result matched to the -- to the query image?</p> <p>12 A. It could.</p> <p>13 Q. Okay.</p> <p>14 MR. EDWARDS: I'm going to hand you the next</p> <p>15 exhibit, Mr. Flickner.</p> <p>16 (Deposition Exhibit 10 was marked.)</p> <p>17 MR. EDWARDS: Handing you what's been marked as</p> <p>18 Exhibit 10.</p> <p>19 For the record, it's IBM Bates Nos. 002418</p> <p>20 to 2430.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. The title of this article is "Updates to</p> <p>23 the QBIC system."</p> <p>24 Do you see that?</p> <p>25 A. Yes.</p>



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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?</p> <p>2 A. Yes.</p> <p>3 Q. You are listed as a co-author of this</p> <p>4 article; is that correct?</p> <p>5 A. Yes.</p> <p>6 Q. And it is a paper that is published in the</p> <p>7 SPIE; correct?</p> <p>8 A. Correct.</p> <p>9 Q. In 1997; correct?</p> <p>10 A. Yes. It was 1997 or 1998.</p> <p>11 Q. No later than 1998; correct?</p> <p>12 A. Correct.</p> <p>13 Q. So just want to kind of orient you to the</p> <p>14 first page, which is IBM 2419.</p> <p>15 A. It's '98 because '97 is a different paper.</p> <p>16 Q. Well, if you turn the page, look at the</p> <p>17 footer on the right-hand side.</p> <p>18 Are you familiar that SPIE usually</p> <p>19 includes footers with the volume and the date at the</p> <p>20 bottom?</p> <p>21 A. Yeah.</p> <p>22 Q. And if you look at the footer kind of</p> <p>23 towards the right it says -786X-97-\$10 [sic]?</p> <p>24 A. Yeah.</p> <p>25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?</p> <p>2 A. Yep.</p> <p>3 Q. Okay. So let's -- I'm going to have you</p> <p>4 jump around, so I apologize in advance. Let's go to</p> <p>5 the -- kind of the back, IBM 2428.</p> <p>6 A. Okay.</p> <p>7 Q. Is that example of the stamps demo that</p> <p>8 was available on IBM's website?</p> <p>9 A. Yes.</p> <p>10 Q. All right. And if you look at the top in</p> <p>11 the location URL it has the almaden.ibm website</p> <p>12 address; correct?</p> <p>13 A. Correct.</p> <p>14 Q. All right. Let's flip forward to 2429.</p> <p>15 And is 2429 a screenshot of a trademark</p> <p>16 demo that was also available in the Almaden --</p> <p>17 excuse me -- almaden.ibm website?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. And that demo looks like the</p> <p>20 trademark query is based on shape; is that right?</p> <p>21 A. It uses shape as one similarity feature.</p> <p>22 Q. Right. So the trademarks are converted to</p> <p>23 a binary image, like we talked before -- talked</p> <p>24 about before, and then they're -- the matching</p> <p>25 process is done based on those binary images?</p>
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the</p> <p>2 conference was in '98.</p> <p>3 Q. Submission was in '97. So the paper was</p> <p>4 published in '97 and then the conference you</p> <p>5 presented it at was in 1998?</p> <p>6 A. That's possible.</p> <p>7 Q. Do you recall presenting this paper at a</p> <p>8 conference in 1998?</p> <p>9 A. No, I don't.</p> <p>10 Q. So the first page refers to the Photonics</p> <p>11 West 1999 -- excuse me. Photonics West 1998</p> <p>12 Electronic Imaging Conference in San Jose.</p> <p>13 Do you recall attending that conference?</p> <p>14 A. It's likely I did, but I don't recall.</p> <p>15 Q. Okay. But you would agree with me this</p> <p>16 paper was made available at least as early as 1998;</p> <p>17 correct?</p> <p>18 A. Yes.</p> <p>19 Q. Okay. So the first page, IBM 2419. Under</p> <p>20 "Introduction," at the time of this paper it says,</p> <p>21 last line on the first paragraph, "Several online</p> <p>22 demos of QBIC are available at</p> <p>23 <a href="http://www.qbic.almaden.ibm.com">http://www.qbic.almaden.ibm.com</a>."</p> <p>24 Do you see that?</p> <p>25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p>22 Q. Okay. So 39 would be the -- so the first</p> <p>23 image at the top left is a 39, the one next to it is</p> <p>24 a 46, so the 39 would be a closer match than the 46;</p> <p>25 correct?</p>



*Nantworks, LLC v. Bank of America Corporation*

Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

Element	'529 Claim Recitation	Exemplary Citations in Reference		
		<p><i>Id.</i> at 174–182:</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; border-right: 1px solid black; padding-right: 10px;"> <p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin-top: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"?                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p> </td> <td style="width: 50%; vertical-align: top; padding-left: 10px;"> <p style="text-align: right; margin-bottom: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. 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Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p> </td> </tr> </table>	<p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. 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		<p style="text-align: right;">Page 178</p> <p>1 the image as well?                  2 MR. HANSEN: Objection; lacks foundation.                  3 THE WITNESS: It points to the file that's the                  4 QBIC catalog.                  5 BY MR. EDWARDS:                  6 Q. Can you walk us through that one more                  7 time? And just be a little bit louder, sorry.                  8 MR. HANSEN: Same objection.                  9 THE WITNESS: So the QBIC catalog is a set of                  10 files that hold data about visual features in the                  11 image.                  12 (Reporter seeks clarification.)                  13 THE WITNESS: Visual features. The image                  14 extender lets you search against that database,                  15 against that object.                  16 BY MR. EDWARDS:                  17 Q. The image extender lets you search against                  18 that catalog, the name of that catalog?                  19 A. The catalog, yeah.                  20 Q. Okay. And it does so by using a pointer                  21 from the handle in the table?                  22 MR. HANSEN: Objection; lacks foundation.                  23 THE WITNESS: Correct.                  24 BY MR. EDWARDS:                  25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold                  2 data for the following image features: Average                  3 color, Histogram color, Positional color and                  4 Texture."                  5 Is that right?                  6 A. Yep.                  7 Q. Okay. We spoke about average color,                  8 histogram color and texture; correct?                  9 A. Right.                  10 Q. What is positional color?                  11 A. We talked about it briefly. It's color in                  12 particular locations in the image.                  13 Q. Ah. Understood.                  14 That is -- that is similar to L in the                  15 demo that we looked at, which is called color                  16 layout.                  17 A. Okay, yes.                  18 Q. Is that correct?                  19 A. I don't remember if it's called L. Sounds                  20 right.                  21 Q. If you look at --                  22 MR. EDWARDS: If you can show -- give him                  23 Exhibit 6.                  24 THE WITNESS: Oh, this L. Yes.                  25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.                  3 MR. HANSEN: Objection; lacks foundation, calls                  4 for speculation.                  5 MR. EDWARDS: You can put that enormous exhibit                  6 aside.                  7 THE WITNESS: Test 1, 2, 3.                  8 BY MR. EDWARDS:                  9 Q. Go back to Exhibit 3, please. If you                  10 could turn to the page Bates-labeled IBM 894 with                  11 the architecture picture.                  12 A. Okay.                  13 Q. So I just -- I just want to kind of walk                  14 the -- through this architecture, Mr. Flickner. But                  15 as a high level, I just want to understand, is                  16 this -- is this a high-level architecture that would                  17 generally be used for any implementation of QBIC?                  18 A. Yes.                  19 Q. All right. So first step is you submit                  20 still images or r-frames for feature extraction; is                  21 that correct?                  22 A. Correct.                  23 Q. Okay. Features are extracted, such as                  24 color, texture, shape, sketch and text; correct?                  25 A. Location, yep.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 182</p> <p>1 Q. And location. Including the ones that I                  2 listed; correct?                  3 A. Yep.                  4 Q. Okay. After feature extraction is done,                  5 the images and those features for the database                  6 images are stored in the database; correct?                  7 A. Correct.                  8 Q. And then once those are stored, a user can                  9 query using some sort of a user interface; is that                  10 right?                  11 A. Correct.                  12 Q. And the user can query based on color,                  13 texture, shape, multi-object, sketch, location or                  14 text; is that right?                  15 A. Correct.                  16 Q. Okay. Those features are then decomposed                  17 and extracted from the query image and then a                  18 matching engine is used to compare those similarly                  19 extracted features from the stored images; is that                  20 correct?                  21 A. Correct.                  22 Q. And then the best matches are returned in                  23 similarity of order back to the user; is that right?                  24 A. Correct.                  25 Q. Okay. Thank you for that.</p> <p><i>Id.</i> at 190–191:                  22 Q. So [as read], "Once the image catalogs are                  23 created, you can use the Image Query component to                  24 find image and business information. Business                  25 information, such as character and numeric data, are</p>

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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p>Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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		<p><i>Id.</i> at 198 – 199:</p> <p>15 Q. Okay. And then if we can go to IBM 849.</p> <p>16 There?</p> <p>17 A. Yeah.</p> <p>18 Q. Top of the page says, "Adding image search</p> <p>19 to your Content Manager."</p> <p>20 Do you see that?</p> <p>21 A. Yeah. Yeah.</p> <p>22 Q. And the first paragraph starts -- talks</p> <p>23 about QBIC.</p> <p>24 Do you see that?</p> <p>25 A. Yeah.</p> <hr/> <p style="text-align: right;">Page 199</p> <p>1 Q. It says, "The image search server uses</p> <p>2 IBM's QBIC (query by image content) technology to</p> <p>3 help you search for objects by certain visual</p> <p>4 properties, such as color and texture."</p> <p>5 Did I read that correctly?</p> <p>6 A. Yes.</p> <p>7 Q. It says [as read], "The image search</p> <p>8 server analyzes images and stores the image</p> <p>9 information in a database. Then users can run image</p> <p>10 queries, which use the visual properties of image,</p> <p>11 to match colors, textures, and their positions</p> <p>12 without describing them -- describing them in</p> <p>13 words."</p> <p>14 Did I read that correctly?</p> <p>15 A. Yes.</p> <p>16 Q. And that's consistent with the features</p> <p>17 and functionalities that we have talked about in the</p> <p>18 1993 SPIE and 1995 IEEE article; correct?</p> <p>19 A. Correct.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9       A. Correct.              10       Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13       A. That weren't described in the articles?              14 No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11       A. Yeah. We call them features.              12       Q. Features. Okay.              13           So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16       A. For example.              17       Q. Any other ones you can think of?              18       A. Nothing comes to mind.              19       Q. But when you refer to features they at              20 least include those four; is that correct?              21       A. Yes. Well, at least includes, yeah.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 312 – 313:</p>

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		<p>21 Q. For every implementation of QBIC, if an                      22 input image has an object and the object has colors,                      23 the color histogram feature would match those stored                      24 image that include objects with similar colors;                      25 correct?</p> <hr/> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 317–322:                      22 Q. Okay. So for every commercial                      23 implementation of QBIC as of the IEEE 1995 article                      24 in Exhibit 3, those implementation calculated                      25 features of a query image and stored image; is that</p>

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		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query,"</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>


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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 322</p> <ol style="list-style-type: none"><li>1 indicates how confident the system is that the</li><li>2 features of the stored image match the features of</li><li>3 the input image; correct?</li><li>4 A. Correct.</li></ol> <p>IBM000001 at 39 – 41</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference																																									
		<p style="text-align: right;"><b>Data structures</b></p> <p><b>Handles</b></p> <p>When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a <b>handle</b> to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object’s attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.</p> <p>User Table</p> <table border="1"> <thead> <tr> <th>ID</th> <th>Name</th> <th>Picture</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Handle 1</td> </tr> <tr> <td></td> <td></td> <td>Handle 2</td> </tr> </tbody> </table> <p>Administrative Support Tables</p> <table border="1"> <thead> <tr> <th colspan="4">Common Attributes</th> </tr> <tr> <th>Handle</th> <th>Importer</th> <th>Updater</th> <th></th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="4">Unique Attributes</th> </tr> <tr> <th>Handle</th> <th>Width</th> <th>Height</th> <th>Numcolors</th> </tr> </thead> <tbody> <tr> <td>Handle 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Handle 2</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>  <p><i>Figure 8. Handles</i></p> <p><b>QBIC catalogs</b></p> <p>A <b>QBIC catalog</b> is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.</p> <p>You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p style="text-align: right;">Chapter 2. DB2 extender concepts <b>19</b>                  IBM 000039</p>	ID	Name	Picture			Handle 1			Handle 2	Common Attributes				Handle	Importer	Updater		Handle 1				Handle 2				Unique Attributes				Handle	Width	Height	Numcolors	Handle 1				Handle 2			
ID	Name	Picture																																									
		Handle 1																																									
		Handle 2																																									
Common Attributes																																											
Handle	Importer	Updater																																									
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		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® D82® Universal Database: Image, Audio, and Video Extenders</p> <p style="text-align: right;">IBM 000040</p>



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		<p style="text-align: right;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot catalog file name</li> <li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li> <li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li> <li>• Shot number</li> <li>• Starting frame number</li> <li>• Ending frame number</li> <li>• Representative frame number</li> <li>• Name of a file that contains the contents of the representative frame</li> </ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"> <li>• Shot handle</li> <li>• Video table name</li> </ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts <b>21</b>                  IBM 000041</p> <p>IBM0002263 at 2264</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>Description</b></p> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <p style="text-align: center;"><b>Image Classification</b></p> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <p style="text-align: center;"><b>Image Query</b></p> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p>and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <p style="text-align: center;"><b>Image Formats</b></p> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCX</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <p style="text-align: center;"><b>Product Positioning</b></p> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almaden Research Center. It provides functions not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <p style="text-align: center;">205-642 <span style="float: right;">IBM 0002264</span></p>

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		<p>IBM000777 at 794</p> <div style="border: 1px solid black; padding: 5px;"> <p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b>                      You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b>                      This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> </div> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"> <li>• Improved installation procedures</li> <li>• Additional connectors for relational databases                      Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li> <li>• Advanced information mining and search capabilities                      Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li> <li>• Workflow capabilities                      By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li> <li>• Federated level access control                      You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li> <li>• Additional support for Content Manager:                         <ul style="list-style-type: none"> <li>- List, add, retrieve, update, and delete of content class</li> <li>- Asynchronous retrieval of object content</li> </ul> </li> </ul> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a</p>

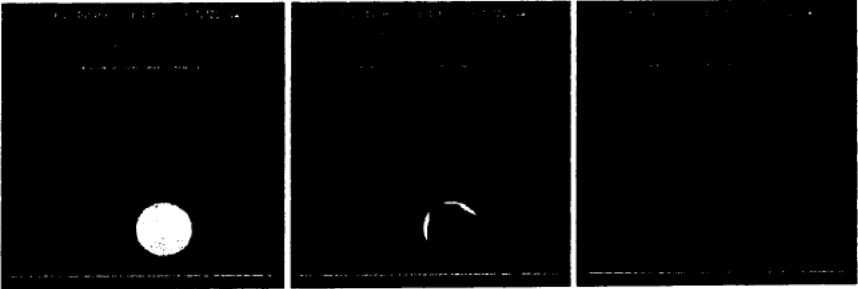
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		<p>person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1E]	<p>associate the object with information; and</p>	<p>QBIC discloses associate the object with information.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396-97</p> <p>4.2. <b>Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of (<i>R, G, B</i>) sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <i>n</i>th best match (<i>n</i> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p>5. <b>Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>(buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p>

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		<p>IBM0002390 at 2391-92</p> <p><b>2.1. Database Population</b></p> <p>The first step in population is to simply load the images into the system. This involves adding the image to the database, preparing a reduced 100x100 “thumbnail”, and adding any available text information to the database. Object/element identification is an optional part of this step. It allows a user to manually or semi-automatically identify objects, areas, or significant edges in a scene using a mouse. Internally, each identified object or area becomes a binary mask. There can be an arbitrary number of objects per image, objects may overlap, and objects may consist of multiple disconnected components (e.g. the set of dots on a polka dot dress). Text (e.g. “baby on beach”) can be added to an outlined object, or to the scene as a whole. Ideally this step would be done automatically but current automatic methods to identify and outline image objects are not sufficiently robust so we allow this step to be done manually or semi-automatically. Because database population is the most labor intensive task in many QBIC applications, we try to automate it as much as possible. We call these semi-automatic methods interactive outlining or shrink-wrapping.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression</p> <p>containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>In interactive outlining, as in other parts of our system, we have attempted to build the functions in such a way as to carefully distribute the tasks between the human and machine. For example, the tasks of giving the starting outline for an object or of attaching semantic meaning to objects is left to the user since they are difficult for machines. On the other hand, computation of quantitative image/object features is ideally suited for machines and so is done automatically.</p>  <p>Figure 1: Original image, approximate user outline, and automatically refined outline of sun.</p>



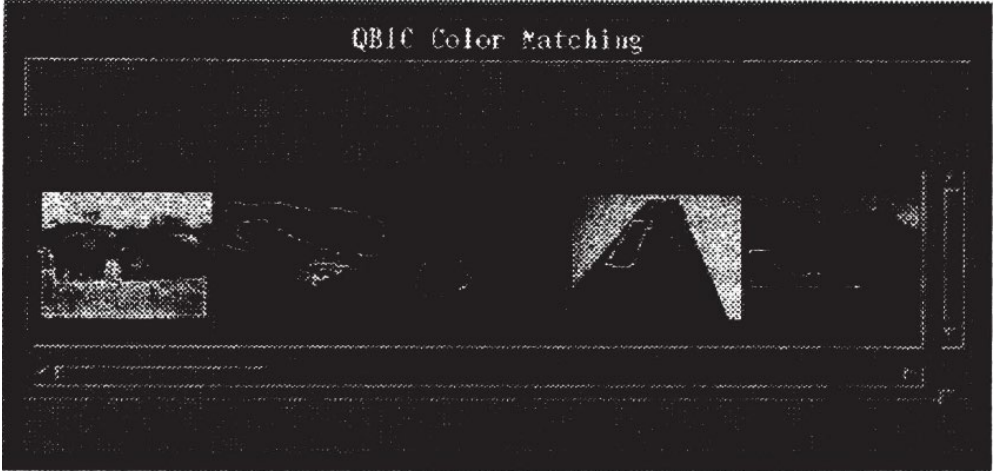
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		<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9</p>  <p>Figure 7: Result of query by example using color only.</p>

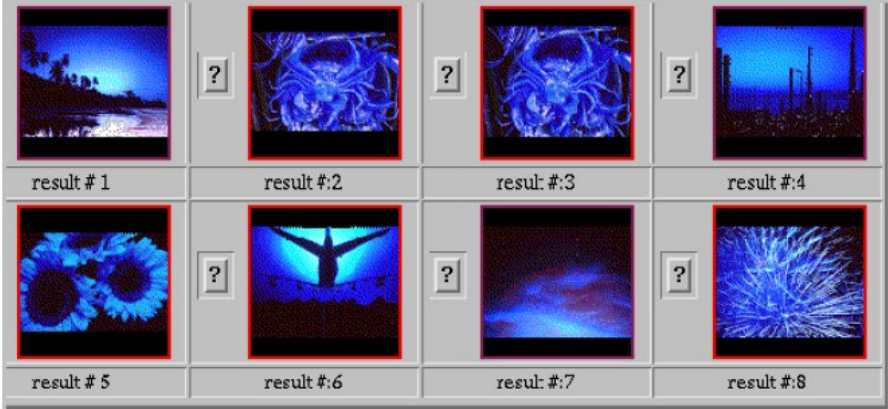
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		 <p>Figure 8: Result of query by example using texture only.</p>

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		 <p>Figure 9: Result of query by example using color and texture.</p> <p>QBIC (Query by Image Content) (BOFA00001391–392) at 2</p>  <p>Result of QBIC Search</p>



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		<p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects.                      For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.                      Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects-for example, a car moving across the screen.                      Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p>

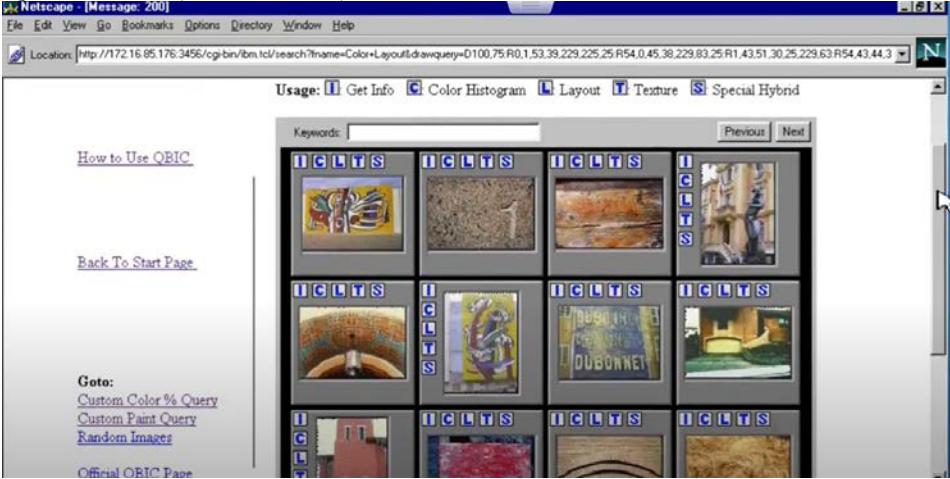

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		<p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>

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		<p><b>QBIC Demo (IBM000747):</b></p>  <p><b>QBIC Demo (IBM000747):</b></p> 

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		<p>Flickner Depo at 201-202:</p> <p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p>

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		<p>1 with -- where you already -- you had already seeked</p> <p>2 to the -- the point of the -- of the match.</p> <p>3 Q. Would it return the same video as the</p> <p>4 query video?</p> <p>5 A. It would -- it would return snippets, as</p> <p>6 I recall.</p> <p>7 Q. And snippets of which videos?</p> <p>8 A. Of the video that's -- the -- that the</p> <p>9 database has been created with.</p> <p>10 Q. Were those video snippets indexed in any</p> <p>11 way?</p> <p>12 A. I'm sure they were.</p> <p><b>Flickner Depo at 131-132:</b></p> <p>14 Q. An action that the QBIC system would</p> <p>15 automatically take based on the results it would</p> <p>16 return.</p> <p>17 A. So you're saying as you return results,</p> <p>18 you do some post-filtering on the image or the --</p> <p>19 what -- what kind of --</p> <p>20 Q. Perhaps not -- not post-filtering.</p> <p>21 But, for example, displaying a hyperlink</p> <p>22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p> <p><i>See also</i> Flickner Depo at 54-55, 75-76, 78-79, 88, 89-90, 159, 209-210.</p> <p>Flickner 8/29/23 Depo at 53-56:</p>

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		16 Q. And when it refers to "text information," 17 what is it referring to? 18 A. Anything that could be extracted in the 19 context of how the image was annotated. 20 Q. And when you say "annotated," annotated by 21 the user who was populating the database? 22 A. Could be. 23 Q. What else could it be? 24 A. It could be the supplier of the data. 25 Q. Okay. So you may have some annotations

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		<table border="0"> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data</p> <p>2 supplied and then also the user populating the</p> <p>3 database could also enter text descriptions?</p> <p>4 A. Right.</p> <p>5 Q. Okay. And were there limitations to the</p> <p>6 text descriptions or -- in terms of character</p> <p>7 limits?</p> <p>8 A. Probably were -- there . . .</p> <p>9 Q. But essentially, other than the character</p> <p>10 limits, could a -- could a user essentially put</p> <p>11 anything in the text description?</p> <p>12 A. You're saying any text in the text</p> <p>13 description?</p> <p>14 Q. Correct.</p> <p>15 A. Sure.</p> <p>16 Q. So, for example, if it were for a product,</p> <p>17 you could put price?</p> <p>18 A. Yep.</p> <p>19 Q. If -- you could put the name of the</p> <p>20 product?</p> <p>21 A. Yeah.</p> <p>22 Q. You could put where you could purchase the</p> <p>23 product?</p> <p>24 A. Yep.</p> <p>25 Q. You -- could you put a URL where you could</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 56</p> <p>1 would do this?</p> <p>2 A. Or an annotator, yeah.</p> <p>3 Q. Okay. And how would they do that?</p> <p>4 A. They could do it manually or they could</p> <p>5 use tools to help identify objects.</p> <p>6 Q. And manually how would that work?</p> <p>7 A. You look at the image and specify what</p> <p>8 objects are in the image.</p> <p>9 Q. And how would they specify it?</p> <p>10 A. Typing in a text phrase.</p> <p>11 Q. Okay. So if it was an image of a dog,</p> <p>12 they could type in "dog." for example?</p> <p>13 A. Yeah, exactly.</p> <p>14 Q. What if there were multiple objects in the</p> <p>15 image, was there a way for the user to outline or</p> <p>16 demarcate those objects?</p> <p>17 A. Yes.</p> <p>18 Q. How would they do that?</p> <p>19 A. They could just put "German Shepherd" and</p> <p>20 "Retriever" to determine the type of dogs. So they</p> <p>21 could do it using annotations of text --</p> <p>22 Q. Was there a way --</p> <p>23 A. -- or they could use extracting tools</p> <p>24 where you could outline the object more accurately.</p> <p>25 Q. So you could outline the edges of the</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 55</p> <p>1 link to to go find the product?</p> <p>2 A. 1993, URLs were just starting to come on</p> <p>3 board, if I recall right. URLs weren't particularly</p> <p>4 popular yet.</p> <p>5 Q. Not in 1993, but the QBIC project lasted</p> <p>6 throughout the '90s; correct?</p> <p>7 A. Yeah.</p> <p>8 Q. So say a user closer to 2000, they could</p> <p>9 insert a URL in that description?</p> <p>10 A. Yeah. Yeah.</p> <p>11 Q. So in addition to uploading the images,</p> <p>12 associated thumbnail, text descriptions, did object</p> <p>13 identification also occur at this database</p> <p>14 population step?</p> <p>15 A. It could.</p> <p>16 Q. And what is object identification?</p> <p>17 A. It's to be taking a region of an image and</p> <p>18 putting a label on it.</p> <p>19 Q. Say the last part?</p> <p>20 A. Putting a label on it.</p> <p>21 Q. Taking a region of an image and putting a</p> <p>22 label on it?</p> <p>23 A. Yeah.</p> <p>24 Q. Okay. And how would you -- and back up.</p> <p>25 The user who was populating the database</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 57</p> <p>1 shape of the object?</p> <p>2 A. Right.</p> <p>3 Q. And you could do that with a manual -- the</p> <p>4 user could do that with a manual tool?</p> <p>5 A. Yeah.</p> <p>6 Q. Were there automatic tools that did --</p> <p>7 that did things like look for objects? So, for</p> <p>8 example, were there automatic tools that QBIC used,</p> <p>9 like edge detection or segmentation, that extracted</p> <p>10 object --</p> <p>11 A. You could --</p> <p>12 Q. -- shapes?</p> <p>13 A. You could use edge detection.</p> <p>14 Q. Okay. Did QBIC use edge detection?</p> <p>15 A. Yes, in certain aspects.</p> <p>16 Q. In what aspects?</p> <p>17 A. So on the annotation tool, if you compute</p> <p>18 gradients, you can make a better prediction of</p> <p>19 helping the person annotate.</p> <p>20 So it's very tedious to go through and</p> <p>21 annotate everything. Whereas if you have a tool,</p> <p>22 it'll tell you where it thinks the boundaries are.</p> <p>23 And you could speed up annotation quite a bit doing</p> <p>24 that.</p> <p>25 Q. So this tool that you're referring to, a</p> </td> </tr> </table>	<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data</p> <p>2 supplied and then also the user populating the</p> <p>3 database could also enter text descriptions?</p> <p>4 A. Right.</p> <p>5 Q. Okay. And were there limitations to the</p> <p>6 text descriptions or -- in terms of character</p> <p>7 limits?</p> <p>8 A. Probably were -- there . . .</p> <p>9 Q. But essentially, other than the character</p> <p>10 limits, could a -- could a user essentially put</p> <p>11 anything in the text description?</p> <p>12 A. You're saying any text in the text</p> <p>13 description?</p> <p>14 Q. Correct.</p> <p>15 A. Sure.</p> <p>16 Q. So, for example, if it were for a product,</p> <p>17 you could put price?</p> <p>18 A. Yep.</p> <p>19 Q. If -- you could put the name of the</p> <p>20 product?</p> <p>21 A. Yeah.</p> <p>22 Q. You could put where you could purchase the</p> <p>23 product?</p> <p>24 A. Yep.</p> <p>25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?</p> <p>2 A. Or an annotator, yeah.</p> <p>3 Q. Okay. And how would they do that?</p> <p>4 A. They could do it manually or they could</p> <p>5 use tools to help identify objects.</p> <p>6 Q. And manually how would that work?</p> <p>7 A. You look at the image and specify what</p> <p>8 objects are in the image.</p> <p>9 Q. And how would they specify it?</p> <p>10 A. Typing in a text phrase.</p> <p>11 Q. Okay. So if it was an image of a dog,</p> <p>12 they could type in "dog." for example?</p> <p>13 A. Yeah, exactly.</p> <p>14 Q. What if there were multiple objects in the</p> <p>15 image, was there a way for the user to outline or</p> <p>16 demarcate those objects?</p> <p>17 A. Yes.</p> <p>18 Q. How would they do that?</p> <p>19 A. They could just put "German Shepherd" and</p> <p>20 "Retriever" to determine the type of dogs. So they</p> <p>21 could do it using annotations of text --</p> <p>22 Q. Was there a way --</p> <p>23 A. -- or they could use extracting tools</p> <p>24 where you could outline the object more accurately.</p> <p>25 Q. So you could outline the edges of the</p>	<p style="text-align: right;">Page 55</p> <p>1 link to to go find the product?</p> <p>2 A. 1993, URLs were just starting to come on</p> <p>3 board, if I recall right. URLs weren't particularly</p> <p>4 popular yet.</p> <p>5 Q. Not in 1993, but the QBIC project lasted</p> <p>6 throughout the '90s; correct?</p> <p>7 A. Yeah.</p> <p>8 Q. So say a user closer to 2000, they could</p> <p>9 insert a URL in that description?</p> <p>10 A. Yeah. Yeah.</p> <p>11 Q. So in addition to uploading the images,</p> <p>12 associated thumbnail, text descriptions, did object</p> <p>13 identification also occur at this database</p> <p>14 population step?</p> <p>15 A. It could.</p> <p>16 Q. And what is object identification?</p> <p>17 A. It's to be taking a region of an image and</p> <p>18 putting a label on it.</p> <p>19 Q. Say the last part?</p> <p>20 A. Putting a label on it.</p> <p>21 Q. Taking a region of an image and putting a</p> <p>22 label on it?</p> <p>23 A. Yeah.</p> <p>24 Q. Okay. And how would you -- and back up.</p> <p>25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?</p> <p>2 A. Right.</p> <p>3 Q. And you could do that with a manual -- the</p> <p>4 user could do that with a manual tool?</p> <p>5 A. Yeah.</p> <p>6 Q. Were there automatic tools that did --</p> <p>7 that did things like look for objects? So, for</p> <p>8 example, were there automatic tools that QBIC used,</p> <p>9 like edge detection or segmentation, that extracted</p> <p>10 object --</p> <p>11 A. You could --</p> <p>12 Q. -- shapes?</p> <p>13 A. You could use edge detection.</p> <p>14 Q. Okay. Did QBIC use edge detection?</p> <p>15 A. Yes, in certain aspects.</p> <p>16 Q. In what aspects?</p> <p>17 A. So on the annotation tool, if you compute</p> <p>18 gradients, you can make a better prediction of</p> <p>19 helping the person annotate.</p> <p>20 So it's very tedious to go through and</p> <p>21 annotate everything. Whereas if you have a tool,</p> <p>22 it'll tell you where it thinks the boundaries are.</p> <p>23 And you could speed up annotation quite a bit doing</p> <p>24 that.</p> <p>25 Q. 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<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data</p> <p>2 supplied and then also the user populating the</p> <p>3 database could also enter text descriptions?</p> <p>4 A. Right.</p> <p>5 Q. Okay. And were there limitations to the</p> <p>6 text descriptions or -- in terms of character</p> <p>7 limits?</p> <p>8 A. Probably were -- there . . .</p> <p>9 Q. But essentially, other than the character</p> <p>10 limits, could a -- could a user essentially put</p> <p>11 anything in the text description?</p> <p>12 A. You're saying any text in the text</p> <p>13 description?</p> <p>14 Q. Correct.</p> <p>15 A. Sure.</p> <p>16 Q. So, for example, if it were for a product,</p> <p>17 you could put price?</p> <p>18 A. Yep.</p> <p>19 Q. If -- you could put the name of the</p> <p>20 product?</p> <p>21 A. Yeah.</p> <p>22 Q. You could put where you could purchase the</p> <p>23 product?</p> <p>24 A. Yep.</p> <p>25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?</p> <p>2 A. Or an annotator, yeah.</p> <p>3 Q. Okay. And how would they do that?</p> <p>4 A. They could do it manually or they could</p> <p>5 use tools to help identify objects.</p> <p>6 Q. And manually how would that work?</p> <p>7 A. You look at the image and specify what</p> <p>8 objects are in the image.</p> <p>9 Q. And how would they specify it?</p> <p>10 A. Typing in a text phrase.</p> <p>11 Q. Okay. So if it was an image of a dog,</p> <p>12 they could type in "dog." for example?</p> <p>13 A. Yeah, exactly.</p> <p>14 Q. What if there were multiple objects in the</p> <p>15 image, was there a way for the user to outline or</p> <p>16 demarcate those objects?</p> <p>17 A. Yes.</p> <p>18 Q. How would they do that?</p> <p>19 A. They could just put "German Shepherd" and</p> <p>20 "Retriever" to determine the type of dogs. So they</p> <p>21 could do it using annotations of text --</p> <p>22 Q. Was there a way --</p> <p>23 A. -- or they could use extracting tools</p> <p>24 where you could outline the object more accurately.</p> <p>25 Q. So you could outline the edges of the</p>					
<p style="text-align: right;">Page 55</p> <p>1 link to to go find the product?</p> <p>2 A. 1993, URLs were just starting to come on</p> <p>3 board, if I recall right. URLs weren't particularly</p> <p>4 popular yet.</p> <p>5 Q. Not in 1993, but the QBIC project lasted</p> <p>6 throughout the '90s; correct?</p> <p>7 A. Yeah.</p> <p>8 Q. So say a user closer to 2000, they could</p> <p>9 insert a URL in that description?</p> <p>10 A. Yeah. Yeah.</p> <p>11 Q. So in addition to uploading the images,</p> <p>12 associated thumbnail, text descriptions, did object</p> <p>13 identification also occur at this database</p> <p>14 population step?</p> <p>15 A. It could.</p> <p>16 Q. And what is object identification?</p> <p>17 A. It's to be taking a region of an image and</p> <p>18 putting a label on it.</p> <p>19 Q. Say the last part?</p> <p>20 A. Putting a label on it.</p> <p>21 Q. Taking a region of an image and putting a</p> <p>22 label on it?</p> <p>23 A. Yeah.</p> <p>24 Q. Okay. And how would you -- and back up.</p> <p>25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?</p> <p>2 A. Right.</p> <p>3 Q. And you could do that with a manual -- the</p> <p>4 user could do that with a manual tool?</p> <p>5 A. Yeah.</p> <p>6 Q. Were there automatic tools that did --</p> <p>7 that did things like look for objects? So, for</p> <p>8 example, were there automatic tools that QBIC used,</p> <p>9 like edge detection or segmentation, that extracted</p> <p>10 object --</p> <p>11 A. You could --</p> <p>12 Q. -- shapes?</p> <p>13 A. You could use edge detection.</p> <p>14 Q. Okay. Did QBIC use edge detection?</p> <p>15 A. Yes, in certain aspects.</p> <p>16 Q. In what aspects?</p> <p>17 A. So on the annotation tool, if you compute</p> <p>18 gradients, you can make a better prediction of</p> <p>19 helping the person annotate.</p> <p>20 So it's very tedious to go through and</p> <p>21 annotate everything. Whereas if you have a tool,</p> <p>22 it'll tell you where it thinks the boundaries are.</p> <p>23 And you could speed up annotation quite a bit doing</p> <p>24 that.</p> <p>25 Q. So this tool that you're referring to, a</p>					

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 60 – 62:</p> <p>25 Q. Okay. And so let's say that objects were</p> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                  2 with those objects? Were they stored, for example,                  3 as a separate image or were they somehow linked to                  4 or associated with the image from which they were                  5 extracted?                  6 A. Typically they were linked.                  7 Q. They were linked to the source image?                  8 A. Yeah.                  9 Q. Okay. And this was done in the database?                  10 A. Could be done in the database.                  11 Q. How was it done?                  12 A. It was probably done in a text database or                  13 some sort of key index pair database. So database                  14 has a lot of different meanings.</p> <p>14 Q. Yeah, that was a bad question.                  15 Once the objects are identified within a                  16 particular source image that's stored in the                  17 database, how are the objects linked to the source                  18 image in the key --                  19 A. The key would have been, like, the image                  20 name and the value would have been the definition of                  21 the -- of the objects.</p> <p><i>Id.</i> at 103:</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p>

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		<p><i>Id.</i> at 129 – 131:</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes.</p> <p>2 Q. Okay. And so when a user clicks the I,</p> <p>3 you can see the I is highlighted in red?</p> <p>4 A. Yeah.</p> <p>5 Q. Was there a -- was there a similar</p> <p>6 functionality on the one on the website, where you</p> <p>7 clicked something and it lit up to tell the user</p> <p>8 that they were actually clicking the button?</p> <p>9 A. Yeah.</p> <p>10 Q. Okay. And then you go to the second page,</p> <p>11 and that is the full image of the thumbnail; is that</p> <p>12 correct?</p> <p>13 A. It's not of the thumbnail, it's the</p> <p>14 full-size image.</p> <p>15 Q. Well, yeah, it's the -- it's the</p> <p>16 full-sized image representation of the thumbnail on</p> <p>17 the first page; right?</p> <p>18 A. I would phrase it as the thumbnail is a</p> <p>19 representation of the full-sized image.</p> <p>20 Q. Understood. The first page is a</p> <p>21 thumbnail. You click on "Info" and then it returns</p> <p>22 to you the full-sized image?</p> <p>23 A. Yeah.</p> <p>24 Q. And that's reflected on the second page?</p> <p>25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that?</p> <p>2 A. That would be the file name of the image.</p> <p>3 Q. Okay. And so if you go back to the first</p> <p>4 page, when the pointer is pointed to I and it clicks</p> <p>5 on that, that is actually directing -- is going to</p> <p>6 direct the user to a separate link, correct, where</p> <p>7 the full-sized image is?</p> <p>8 A. Yes.</p> <p>9 Q. And the address of that link's on the</p> <p>10 second page at the top that says "Location";</p> <p>11 correct?</p> <p>12 A. Yeah, the URL.</p> <p>13 Q. Right. And so that would be similar to</p> <p>14 how the demo is on the website, it would go to a</p> <p>15 specific URL that's linked to where that image is</p> <p>16 stored?</p> <p>17 A. Yes.</p> <p>18 Q. Right? And that's how it would work on</p> <p>19 any implementation, any commercial implementation;</p> <p>20 correct?</p> <p>21 A. Yeah.</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 MR. EDWARDS: So we've been going for about an</p> <p>24 hour. How do you -- how are you feeling?</p> <p>25 THE WITNESS: I'm all right.</p>	

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 165:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p><i>Id.</i> at 180-181:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p> <hr/> <p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9       A. Correct.              10       Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13       A. That weren't described in the articles?              14       No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11       A. Yeah. We call them features.              12       Q. Features. Okay.              13           So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16       A. For example.              17       Q. Any other ones you can think of?              18       A. Nothing comes to mind.              19       Q. But when you refer to features they at              20 least include those four; is that correct?              21       A. Yes. Well, at least includes, yeah.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract, right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

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		<p><i>Id.</i> at 321:</p> <p>5 Q. Mr. Flickner, every commercial                      6 implementation of QBIC as of the Exhibit 3, IEEE                      7 1995 article, returned results of the matching                      8 process to the user in the form of a stored image                      9 and information associated with that image; is that                      10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.                      12 THE WITNESS: Yes.                      13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;                      15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	return the information to the network-enabled device; and	<p>QBIC discloses return the information to the network-enabled device.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape</p>

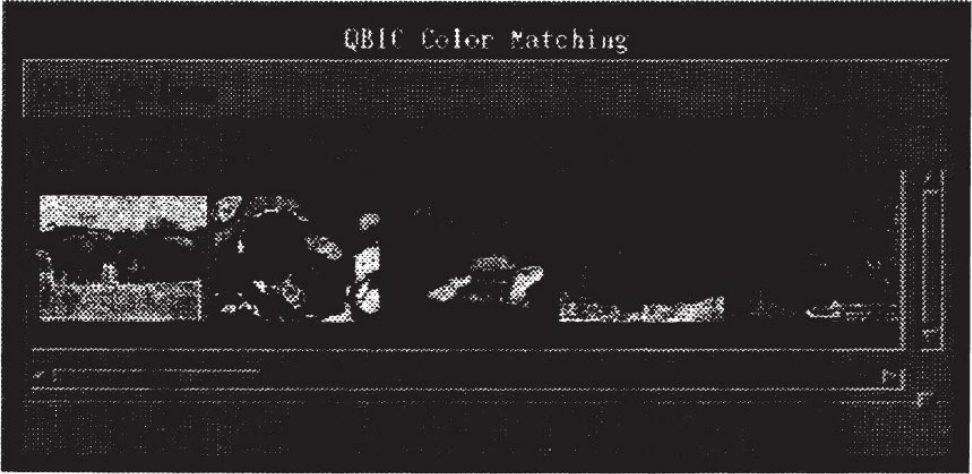
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		<p>(IBM 0002390–404) at 2395-96.</p> <p><b>4.2. Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of (<i>R, G, B</i>) sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <i>n</i>th best match (<i>n</i> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p><b>5. Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>(buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape                      (IBM 0002390–404) at Figs. 7–9</p>

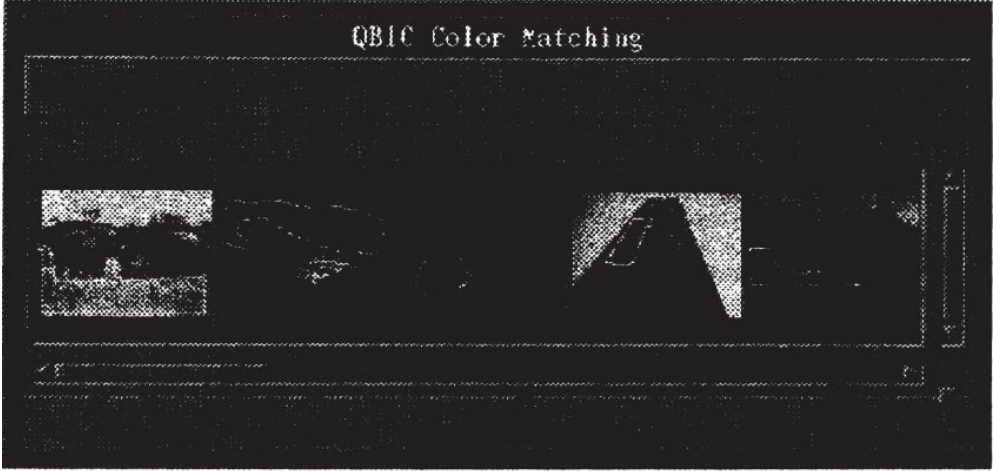
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 7: Result of query by example using color only.</p>

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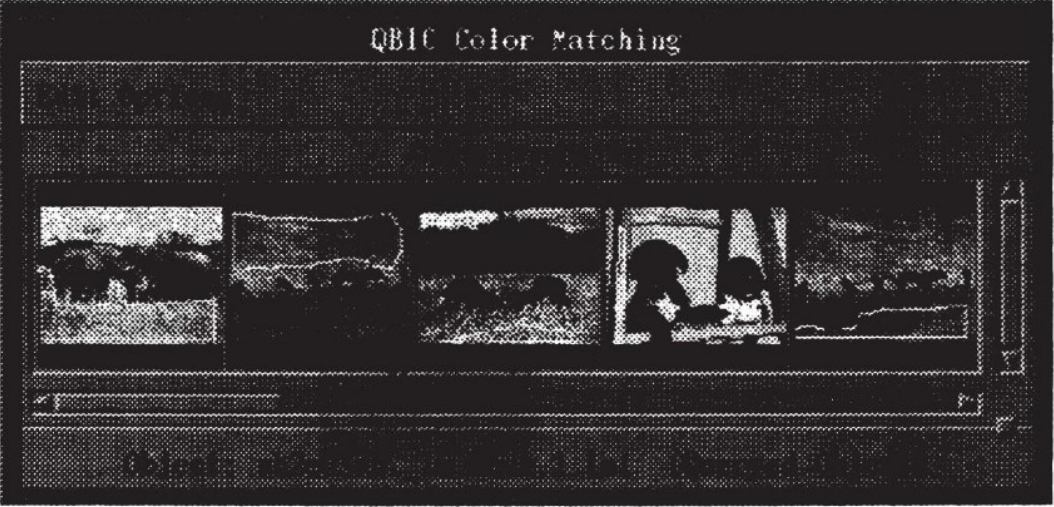
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 8: Result of query by example using texture only.</p>



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		 <p>Figure 9: Result of query by example using color and texture.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>



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		<p>The diagram illustrates the QBIC system architecture, divided into two main parts: database population (top) and query (bottom).</p> <p><b>Database Population (Top):</b></p> <ul style="list-style-type: none"> <li><b>Input:</b> Still images and Video.</li> <li><b>Processing:</b> Video is processed through "Feature extraction" to produce "Representative frames" and "Motion objects". Still images are processed through "Object identification" (aided by a "User") to produce "Objects".</li> <li><b>Feature Extraction:</b> This step takes "Objects" and "Motion objects" as input and produces "Feature extraction" results, which are categorized into "Scene" (Sketch, Positional color/texture) and "Object" (User defined, Texture, Color, Location, Shape).</li> <li><b>Database:</b> The extracted features are stored in a "Database".</li> <li><b>Filtering/Indexing:</b> This process interacts with the Database to manage the stored data.</li> </ul> <p><b>Query (Bottom):</b></p> <ul style="list-style-type: none"> <li><b>Query Interface:</b> A "User" provides input through this interface, which includes categories: Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, User defined, and Existing image.</li> <li><b>Match Engine:</b> This engine processes the query against the database and returns results categorized by: Color, Texture, Shape, Multiobject, Sketch, Location, Text, Positional color/texture, Object motion, Camera motion, and User defined.</li> <li><b>Output:</b> The system returns "Best matches returned in similarity order" to the "User".</li> </ul> <p>Figure 2. QBIC database population (top) and query (bottom) architecture.</p>

*Id.* at Fig. 2.

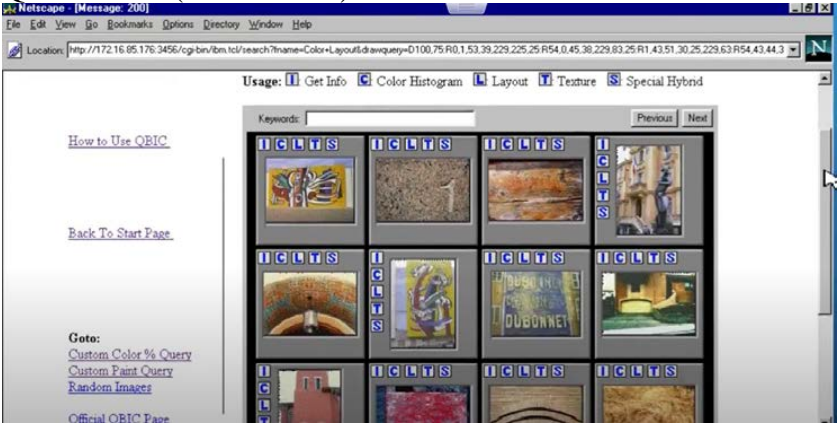

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		<div> <p>Figure 8. Top: Query by texture. Texture sampler on left (query specification is right middle texture); best 21 results from a 12,966-picture database on right. Bottom: Query by shape. User input shape on left and query results on right.</p> </div> <p>8</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.”</p> <p><i>Id.</i> at pp. 20–21.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>QBIC Demo (IBM000747):</b></p>  <p><b>QBIC Demo (IBM000747):</b></p> 

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		<p>Flickner Depo at 41-42:</p> <p>18 Q. So if I'm understanding this right, you                      19 could take a query video, the system would extract                      20 frames, which would then extract features from it,                      21 and then the system would return either shot clips                      22 or key frames; is that right?</p> <p>1 A. Right.</p> <p>2 Q. Okay. And how many key frames would be                      3 returned?</p> <p>4 A. It depends how many you requested.</p> <p>5 Q. Could you alter how many you request?</p> <p>6 A. Probably.</p> <p>7 Q. Could you return key frames based on some                      8 defined threshold of the distance?</p> <p>9 A. Probably.</p> <p>Flickner Depo at 50:</p> <p>7 Q. And so if I clicked on this T, and it                      8 used the texture features, what would -- what would                      9 the system do?</p> <p>10 A. It would return the list of stamps based                      11 on similarity and texture.</p> <p>12 Q. And how would it decide which stamps were                      13 the most similar to that query image?</p> <p>14 A. It would use those texture features to                      15 compute it, and then it -- I think it was using L                      16 to distance.</p> <p>Flickner Depo at 162-163:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>15 Q. How did the trade -- how did the                      16 technology implemented in the trademark demo decide                      17 how many results to return to the user?</p> <p>18 A. So it was -- it was an exact match or a                      19 binary search for the text fields using some                      20 metric, like string at a distance, or something                      21 like that, and that would give you a list and a                      22 rank by the image features.</p> <p>7 Q. Okay. What about the -- the stamps demo,                      8 going back to that, did the stamps demo return a                      9 set number of results for each query?</p> <p>10 For example, was it always the original                      11 image and 11 results?</p> <p>12 A. Again, the output -- the number of                      13 results output was probably a parameterized                      14 option -- option, and I don't recall having text                      15 ability on the stamp demo.</p> <p>16 Q. So you think that the user may have been                      17 able to indicate to the QBIC system how many                      18 results he wanted to see?</p> <p>19 A. The user could configure the -- the GUI                      20 to display a certain number of results.</p> <p><i>See also</i> Flickner Depo at 25-26, 54-55, 78-79, 131-132, 201-202, 209-210.</p> <p>Flickner 8/29/23 Depo at 68-72:</p>

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		<p>22 Q. Okay. And in what form would those 23 results be displayed to me? For images would they 24 be displayed as a thumbnail? 25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those 2 be displayed to you? 3 A. It could be as a thumbnail or as a short 4 video clip or as a single representative frame. 5 Q. Okay. So they could be -- so for a video, 6 there's a video that matched the image query of an 7 r-frame, the results I could get back could include 8 three things. It could be a still image, it could 9 be a thumbnail, or it could be an r-frame 10 representation? 11 A. R-frame, I think, is representative frame. 12 So it was a key frame in that video sequence, 13 summary frame. 14 Q. Once I ran a query on an r-frame; right? 15 Well, let's stop there. 16 If I run a query on still images, 17 typically the results I would get back are 18 thumbnails that are most similar to the 19 characteristics which I queried from the query 20 image; right? 21 A. You could get thumbnails back. You could 22 also get the full-sized image back. 23 Q. Okay. 24 A. Thumbnail is a tool for helping you return 25 lots of results and quickly scan it.</p>	
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		<table border="0"> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I</p> <p>2 have to click on the thumbnail in order to bring up</p> <p>3 the full-sized image?</p> <p>4 A. You could.</p> <p>5 Q. Otherwise I could automatically receive</p> <p>6 the full-sized image as part of the result?</p> <p>7 A. You could.</p> <p>8 Q. Okay. So walk through that process if I'm</p> <p>9 using an r-frame of a video. If I do a -- if I run</p> <p>10 a query on an r-frame of a video as a -- an image</p> <p>11 query, how could I get the results back?</p> <p>12 MR. HANSEN: Objection; vague and ambiguous.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. In what form would I get the results back?</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 THE WITNESS: You could get back the still</p> <p>17 r-frame, representative frame, you could get back</p> <p>18 the thumbnail, or you could get back the entire</p> <p>19 video clip that that r-frame represents, a few</p> <p>20 frames.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. If I received a thumbnail or the r-frame,</p> <p>23 would there be some sort of link I could click on to</p> <p>24 get the underlying full video?</p> <p>25 MR. HANSEN: Objection; vague and ambiguous,</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic</p> <p>2 units initially returned in a video query."</p> <p>3 Meaning the r-frames?</p> <p>4 A. Correct.</p> <p>5 Q. "For example, in a query for shots that</p> <p>6 are dominantly red, a set of r-frames will be</p> <p>7 displayed. To see the actual video shot, the user</p> <p>8 clicks on the displayed r-frame icon."</p> <p>9 A. Yep.</p> <p>10 Q. And that was one of the ways you were</p> <p>11 describing that the results of a r-frame query would</p> <p>12 be returned to the user?</p> <p>13 A. Right.</p> <p>14 Q. Do you know if that was the preferred way</p> <p>15 that was used in demos in commercial applications?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous,</p> <p>17 lacks foundation.</p> <p>18 MR. STRAUSSMAN: You can answer.</p> <p>19 THE WITNESS: I don't know.</p> <p>20 BY MR. EDWARDS:</p> <p>21 Q. But, Mr. Flickner, this -- generally this</p> <p>22 article represents the status of the QBIC technology</p> <p>23 as of the date of this publication, which is</p> <p>24 September 1995; is that right?</p> <p>25 A. Actually a little before September 1995</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 71</p> <p>1 calls for speculation.</p> <p>2 THE WITNESS: As I recall -- I'm not sure</p> <p>3 definitely, but, yes, this is -- you could do that.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. So let's go to page IBM 898.</p> <p>6 So if you'll take -- just read that</p> <p>7 paragraph that starts with the header</p> <p>8 "Representative Frame Generation."</p> <p>9 MR. STRAUSSMAN: And if you need to read</p> <p>10 anything else to put it in context, feel free to do</p> <p>11 so.</p> <p>12 THE WITNESS: Okay.</p> <p>13 (Witness reviews document.)</p> <p>14 THE WITNESS: So what was your question, again?</p> <p>15 BY MR. EDWARDS:</p> <p>16 Q. If you go to the sentence that says,</p> <p>17 "First" -- it's the second sentence in that</p> <p>18 paragraph. It says, "First, during database</p> <p>19 population, r-frames are treated as still images."</p> <p>20 See that?</p> <p>21 A. Yeah.</p> <p>22 Q. And that's what you told me earlier;</p> <p>23 correct?</p> <p>24 A. Yeah.</p> <p>25 Q. And then if you go to the next sentence,</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 73</p> <p>1 because --</p> <p>2 Q. Okay.</p> <p>3 A. -- there's an editorial process.</p> <p>4 Q. Say that last part?</p> <p>5 A. There's an editorial process. You submit</p> <p>6 it, they edit and make changes and eventually it</p> <p>7 appears.</p> <p>8 Q. Right. So what you're saying is there's</p> <p>9 some lag between the time that you wrote the article</p> <p>10 and the time it was published?</p> <p>11 A. Yeah.</p> <p>12 Q. So this article -- but this article</p> <p>13 represents the state of the QBIC technology at least</p> <p>14 as of September 1995?</p> <p>15 A. Yeah. Yes.</p> <p>16 Q. And then let's go to IBM 900.</p> <p>17 And take your time to orient yourself on</p> <p>18 that page, but what I really want to ask you about</p> <p>19 is the last paragraph on the left-hand column going</p> <p>20 up to the top of the right-hand column.</p> <p>21 A. Yep.</p> <p>22 Q. So it says this paper describes [as read],</p> <p>23 "a prototype system that uses image and video</p> <p>24 content as the basis for retrievals."</p> <p>25 Is that right?</p> </td> </tr> </table>	<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I</p> <p>2 have to click on the thumbnail in order to bring up</p> <p>3 the full-sized image?</p> <p>4 A. You could.</p> <p>5 Q. Otherwise I could automatically receive</p> <p>6 the full-sized image as part of the result?</p> <p>7 A. You could.</p> <p>8 Q. Okay. So walk through that process if I'm</p> <p>9 using an r-frame of a video. If I do a -- if I run</p> <p>10 a query on an r-frame of a video as a -- an image</p> <p>11 query, how could I get the results back?</p> <p>12 MR. HANSEN: Objection; vague and ambiguous.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. In what form would I get the results back?</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 THE WITNESS: You could get back the still</p> <p>17 r-frame, representative frame, you could get back</p> <p>18 the thumbnail, or you could get back the entire</p> <p>19 video clip that that r-frame represents, a few</p> <p>20 frames.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. If I received a thumbnail or the r-frame,</p> <p>23 would there be some sort of link I could click on to</p> <p>24 get the underlying full video?</p> <p>25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic</p> <p>2 units initially returned in a video query."</p> <p>3 Meaning the r-frames?</p> <p>4 A. Correct.</p> <p>5 Q. "For example, in a query for shots that</p> <p>6 are dominantly red, a set of r-frames will be</p> <p>7 displayed. To see the actual video shot, the user</p> <p>8 clicks on the displayed r-frame icon."</p> <p>9 A. Yep.</p> <p>10 Q. And that was one of the ways you were</p> <p>11 describing that the results of a r-frame query would</p> <p>12 be returned to the user?</p> <p>13 A. Right.</p> <p>14 Q. Do you know if that was the preferred way</p> <p>15 that was used in demos in commercial applications?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous,</p> <p>17 lacks foundation.</p> <p>18 MR. STRAUSSMAN: You can answer.</p> <p>19 THE WITNESS: I don't know.</p> <p>20 BY MR. EDWARDS:</p> <p>21 Q. But, Mr. Flickner, this -- generally this</p> <p>22 article represents the status of the QBIC technology</p> <p>23 as of the date of this publication, which is</p> <p>24 September 1995; is that right?</p> <p>25 A. Actually a little before September 1995</p>	<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.</p> <p>2 THE WITNESS: As I recall -- I'm not sure</p> <p>3 definitely, but, yes, this is -- you could do that.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. So let's go to page IBM 898.</p> <p>6 So if you'll take -- just read that</p> <p>7 paragraph that starts with the header</p> <p>8 "Representative Frame Generation."</p> <p>9 MR. STRAUSSMAN: And if you need to read</p> <p>10 anything else to put it in context, feel free to do</p> <p>11 so.</p> <p>12 THE WITNESS: Okay.</p> <p>13 (Witness reviews document.)</p> <p>14 THE WITNESS: So what was your question, again?</p> <p>15 BY MR. EDWARDS:</p> <p>16 Q. If you go to the sentence that says,</p> <p>17 "First" -- it's the second sentence in that</p> <p>18 paragraph. It says, "First, during database</p> <p>19 population, r-frames are treated as still images."</p> <p>20 See that?</p> <p>21 A. Yeah.</p> <p>22 Q. And that's what you told me earlier;</p> <p>23 correct?</p> <p>24 A. Yeah.</p> <p>25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --</p> <p>2 Q. Okay.</p> <p>3 A. -- there's an editorial process.</p> <p>4 Q. Say that last part?</p> <p>5 A. There's an editorial process. You submit</p> <p>6 it, they edit and make changes and eventually it</p> <p>7 appears.</p> <p>8 Q. Right. So what you're saying is there's</p> <p>9 some lag between the time that you wrote the article</p> <p>10 and the time it was published?</p> <p>11 A. Yeah.</p> <p>12 Q. So this article -- but this article</p> <p>13 represents the state of the QBIC technology at least</p> <p>14 as of September 1995?</p> <p>15 A. Yeah. Yes.</p> <p>16 Q. And then let's go to IBM 900.</p> <p>17 And take your time to orient yourself on</p> <p>18 that page, but what I really want to ask you about</p> <p>19 is the last paragraph on the left-hand column going</p> <p>20 up to the top of the right-hand column.</p> <p>21 A. Yep.</p> <p>22 Q. So it says this paper describes [as read],</p> <p>23 "a prototype system that uses image and video</p> <p>24 content as the basis for retrievals."</p> <p>25 Is that right?</p>
<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I</p> <p>2 have to click on the thumbnail in order to bring up</p> <p>3 the full-sized image?</p> <p>4 A. You could.</p> <p>5 Q. Otherwise I could automatically receive</p> <p>6 the full-sized image as part of the result?</p> <p>7 A. You could.</p> <p>8 Q. Okay. So walk through that process if I'm</p> <p>9 using an r-frame of a video. If I do a -- if I run</p> <p>10 a query on an r-frame of a video as a -- an image</p> <p>11 query, how could I get the results back?</p> <p>12 MR. HANSEN: Objection; vague and ambiguous.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. In what form would I get the results back?</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 THE WITNESS: You could get back the still</p> <p>17 r-frame, representative frame, you could get back</p> <p>18 the thumbnail, or you could get back the entire</p> <p>19 video clip that that r-frame represents, a few</p> <p>20 frames.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. If I received a thumbnail or the r-frame,</p> <p>23 would there be some sort of link I could click on to</p> <p>24 get the underlying full video?</p> <p>25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic</p> <p>2 units initially returned in a video query."</p> <p>3 Meaning the r-frames?</p> <p>4 A. Correct.</p> <p>5 Q. "For example, in a query for shots that</p> <p>6 are dominantly red, a set of r-frames will be</p> <p>7 displayed. To see the actual video shot, the user</p> <p>8 clicks on the displayed r-frame icon."</p> <p>9 A. Yep.</p> <p>10 Q. And that was one of the ways you were</p> <p>11 describing that the results of a r-frame query would</p> <p>12 be returned to the user?</p> <p>13 A. Right.</p> <p>14 Q. Do you know if that was the preferred way</p> <p>15 that was used in demos in commercial applications?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous,</p> <p>17 lacks foundation.</p> <p>18 MR. STRAUSSMAN: You can answer.</p> <p>19 THE WITNESS: I don't know.</p> <p>20 BY MR. EDWARDS:</p> <p>21 Q. But, Mr. Flickner, this -- generally this</p> <p>22 article represents the status of the QBIC technology</p> <p>23 as of the date of this publication, which is</p> <p>24 September 1995; is that right?</p> <p>25 A. Actually a little before September 1995</p>					
<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.</p> <p>2 THE WITNESS: As I recall -- I'm not sure</p> <p>3 definitely, but, yes, this is -- you could do that.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. So let's go to page IBM 898.</p> <p>6 So if you'll take -- just read that</p> <p>7 paragraph that starts with the header</p> <p>8 "Representative Frame Generation."</p> <p>9 MR. STRAUSSMAN: And if you need to read</p> <p>10 anything else to put it in context, feel free to do</p> <p>11 so.</p> <p>12 THE WITNESS: Okay.</p> <p>13 (Witness reviews document.)</p> <p>14 THE WITNESS: So what was your question, again?</p> <p>15 BY MR. EDWARDS:</p> <p>16 Q. If you go to the sentence that says,</p> <p>17 "First" -- it's the second sentence in that</p> <p>18 paragraph. It says, "First, during database</p> <p>19 population, r-frames are treated as still images."</p> <p>20 See that?</p> <p>21 A. Yeah.</p> <p>22 Q. And that's what you told me earlier;</p> <p>23 correct?</p> <p>24 A. Yeah.</p> <p>25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --</p> <p>2 Q. Okay.</p> <p>3 A. -- there's an editorial process.</p> <p>4 Q. Say that last part?</p> <p>5 A. There's an editorial process. You submit</p> <p>6 it, they edit and make changes and eventually it</p> <p>7 appears.</p> <p>8 Q. Right. So what you're saying is there's</p> <p>9 some lag between the time that you wrote the article</p> <p>10 and the time it was published?</p> <p>11 A. Yeah.</p> <p>12 Q. So this article -- but this article</p> <p>13 represents the state of the QBIC technology at least</p> <p>14 as of September 1995?</p> <p>15 A. Yeah. Yes.</p> <p>16 Q. And then let's go to IBM 900.</p> <p>17 And take your time to orient yourself on</p> <p>18 that page, but what I really want to ask you about</p> <p>19 is the last paragraph on the left-hand column going</p> <p>20 up to the top of the right-hand column.</p> <p>21 A. Yep.</p> <p>22 Q. So it says this paper describes [as read],</p> <p>23 "a prototype system that uses image and video</p> <p>24 content as the basis for retrievals."</p> <p>25 Is that right?</p>					

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 129 – 131:</p> <p>9 Q. Okay? And if you want to compare, or you                      10 can take my word for it, the image in the top left                      11 corner, the querying image, is the same one that was                      12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I                      15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full                      22 resolution.</p> <p>23 Q. Okay. And was there a similar                      24 functionality on the demo app on the -- on the                      25 website in the '90s?</p>



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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p> <p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 165:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.</p> <p>2 Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6 A. Yep.</p> <p>7 Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9 A. Correct.</p> <p>10 Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13 Do you see that?</p> <p>14 A. Yes.</p> <p>15 Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18 A. Yes.</p> <p>19 Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21 A. Typically, yes.</p> <p><i>Id.</i> at 180-181:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p> <hr/> <p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.</p>

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Invalidity Chart for U.S. Patent 7,881,529 based on the Query by Image and Video Content (“QBIC”) System

Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9       A. Correct.              10       Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13       A. That weren't described in the articles?              14 No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11       A. Yeah. We call them features.              12       Q. Features. Okay.              13           So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16       A. For example.              17       Q. Any other ones you can think of?              18       A. Nothing comes to mind.              19       Q. But when you refer to features they at              20 least include those four; is that correct?              21       A. Yes. Well, at least includes, yeah.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for an input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>

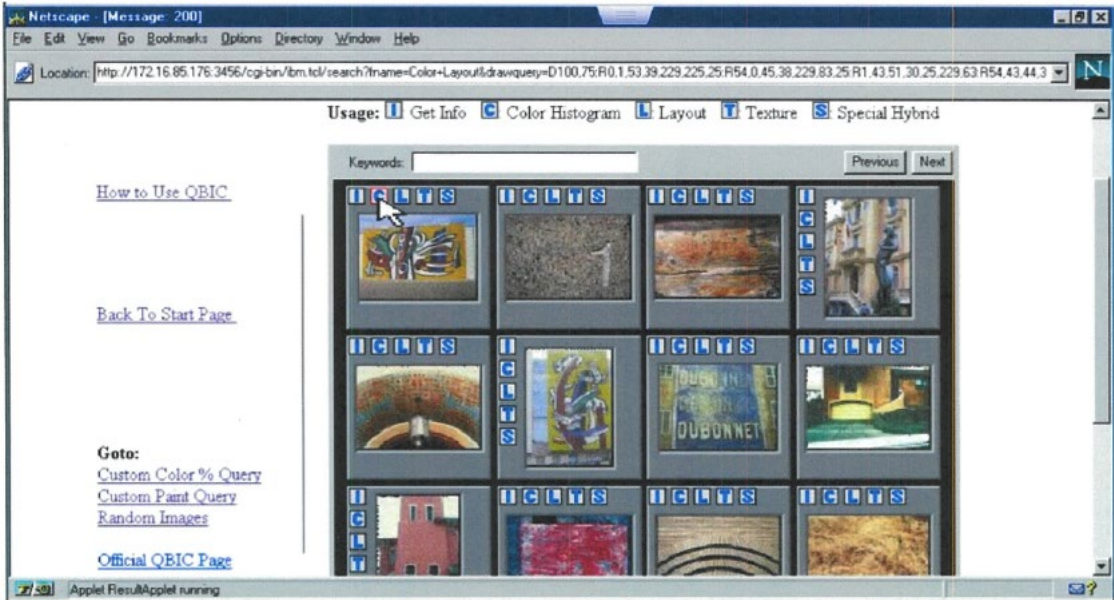
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 321:</p> <p>5 Q. Mr. Flickner, every commercial 6 implementation of QBIC as of the Exhibit 3, IEEE 7 1995 article, returned results of the matching 8 process to the user in the form of a stored image 9 and information associated with that image; is that 10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation. 12 THE WITNESS: Yes. 13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image; 15 correct? 16 A. Thumbnail is an image.</p> <p>Flickner 8/29/23 Depo Ex. 7 at 1:</p>

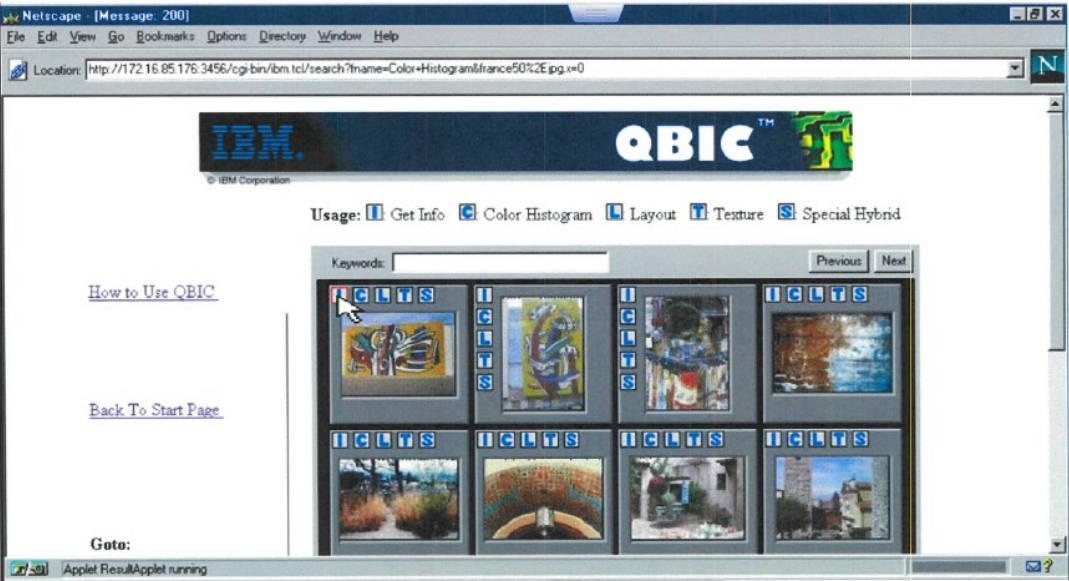
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo Ex. 8 at 1:</p>

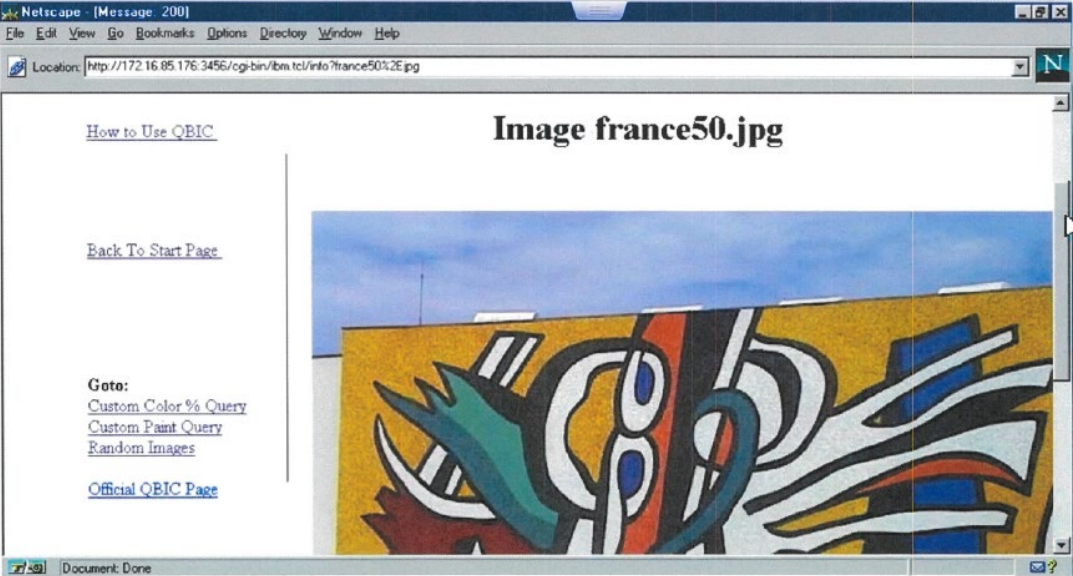
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2:</p>

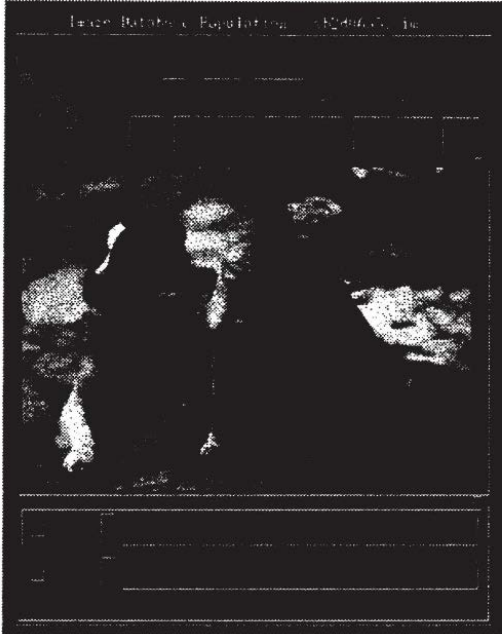
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1G]	the network-enabled device further programmed to present the information related to the	QBIC discloses the network-enabled device further programmed to present the information related to the object to a user.

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	object to a user.	<p><i>See</i> Limitation 1F.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396</p> <p>4.1. <b>Object/element identification</b></p> <p>Our user interface for object identification, shown in figure 4, allows for user assisted object identification. This interface is made up of four parts (listed from top to bottom): the window menu, the tool selection buttons, the image display area, and the object entry area. From the File menu selection the user has the ability to save the current image and objects and load another image. The Options menu contains selections for tuning panels for Snakes, Flood-Fill, as well as a Zoom selection, useful for working with very large or small images.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2400, Fig. 4</p>  <p>Figure 4: Object Identification Tool. Note for example, the right dog’s ear, which has been outlined.</p>



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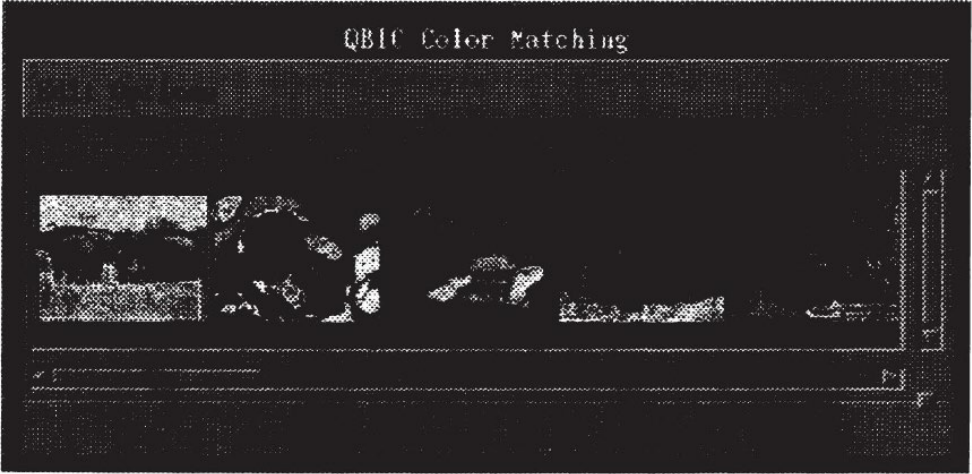
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 8</p> <p>4.2. <b>Performing Queries</b></p> <p>Our user interface for query allows a user to specify color, texture, and shape properties visually by example. Each property has an associated “picker”. The color picker consists of a standard set of (<i>R, G, B</i>) sliders and a color patch showing the currently selected color. We have also used various color wheels and IHS color pickers. The texture picker presents patches of synthetically generated textures that span the space of the texture parameters, and the user selects the texture for a query. For shape, the picker is a blackboard drawing area in which the user draws a shape. The color and shape pickers are shown in Figure 5.</p> <p>All the above measures can be used individually or in any weighted combination (as selected by the user), allowing, for example, queries based on color only, on color and shape, and so on. When a query is run, results are displayed in order, from best match to <i>n</i>th best match (<i>n</i> is user-settable). Any returned hit can be used as the basis for subsequent queries of the form “Find images like this one”. We also have a variety of utility functions available for any returned image including display its similarity value to the query image, display the image full scale (only thumbnails are displayed directly as a result of a query), use it as the basis of the next query to allow iterated query refinement, place the image in a holding area for later processing, perform a user defined image operation or comparison, and so on.</p> <p>5. <b>Sample Query Results</b></p> <p>Sample query results are shown in the following figures. The reproductions are in black and white and do not show the color component which, for these images, is an important component. Figures 6 through 11 and 12 show a color query, a texture query, a combined color and texture query, a shape query, and a query by sketch. All queries are done on a database of about 1000 objects with a wide diversity of photo clip art subject matter (buildings, people, landscapes, animals, etc.). Formal experiments to access the recall and precision rate of QBIC queries are in progress.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at Figs. 7–9</p>

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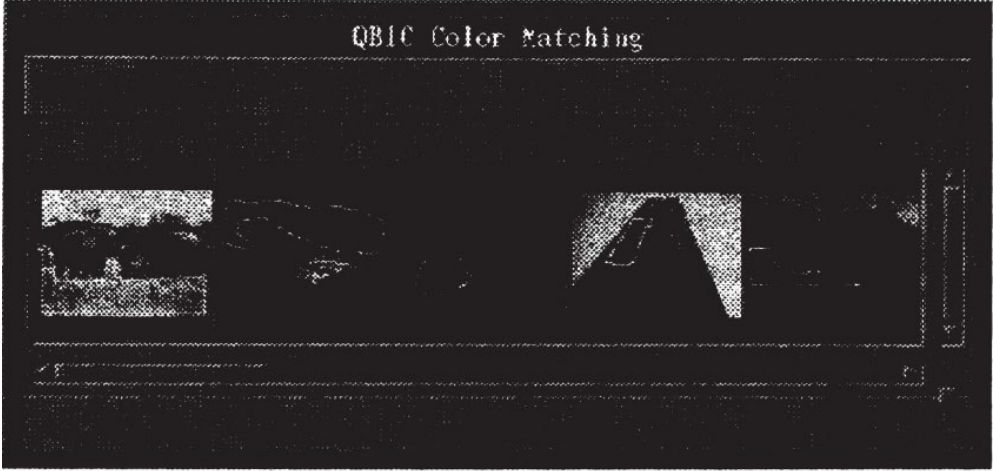
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 7: Result of query by example using color only.</p>



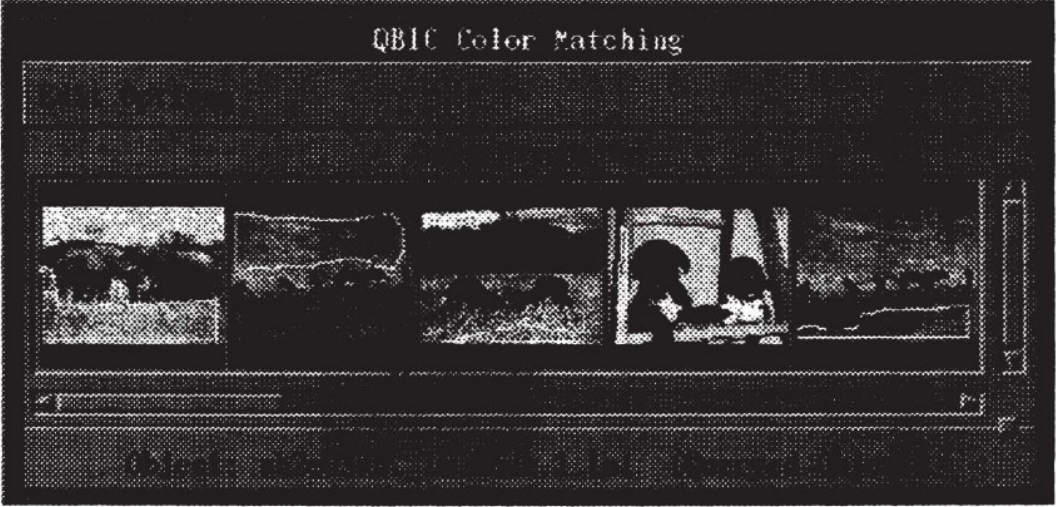
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 8: Result of query by example using texture only.</p>

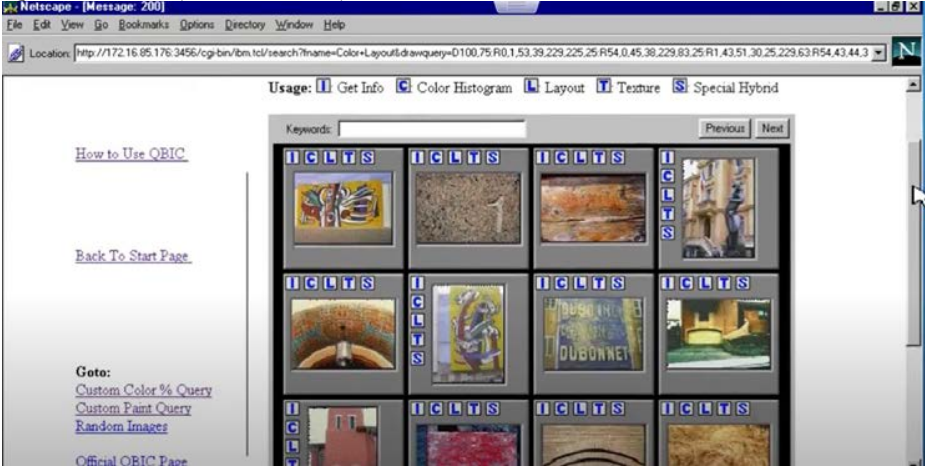

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 9: Result of query by example using color and texture.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>QBIC Demo (IBM000747):</b></p>  <p><b>QBIC Demo (IBM000747):</b></p> 

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 63:</p> <p>13 Q. And what would the system return, once a 14 user searched an example image? 15 A. A list of images. Typically, thumbnails.</p> <p>Flickner 8/29/23 Depo at 68–72:</p>

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		<p>22 Q. Okay. And in what form would those 23 results be displayed to me? For images would they 24 be displayed as a thumbnail? 25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those 2 be displayed to you? 3 A. It could be as a thumbnail or as a short 4 video clip or as a single representative frame. 5 Q. Okay. So they could be -- so for a video, 6 there's a video that matched the image query of an 7 r-frame, the results I could get back could include 8 three things. It could be a still image, it could 9 be a thumbnail, or it could be an r-frame 10 representation? 11 A. R-frame, I think, is representative frame. 12 So it was a key frame in that video sequence, 13 summary frame. 14 Q. Once I ran a query on an r-frame; right? 15 Well, let's stop there. 16 If I run a query on still images, 17 typically the results I would get back are 18 thumbnails that are most similar to the 19 characteristics which I queried from the query 20 image; right? 21 A. You could get thumbnails back. You could 22 also get the full-sized image back. 23 Q. Okay. 24 A. Thumbnail is a tool for helping you return 25 lots of results and quickly scan it.</p>	
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Element	'529 Claim Recitation	Exemplary Citations in Reference	
		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I 2 have to click on the thumbnail in order to bring up 3 the full-sized image? 4 A. You could. 5 Q. Otherwise I could automatically receive 6 the full-sized image as part of the result? 7 A. You could. 8 Q. Okay. So walk through that process if I'm 9 using an r-frame of a video. If I do a -- if I run 10 a query on an r-frame of a video as a -- an image 11 query, how could I get the results back? 12 MR. HANSEN: Objection; vague and ambiguous. 13 BY MR. EDWARDS: 14 Q. In what form would I get the results back? 15 MR. HANSEN: Same objection. 16 THE WITNESS: You could get back the still 17 r-frame, representative frame, you could get back 18 the thumbnail, or you could get back the entire 19 video clip that that r-frame represents, a few 20 frames. 21 BY MR. EDWARDS: 22 Q. If I received a thumbnail or the r-frame, 23 would there be some sort of link I could click on to 24 get the underlying full video? 25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic 2 units initially returned in a video query." 3 Meaning the r-frames? 4 A. Correct. 5 Q. "For example, in a query for shots that 6 are dominantly red, a set of r-frames will be 7 displayed. To see the actual video shot, the user 8 clicks on the displayed r-frame icon." 9 A. Yep. 10 Q. And that was one of the ways you were 11 describing that the results of a r-frame query would 12 be returned to the user? 13 A. Right. 14 Q. Do you know if that was the preferred way 15 that was used in demos in commercial applications? 16 MR. HANSEN: Objection; vague and ambiguous, 17 lacks foundation. 18 MR. STRAUSSMAN: You can answer. 19 THE WITNESS: I don't know. 20 BY MR. EDWARDS: 21 Q. But, Mr. Flickner, this -- generally this 22 article represents the status of the QBIC technology 23 as of the date of this publication, which is 24 September 1995; is that right? 25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation. 2 THE WITNESS: As I recall -- I'm not sure 3 definitely, but, yes, this is -- you could do that. 4 BY MR. EDWARDS: 5 Q. So let's go to page IBM 898. 6 So if you'll take -- just read that 7 paragraph that starts with the header 8 "Representative Frame Generation." 9 MR. STRAUSSMAN: And if you need to read 10 anything else to put it in context, feel free to do 11 so. 12 THE WITNESS: Okay. 13 (Witness reviews document.) 14 THE WITNESS: So what was your question, again? 15 BY MR. EDWARDS: 16 Q. If you go to the sentence that says, 17 "First" -- it's the second sentence in that 18 paragraph. It says, "First, during database 19 population, r-frames are treated as still images." 20 See that? 21 A. Yeah. 22 Q. And that's what you told me earlier; 23 correct? 24 A. Yeah. 25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because -- 2 Q. Okay. 3 A. -- there's an editorial process. 4 Q. Say that last part? 5 A. There's an editorial process. You submit 6 it, they edit and make changes and eventually it 7 appears. 8 Q. Right. So what you're saying is there's 9 some lag between the time that you wrote the article 10 and the time it was published? 11 A. Yeah. 12 Q. So this article -- but this article 13 represents the state of the QBIC technology at least 14 as of September 1995? 15 A. Yeah. Yes. 16 Q. And then let's go to IBM 900. 17 And take your time to orient yourself on 18 that page, but what I really want to ask you about 19 is the last paragraph on the left-hand column going 20 up to the top of the right-hand column. 21 A. Yep. 22 Q. So it says this paper describes [as read], 23 "a prototype system that uses image and video 24 content as the basis for retrievals." 25 Is that right?</p>

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		<p><i>Id.</i> at 129 – 131:</p> <p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p> <p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 161:</p> <p>1 Q. And does the thumbnail also provide links 2 to information about the image that was associated 3 with the image in the database? 4 A. Yes. 5 Q. And, again, that can be that -- whatever 6 information that the user inputted or was associated 7 with the image from the source? 8 A. Yes. 9 Q. Could the results also display a matching 10 score so the user could see how well the particular 11 result matched to the -- to the query image? 12 A. It could.</p> <p><i>Id.</i> at 165:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 165</p> <p>1     A. I think that's correct.</p> <p>2     Q. Okay. And here we're showing the query</p> <p>3 image is a -- is a heart -- a heart pattern with</p> <p>4 Love's next to it. It's in the top part of the</p> <p>5 screenshot.</p> <p>6     A. Yep.</p> <p>7     Q. And the results are shown below that under</p> <p>8 "Shapes judged to be most similar"; is that right?</p> <p>9     A. Correct.</p> <p>10    Q. Okay. And the results also show</p> <p>11 underneath each one the trademark number followed by</p> <p>12 matching score after the colon.</p> <p>13        Do you see that?</p> <p>14    A. Yes.</p> <p>15    Q. And this is -- is this an example of what</p> <p>16 you told me before, that matching scores could be</p> <p>17 presented to the user?</p> <p>18    A. Yes.</p> <p>19    Q. And so is it the lower the score, the</p> <p>20 closer the match; is that correct?</p> <p>21    A. Typically, yes.</p> <p><i>Id.</i> at 180-181:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:                  2 Q. So take a look at the bottom of IBM                  3 page 40 to the top of 41.                  4 So it says, "When you search for an image                  5 by content, your query identifies one or more                  6 features for the search (such as average color), a                  7 source for each feature (such as an example image),                  8 and a target set of cataloged images. The Image                  9 Extender computes the feature value of the source                  10 and compares it to the cataloged feature values for                  11 the target images. It then computes a score that                  12 indicates how similar the feature values of the                  13 target images are to the source. You can have the                  14 Image Extender return the images whose features are                  15 most similar to the source. The Image Extender will                  16 return the handle of each image and the image                  17 score."                  18 Did I read that correctly?                  19 A. Yes.                  20 Q. So if you were to use the image extender                  21 in the DB2 universal database when you search for an                  22 image by content using a query image, it will                  23 extract the features for whatever you want, compare                  24 that to the features of images in a database, return                  25 your results, which includes the score for the</p> <hr/> <p style="text-align: right;">Page 181</p> <p>1 match?                  2 A. Correct.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 305:</p> <p>7           So these articles describe various              8 features of various versions of QBIC; right?              9       A. Correct.              10       Q. Do they describe any features -- does the              11 demo you operated include any features that weren't              12 described in these articles?              13       A. That weren't described in the articles?              14 No.</p> <p><i>Id.</i> at 35:</p> <p>6       Q. Okay. And the analytics that you're              7 talking about, where you extract these characters              8 from the image, that is -- those run on both the              9 query image and the images that are stored in the              10 database; is that right?              11       A. Yeah. We call them features.              12       Q. Features. Okay.              13           So when you say "features," you're talking              14 about the features that we talked about before:              15 Color, texture, shape, sketch?              16       A. For example.              17       Q. Any other ones you can think of?              18       A. Nothing comes to mind.              19       Q. But when you refer to features they at              20 least include those four; is that correct?              21       A. Yes. Well, at least includes, yeah.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 109-110:</p> <p>12 Q. And it indicates the demo does                      13 content-based search based on color histogram, color                      14 position and texture.                      15 Do you see that?                      16 A. Yep.                      17 Q. That's a limited number of the features                      18 that QBIC could extract; right?                      19 A. Correct.                      20 Q. Was there -- for those demo applications                      21 that you -- that you all created, was there a                      22 conscious effort to limit the number of                      23 characteristics you put on the demo?                      24 A. Probably limited by the size of the CD.                      25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to                      23 highlight the capabilities of QBIC to people                      24 external to IBM; isn't that correct?                      25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p>2 Q. Exhibits 2, 3 and 10 are the papers that</p> <p>3 you co-authored. If your counsel can provide those</p> <p>4 to you just so that you have them in front of you.</p> <p>5 A. I have them here.</p> <p>6 MR. STRAUSSMAN: Okay.</p> <p>7 THE WITNESS: Okay.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. And can you just confirm for me,</p> <p>10 Mr. Flickner, Exhibits 2, 3 and 10 were papers you</p> <p>11 co-authored?</p> <p>12 A. Yes.</p> <p>13 Q. You would have included accurate</p> <p>14 information in those -- in those papers at the time</p> <p>15 that you authored them; is that correct?</p> <p>16 MR. HANSEN: Objection; vague and ambiguous.</p> <p>17 THE WITNESS: Yes.</p> <p>18 BY MR. EDWARDS:</p> <p>19 Q. And the information in those papers</p> <p>20 accurately reflected the functionality of QBIC at</p> <p>21 the time those articles were published; is that</p> <p>22 correct?</p> <p>23 A. Correct.</p>

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for an input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p>



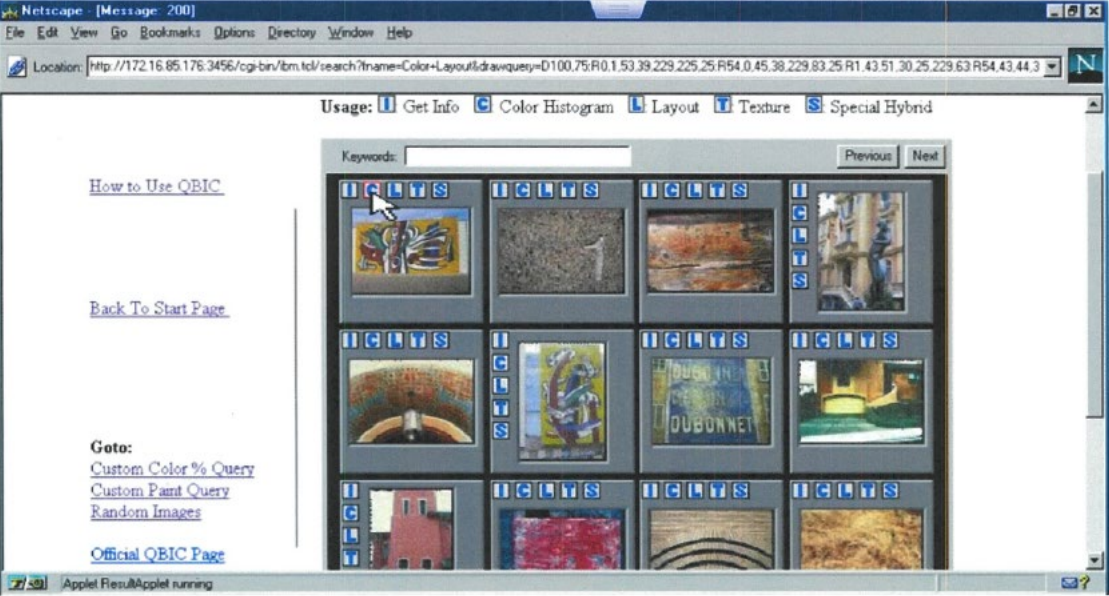
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 321:</p> <p>5 Q. Mr. Flickner, every commercial                      6 implementation of QBIC as of the Exhibit 3, IEEE                      7 1995 article, returned results of the matching                      8 process to the user in the form of a stored image                      9 and information associated with that image; is that                      10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.                      12 THE WITNESS: Yes.                      13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;                      15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>Flickner 8/29/23 Depo Ex. 7 at 1:</p>

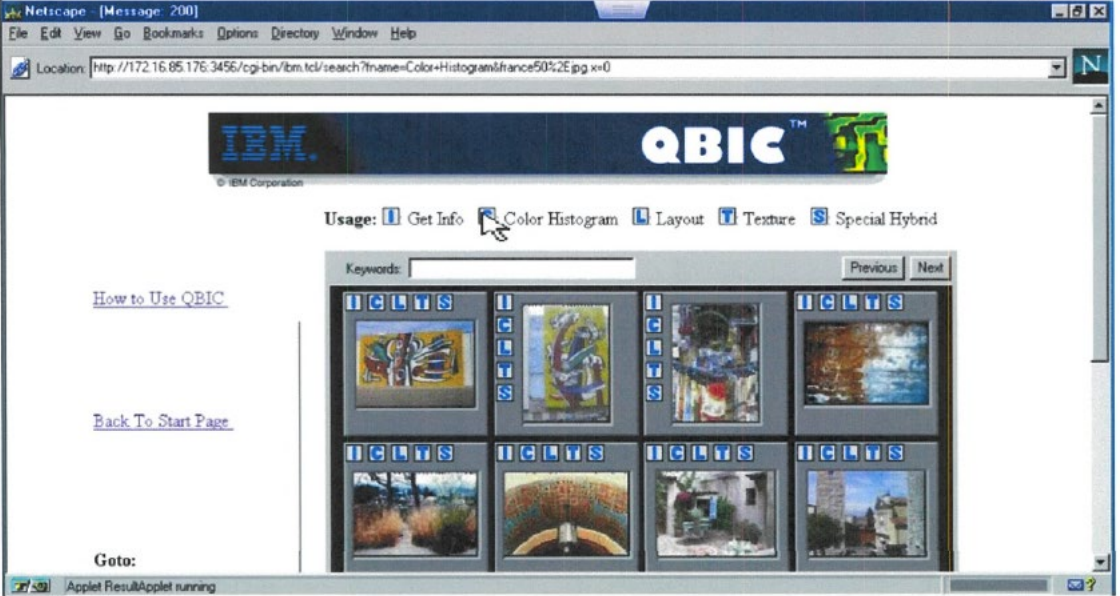
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2:</p>

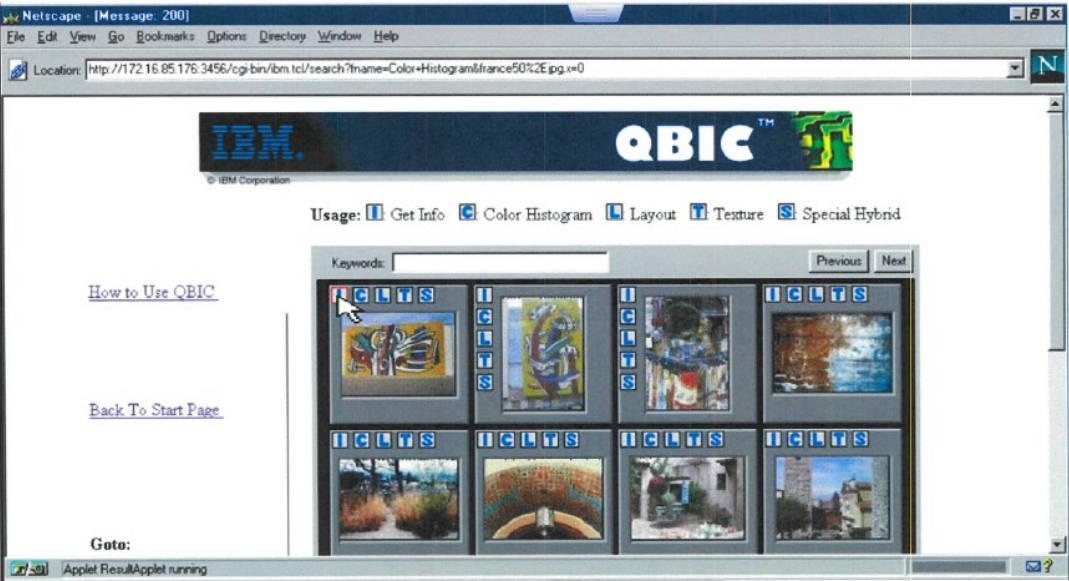
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Flickner 8/29/23 Depo Ex. 8 at 1:</p>

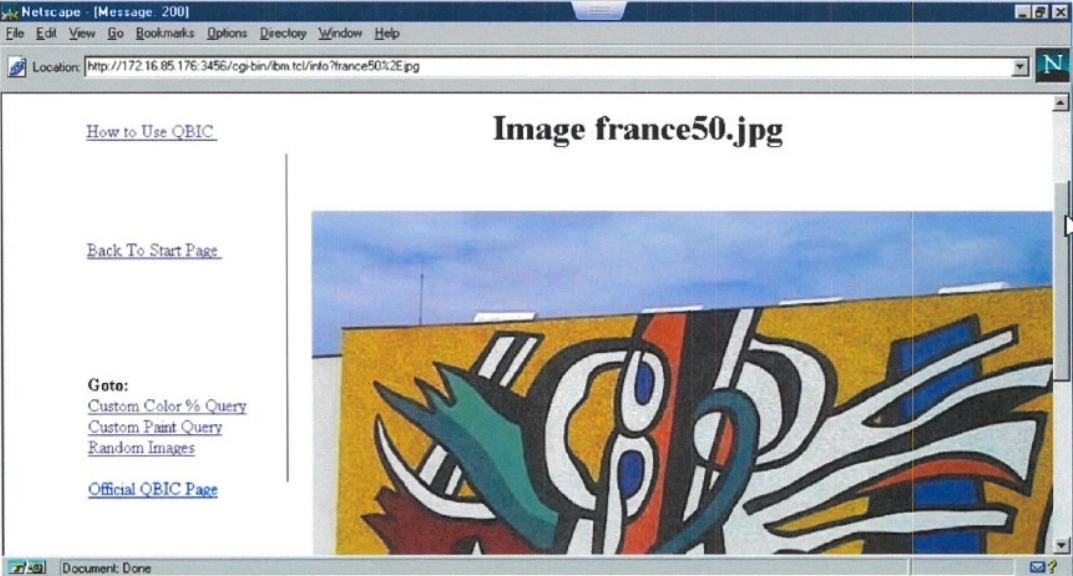
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><i>Id.</i> at 2:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>



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2. Claim 4

Claim	'529 Claim Recitation	Exemplary Citations in Reference
4	<p>The system of claim 1, wherein the service is further programmed to identify the object by applying multiple algorithms to at least a portion of the image or of the data, and identify the object as a function of a confidence levels associated with results of the multiple algorithms.</p>	<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 3</p> <p>Querying image databases by their image content is an active area of research. Some examples include the system in [2], which has been used to retrieve images of electrical components and MRI images, the system in [3] which retrieves images based on a sketch or other image example, or by “sense retrieval” (e.g. “retrieve clear, bright and clean images”), [4] which retrieves images based on their color content, and [5] which retrieves MRI images based on the sizes and relative positions of multiple objects in the images. The QBIC system which we are developing allows images to be retrieved by a variety of image content descriptors including color, texture, and shape.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2391-92.</p> <p><i>Interactive Outlining:</i> In this operation, the user provides some starting information which the system uses, along with image analysis methods, to compute an object outline. An example is shown in Figure 1. One technique, described in these proceedings [6], uses “snakes” or active contours. The user enters an approximate object outline, and the method iteratively adjusts this outline using an algorithm that minimizes an expression containing two main terms: total image edge strength along the outline, and the outline curvature. Another method, flood fill, can take as starting information a single mouse-clicked image point. Starting from this object point, all adjacent pixels are included in the object whose color is within a specified color distance from the original point. The perimeter of all included points becomes the object boundary. For reasonably uniform objects that are distinct from the background, this operation provides a fast object outliner.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2392-93</p> <p><b>2.2. Feature Calculation</b></p> <p>The properties of color, texture, and shape have broad, intuitive applicability, and they were the first image content properties we selected on which to base our queries. Corresponding features are computed for all objects and full scenes and stored for use in subsequent queries. The computed features are:</p> <p><i>Color features:</i> We compute the average <math>(R, G, B)</math>, <math>(Y, i, q)</math>, <math>(L, a, b)</math>, and <math>MTM</math> (Mathematical Transform to Munsell [7]) coordinates of each object and image. We also compute a <math>k</math> element color histogram, where <math>k</math> is user-settable. (We currently run with <math>k = 64</math>.) Because the original color images may include any of</p>

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		<p><i>Texture features:</i> Our texture features are based on modified versions of the coarseness, contrast, and directionality features proposed in [10]. The <i>coarseness</i> feature helps measure the scale of the texture (pebbles vs. boulders), and is calculated using moving windows of different sizes. The <i>contrast</i> feature describes the vividness of the pattern, and is a function of the variance of the gray-level histogram. The <i>directionality</i> feature describes whether or not the image has a favored direction (like grass), or whether it is isotropic (like a smooth</p> <p><i>Shape features:</i> One of the most challenging aspects to content based image retrieval is retrieval by shape. Shape similarity has proven to be a difficult problem [12, 13] in model based vision applications and the problem remains difficult in content based image retrieval applications.</p> <p><i>Sketch features:</i> We implemented the image retrieval method described in [17, 18] that allows images to be retrieved based on a rough user sketch. The feature needed to support this retrieval consists of a reduced resolution edge map of each image. To compute these edge maps, we (1) convert each color image to a single band luminance; (2) compute the binary edge image using a Canny edge operator; and (3) reduce the edge image to size 64 x 64. To do the reduction, for <math>w</math> the width of the image in pixels and <math>h</math> its height, we partition</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 5–6</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metrics such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low</p>
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		<p>similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <math>L</math> component of an <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue objects better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance, and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar colors (e.g. red and orange).</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):</p> <p>“QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.”</p> <p><i>Id.</i> at p. 3.</p>
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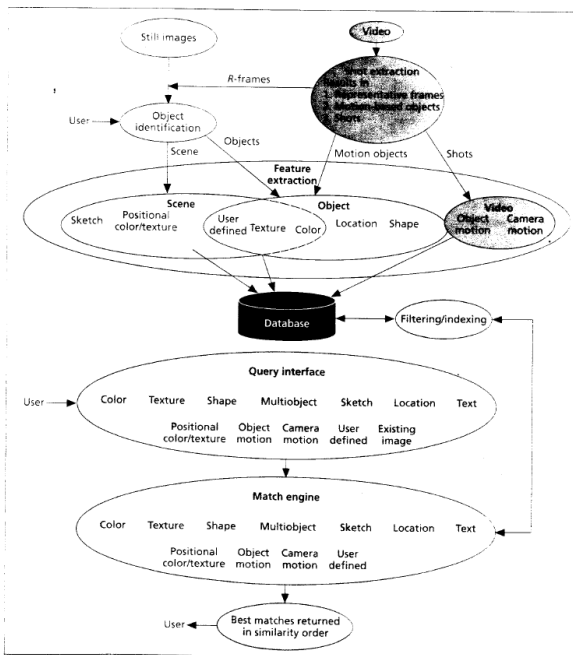


Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.

“Ideally, object identification would be automatic, but this is generally difficult. The alternative-manual identification-is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised segmentation methods along with a foreground/background model to identify objects in a restricted class of images. The images, typical of museums i and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.” *Id.* at pp. 3–4.

“ANNOTATION AND DATABASE POPULATION TOOLS. Automatic methods (such as our Positional Color query) that don't rely on object identification,

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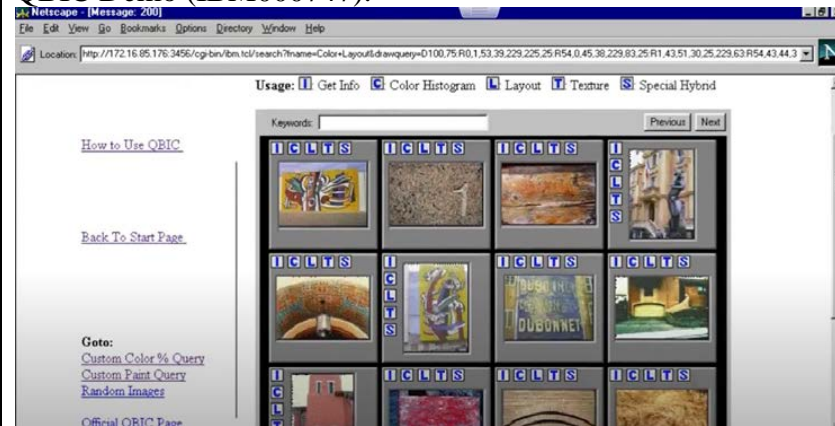
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		<p>methods that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.” <i>Id.</i> at p. 8.</p> <p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog. When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>
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QBIC Demo (IBM000747):



QBIC Demo (IBM000747):



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		<p>Flickner Depo at 28-29:</p> <p>2 Q. Okay. And how would you alter it then?</p> <p>3 A. I don't remember exactly how we -- we</p> <p>4 ended up doing it in the actual system. But the</p> <p>5 ways to do it was either specify a parameter in the</p> <p>6 X defaults file or you could -- we could -- we</p> <p>7 could compile it in a color, if we had to, as well.</p> <p>8 Q. Could you, say, take some sort of</p> <p>9 threshold and ask for all images within that</p> <p>10 distance threshold?</p> <p>11 A. You could.</p> <p>12 Q. Okay. And how would you do that?</p> <p>13 A. As you said, you take the threshold</p> <p>14 and -- and use that as -- the distance measuring,</p> <p>15 and you just drop off the images. You wouldn't</p> <p>16 display images that are below the threshold.</p> <p>17 Q. And would the system always return the</p> <p>18 closest match to the image or would it be more</p> <p>19 approximate?</p> <p>20 A. Our system would return closest match --</p> <p>21 Q. Okay.</p> <p>22 A. -- although we did experiment with some</p> <hr/> <p>1 nearest neighbor approximate matches.</p> <p>2 Q. Okay. And were those approximate matches</p> <p>3 ever incorporated into any public QBIC system that</p> <p>4 you're aware of?</p> <p>5 A. I'm not sure I can re- -- that detail I</p> <p>6 can recall.</p> <p>7 Q. And this system, when were -- this was</p> <p>8 all out there in the 19- -- or this system that</p> <p>9 we've been discussing, this was out there in the</p> <p>10 1990s?</p> <p>11 A. It was.</p>
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		<p><i>See also</i> Flickner Depo at 25-26, 41-42, 131-132, 162-163.</p> <p>Flickner 8/29/23 Depo at 85–99:</p> <p>20 Q. So for each of color, texture, shape, 21 sketch, there are algorithms that are performing 22 some mathematical computation to calculate those 23 features; is that right? 24 A. Yes. 25 Q. Okay. So let's talk about the color</p>
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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two                  2 different color computations that are done. One is                  3 average color, the other is color histogram; is that                  4 right?                  5 A. There certainly are those two.                  6 Q. Say again.                  7 A. There certainly are those two.                  8 Q. Okay. And for average color, let's talk                  9 about that first, it says [as read], "We compute the                  10 average," and it lists four things, "(R, G, B), (Y,                  11 i, q), (L, a, b), and MTM coordinates of each object                  12 and image."                  13 You see that?                  14 A. Yep.                  15 Q. So does that mean that it does -- every                  16 time it -- if it computes average color, it computes                  17 all four of those things? Or are those optional,                  18 meaning that it can compute one as opposed -- or                  19 some combination of those four?                  20 A. Some combination of those four.                  21 Q. Okay. Are there different algorithms for                  22 each of those four or is it the same algorithm?                  23 A. RGB, Yiq and LAB are all linear                  24 transformations.                  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed                  2 over time going forward from 1993?                  3 A. Most likely they did.                  4 Q. Do you recall any details for how they may                  5 have changed?                  6 A. No.                  7 Q. Do you know if functionality was added to                  8 compute average color?                  9 A. No.                  10 Q. Do you -- do you recall any other                  11 algorithms or methodologies that were used besides                  12 the four that are listed here?                  13 A. No.                  14 Q. Okay. Second methodology to compute color                  15 is referred to as color histogram here; is that                  16 correct?                  17 A. Yes.                  18 Q. And so at a high level can you explain to                  19 me what a color histogram is?                  20 A. A histogram is a count of each value. And                  21 so, for example, if you have 1, 2, 3 as a value and                  22 you say 1, 2, 3 again, the histogram would say 2                  23 because there are two 1s, two 2s, and two 3s. So                  24 it's a count of the number of values across the                  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my                  2 head.                  3 Q. That's something different from a linear                  4 transformation?                  5 A. It might be a different linear                  6 transformation. I don't recall.                  7 Q. Okay. So for average color, the                  8 algorithms will compute that based on some                  9 combination of those four methodologies?                  10 A. Yes.                  11 Q. Okay. Do you know if those methodologies                  12 evolved over time? So this -- so, for example, this                  13 argu- -- excuse me -- article was written in 1993.                  14 Do you know if the way in which QBIC computed                  15 average color changed over time or did it stay the                  16 same?                  17 MR. STRAUSSMAN: Objection; compound.                  18 MR. EDWARDS: Let me rephrase.                  19 THE WITNESS: I don't recall.                  20 MR. EDWARDS: Let me rephrase.                  21 BY MR. EDWARDS:                  22 Q. So this article was written in 1993, and                  23 it lists four methodologies for computing average                  24 color features.                  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?                  2 A. Pixels, color.                  3 Q. So is it measuring the probability                  4 density --                  5 A. It's a --                  6 Q. -- of a color being in an image?                  7 A. It's a PDF estimator.                  8 Q. And what does PDF stand for?                  9 A. Probability density function.                  10 Q. Okay. Once the color histogram is                  11 computed, is it normalized after that?                  12 A. Yes, it was normalized.                  13 Q. And why did you normalize the color                  14 histogram?                  15 A. Because different images would have                  16 different color balances.                  17 (Reporter seeks clarification.)                  18 A. Balances, yeah.                  19 Q. Is a -- is a reason why you normalize the                  20 color histogram in -- for stored images -- well,                  21 strike that.                  22 Did you -- did you normalize color                  23 histograms when you extract -- strike that.                  24 When you calculated the color histogram                  25 features from a query image and a stored image, is</p>

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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>



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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or          2 more of these features than the other?          3 A. Yes.          4 Q. Which one?          5 A. Shape.          6 Q. Okay.          7 (Witness reviews document.)          8 A. So one thing I can state is originally I          9 couldn't remember the name of the edge operator --          10 and the name is Canny, the Canny edge operator --          11 when we were talking about finding edges.          12 Q. Okay. So this -- the paragraph on          13 IBM 2393 refreshed your memory that shape          14 calculation used Canny edge detection?          15 A. No, that's sketch.          16 Q. Oh, I'm sorry.          17 A. I'm just stating that originally I was          18 asked a question about standard edge operators. I          19 couldn't remember the name. The name was Canny.          20 Q. Canny. And Canny is used in the sketch          21 calculation?          22 A. Yeah, it's used in the sketch calculation.          23 Q. Understood. Okay. Let's go back to          24 shape.          25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.          2 Q. Can you say the name of the word again?          3 A. I think it's called perround.          4 Q. Per round?          5 A. Yeah.          6 Q. Those -- are those two words, p-e-r,          7 r-o-u-n-d?          8 A. P-e-r -- one word.          9 Q. Okay. Perround, one word.          10 A. It's basically the perimeter squared over          11 area.          12 (Reporter seeks clarification.)          13 A. Perimeter squared over area.          14 (Reporter seeks clarification.)          15 A. Length of the -- over area.          16 Q. Okay. So let's step back a little bit.          17 So it says -- the second paragraph says [as read],          18 "Our shape features are based on a combination of          19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features          20 area, circularity, eccentricity, major access          21 orientation and a set of algebraic moment          22 invariants," i-n-v-a-r-i-a-n-t-s.          23 Did I read that correctly?          24 A. Um-hum.          25 Q. Okay. For circularity, that is computed</p>
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.          2 To calculate the shape feature in a query          3 image or a stored database image, is the first step          4 to convert that image into a binary image?          5 A. I don't think so.          6 Q. So if you look at the second paragraph --          7 and the reason why I ask is -- it's the second          8 sentence in the second paragraph under "Shape          9 features." It says [as read], "All shapes are          10 assumed to be non-occluded planar shapes allowing          11 for each shape to be represented as a binary image."          12 See that?          13 A. Yeah.          14 Q. And then the next sentence says [as read],          15 "The area is computed as the number of pixels set in          16 the binary image."          17 A. Right.          18 Q. So that's why I ask is it the first step          19 in calculating shape to convert the image to binary?          20 A. Yes.          21 Q. And then once you convert it to binary          22 image, then what do you do next in order to          23 calculate the shape?          24 A. You're computing something called          25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?          2 A. Right.          3 Q. All right. Area is the number of pixels          4 in the binary image?          5 A. In the binary blob.          6 Q. In the binary what?          7 A. Blob.          8 Q. Blob. And when you say "blob," what does          9 that refer to?          10 A. The outline of the object that you're          11 doing a shape query on.          12 Q. And so are each of these, area,          13 circularity, eccentricity, major axis orientation          14 and algebraic moment invariants, are those each          15 different algorithms or is it all the same          16 algorithm?          17 A. It's different algorithms.          18 Q. Okay. And since you worked on the shape          19 feature the most, do you recall any other details          20 that are not disclosed in this paragraph?          21 A. Well, this evolved and we ended up doing          22 an implementation of something that's not in here.          23 Q. Okay. And what was that implementation?          24 A. Something called turning angle per round,          25 turning angle, which is -- it looks at the tangent</p>



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		<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So 2 you're computing the turning angle. You're 3 computing this angle that represents a shape in a 4 very interesting way. 5 They don't seem to be very good for 6 human -- so if you asked a human whether these two 7 shapes are similar, they would say "yes," but under 8 that feature set. 9 Q. And you call that something per round? 10 What was the name of it? Started with a T. 11 Turrent? 12 A. Turning angle. 13 Q. Oh, turning angle. 14 A. Yeah. 15 Q. Well, it said -- your answer -- you did 16 say turning angle, but you said something called 17 something per round, and it started with a T. I 18 thought you said turrent, but maybe I misunderstood. 19 MR. STRAUSSMAN: Tangent? 20 THE WITNESS: Tangent angle, yeah. 21 BY MR. EDWARDS: 22 Q. Okay. So something called tangent per 23 round, is that what you would call it, this -- 24 A. No. 25 Q. -- this implementation?</p>	<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle. 2 Q. Okay. So the name of the new 3 implementation you're talking about for shape 4 calculation is called turning angle? 5 A. It used turning angle as a major feature. 6 Q. Okay. Was there any other name it went 7 by? 8 A. I don't recall. 9 Q. All right. And that was -- that 10 methodology was implemented to calculate shape on a 11 query image and an image stored in the database post 12 this article? 13 A. Yes. 14 Q. Was that the -- did that -- did that 15 implementation, the turning angle, did that replace 16 the methodology in this article or was it 17 supplementing the metho- -- 18 A. Supplementing.</p>
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		<p><i>Id.</i> at 123 – 124:</p> <p>12 Q. Okay. And the last one is S. It's, 13 "Search images with special multipass filter." 14 Do you recall, in your work on the QBIC 15 project, being able to calculate a feature called 16 multipass filter? 17 A. Probably Gabor functions. 18 Q. Say again? 19 A. Gabor functions. 20 Q. One more time and louder. 21 A. Gabor functions. 22 Q. Gabor functions. Okay. What are Gabor 23 functions? 24 A. Gabor functions are a way of producing 25 multiple resolution closed contours.</p> <p style="text-align: right;">page 124</p> <p>1 Q. Okay. And how do you spell Gabor? 2 A. G-a-b-o-r.</p> <p><i>Id.</i> at 127 – 128:</p>
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		<p style="text-align: right;">Page 126</p> <p>1 screenshot?                  2 A. Right.                  3 Q. Right? And then the one that you hosted                  4 on the -- on the website that you said those --                  5 there would be on order of thousands of thumbnails;                  6 correct?                  7 A. Tens of thousands.                  8 Q. Tens of thousands. Okay. Let's put that                  9 aside.                  10 MR. EDWARDS: Mark another screenshot as                  11 Exhibit 7.                  12 (Deposition Exhibit 7 was marked.)                  13 BY MR. EDWARDS:                  14 Q. So for Exhibit 7, again, I'll represent to                  15 you this is another screenshot from the QBIC demo                  16 produced as IBM 747. And in this screenshot the                  17 icon C is being clicked on the first page.                  18 Do you see that?                  19 A. Yep.                  20 Q. And that's highlighted in red.                  21 Do you see that?                  22 A. Yep.                  23 Q. Okay. And the second page are the results                  24 of that color histogram query from the first page.                  25 A. Correct.</p> <p style="text-align: right;">Page 127</p> <p>1 Q. Okay. And so when the user clicks C on                  2 that image in the top left corner, what happens, in                  3 the second page?                  4 A. The database returned the top 10 -- or it                  5 ordered the images and it returned the top K based                  6 on the vector distance or the feature distance                  7 related to what was computed and stored in the                  8 database and what's recorded. This is an N database                  9 image. It represents -- it always matches itself                  10 perfectly.                  11 Q. Okay. So in the -- in the demo that you                  12 hosted on IBM's website in the '90s, did it have a                  13 similar functionality where you could click on the                  14 thumbnail and it would -- it would return matches?                  15 A. Yeah.                  16 Q. And what would you click on on the one on                  17 the website?                  18 A. I don't remember exactly how the user                  19 interface worked.                  20 Q. But you could have -- you could click                  21 something akin to color histogram --                  22 A. Yes.                  23 Q. -- or texture or things like that?                  24 A. Yes.                  25 Q. And would it sort similarly to what's</p>	<p style="text-align: right;">Page 128</p> <p>1 shown here?                  2 A. Yes.                  3 Q. Okay. So the querying image is the top                  4 left image; is that right?                  5 A. I think so, yeah.                  6 Q. Well, go back to the first page.                  7 A. It's the match, yeah.                  8 Q. So you click C on that first image, and                  9 when you -- when you do that, that image that's                  10 being queried for color histogram remains in the top                  11 left box; is that right?                  12 A. Yeah.                  13 Q. And then the image that's immediately to                  14 the right of that, is that the best match out of the                  15 images in the database?                  16 A. That would -- yes.                  17 Q. And then the image immediately to the                  18 right of that one is the second best match?                  19 A. Yes.                  20 Q. And so on and so forth?                  21 A. Yes.                  22 Q. And when we say "match" we're talking                  23 about in terms of the color histogram features?                  24 A. Yeah.                  25 Q. Okay. Okay. Last one.</p> <p style="text-align: right;">Page 129</p> <p>1 MR. EDWARDS: Last screenshot. I'm going to                  2 mark it as Exhibit 8.                  3 (Deposition Exhibit 8 was marked.)                  4 BY MR. EDWARDS:                  5 Q. And, again, Mr. Flickner, I'll represent                  6 this is a screenshot from the QBIC demo on the CD                  7 IBM 747 produced by your counsel.                  8 A. Okay.                  9 Q. Okay? And if you want to compare, or you                  10 can take my word for it, the image in the top left                  11 corner, the querying image, is the same one that was                  12 on Exhibit 7.                  13 A. Yes.                  14 Q. Okay. And here the user's clicking the I                  15 icon, which stands for "Get Info."                  16 Do you see that?                  17 A. Um-hum.                  18 Q. On the first page?                  19 A. Yeah.                  20 Q. And the second page is doing what?                  21 A. Is presenting the image at full                  22 resolution.                  23 Q. Okay. And was there a similar                  24 functionality on the demo app on the -- on the                  25 website in the '90s?</p>
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*Id.* at 135 – 136:

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		<p style="text-align: right;">Page 134</p> <p>1 web.archive.org, which is also referred to as the                  2 Wayback Machine.                  3 Are you familiar with that website?                  4 A. Yes.                  5 Q. Okay. You can see at the top it's a                  6 capture from January 17th, 1999.                  7 Do you see that?                  8 A. Yeah, I see February 18th, 1998.                  9 Q. So if you look at the top right-hand box,                  10 it says July, January, February and then it says                  11 '98, '99, 2000.                  12 Do you see that?                  13 A. Yeah.                  14 Q. In the middle column it's January 17th,                  15 1999.                  16 Do you see that?                  17 A. Yeah.                  18 Q. Okay. And then the URL that it's                  19 capturing is <a href="http://www.qbic.almaden.ibm.com/cgi-bin--b-i-n--/stamps-demo">http://www.qbic.almaden.ibm.com/                  20 cgi-bin -- b-i-n -- /stamps-demo</a>.                  21 Do you see that?                  22 A. Yeah.                  23 Q. And does this look like a representation                  24 of the stamps demo that was on IBM's website in                  25 1999?</p>	<p style="text-align: right;">Page 136</p> <p>1 rank the feature vectors and you give an order, list                  2 of the top N images that have -- match the small --                  3 the closest distance.                  4 Q. You give an order list of the top --                  5 A. K or N. However many you request. It                  6 orders the entire database, but it only returns the                  7 top, the best matches.                  8 Q. Okay. Just so I understand, the database                  9 query, you extract feature vectors and then you rank                  10 the feature vectors and give an ordered list of the                  11 top results that match based on a distance                  12 measurement?                  13 A. So you take the queried image, you extract                  14 the feature vectors and now you're going to ask the                  15 database how many images do you have that are close                  16 in feature space to this query.                  17 And it'll return the top best -- the best                  18 hits.                  19 Q. Okay. So one way is to submit an image                  20 query, where you -- where you submit a -- as an                  21 input to the query an image, and that could be a                  22 still image or an r-frame; correct?                  23 A. Correct.                  24 Q. Is another way to do a query to use a                  25 keyword search?</p>
		<p style="text-align: right;">Page 135</p> <p>1 A. Yes.                  2 Q. And you would have hosted this demo?                  3 A. Yes.                  4 Q. And do you see here that it has similar                  5 icons that we looked at in our previous exhibits,                  6 Exhibits 5 through 8, icons I, C, L, T and S.                  7 Do you see that?                  8 A. Yeah. Yes.                  9 Q. Does that refresh your memory that the                  10 demos on the IBM's website in the '90s, but                  11 specifically on or around 1999, would have had these                  12 similar icons that a user could click on?                  13 A. Yes.                  14 Q. Okay. Let's put that aside.                  15 Okay. Now I want to talk about the last                  16 step in the process that we've talked about -- that                  17 we -- that we started on at the beginning of your                  18 deposition. And the last step is database query.                  19 Okay?                  20 Generally what is the database query                  21 process for the QBIC system?                  22 A. You extract feature vectors and then you                  23 rank --                  24 (Reporter seeks clarification.)                  25 A. You extract feature vectors and then you</p>	<p style="text-align: right;">Page 137</p> <p>1 A. Correct.                  2 Q. Is another -- yet another way to use                  3 something like a color picker?                  4 A. Yes.                  5 Q. What's a color picker?                  6 A. It's a way of specifying colors.                  7 Q. So you would -- you would, in a -- in some                  8 kind of a color wheel or some kind of graphical                  9 representation, you would select the colors you want                  10 to be searched against the database?                  11 A. Right. Correct.                  12 Q. And then another query methodology would                  13 be based on sketch, a shape?                  14 A. Sketch. Shape was typically on the                  15 object.                  16 Q. Okay. So shape's separate from sketch?                  17 A. Yeah.                  18 Q. Okay. Sketch would be a user would sketch                  19 some kind of figure that's in black and white and                  20 then a query would be run off of that sketch?                  21 A. Right.                  22 Q. Okay. And then the last one would be                  23 shape, a user could pick a particular shape -- a                  24 sample image of a particular shape, whether it's a                  25 circle or something like that.</p>

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		<p><i>Id.</i> at 143 – 149:</p> <p style="text-align: right;">Page 142</p> <p>1 QBIC system would uncompress it?                  2 A. Yep.                  3 Q. And then it would extract whatever feature                  4 you want from that uncompressed image?                  5 A. Correct.                  6 Q. And then those extracted features from the                  7 uncompressed JPEG image are used in the matching                  8 process?                  9 A. Correct.                  10 Q. Okay. And you were using -- you were                  11 doing this for JPEG image -- or the QBIC system was                  12 doing this for JPEG images in the -- in the '90s?                  13 A. Yes.                  14 Q. Okay. So once the system -- now, we're                  15 only talking about image-based queries, image using                  16 as input for the queries.                  17 Once you submit an image for the query, if                  18 it's a -- you do your preprocessing that need to be                  19 done. Features are extracted. So now we've got                  20 just the extracted features, whatever those are.                  21 What happens with those extracted features                  22 next?                  23 A. They're put in the database and then                  24 potentially there are indexes built that help you do                  25 fast search against those features.</p> <p style="text-align: right;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm                  2 talking about for a query, so I'm taking an image                  3 and submitting it to a system as a query.                  4 A. Query by example.                  5 Q. Query by example. Okay. Once those                  6 features extracted for that image, what happens next                  7 in the process?                  8 A. You take the feature vector and you                  9 present it to the database and say return the best                  10 matches to this feature vector.                  11 Q. Okay. So the system would compare -- the                  12 QBIC system would compare the features that are                  13 calculated from the input image to stored calculated                  14 features of the images in the database and come up                  15 with a match?                  16 A. Yes.                  17 Q. Okay. And those matches would be sorted                  18 or arranged in order of most similar?                  19 A. Yes.                  20 Q. And would algorithms do these comparisons?                  21 A. Yes.                  22 Q. Would it be a different algorithm for each                  23 of the features? So, for example, would there be an                  24 algorithm that does the comparison for color                  25 histogram and then there's a different algorithm</p>	<p style="text-align: right;">Page 144</p> <p>1 that does a comparison for say texture?                  2 A. You say the matching algorithm?                  3 Q. Correct.                  4 A. Yes, they could be different.                  5 Q. Well, let's talk about them. We can get                  6 into detail here.                  7 Well, before we -- before we get there, so                  8 how does the QBIC system display the results of                  9 matches to the user?                  10 A. Typically just thumbnails in a window in                  11 multiple ordered hits.                  12 Q. Okay. And it displays them in the order                  13 by which they're most similar. So the, you know,                  14 best match to the next best match to the next best                  15 match, so on and so forth?                  16 A. Correct.                  17 Q. Okay. And you said the system determines                  18 similarity based on some distance measure between                  19 the extracted features in the image query versus the                  20 stored image?                  21 A. The features of the stored image.                  22 Q. But it's a -- it's some sort of distance                  23 measure?                  24 A. Yes.                  25 Q. Okay. So let's go back to Exhibit 2.</p> <p style="text-align: right;">Page 145</p> <p>1 So if you turn to page IBM 2393 and                  2 rolling over to IBM 2395, that's a discussion on the                  3 image query. And so what I want to do -- I have a                  4 couple high-level questions, but then I want to walk                  5 through each one. Color starts on 2394, then                  6 texture and then shape and sketch are on 2395.                  7 So in terms of the -- in terms of the                  8 distance measure, Mr. Flickner, if -- I know you                  9 said that the results are termed based on those that                  10 are most similar but it could come up with something                  11 that's an exact match; is that right?                  12 A. It's possible.                  13 Q. Like the distance measure, the result                  14 would be zero if it was an exact match; right?                  15 A. Typically you'd get that only if you had                  16 the query image the same as a result image.                  17 Q. Right. But that's a possibility?                  18 A. Yeah.                  19 Q. Okay. So let's take a look at color --                  20 it's on -- starting at the top of 2394. You know,                  21 take your time and read that and then I want to ask                  22 you some questions about it.                  23 (Witness reviews document.)                  24 A. Okay.                  25 Q. Okay. So let's first start with average</p>
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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between                  2 the query image and the database image using                  3 weighted Euclidean distance; is that right?                  4 A. Yep.                  5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.                  6 And can you just tell us at a high level                  7 what -- if you can -- what Euclidean distance is?                  8 A. So if you have multiple features or                  9 multiple scaler features, you have to ask the                  10 question I'm trying to build a distance from that                  11 vector to a query vector.                  12 And as you build that -- the distance, you                  13 have -- you may want to weight different elements of                  14 the vector differently. And we found out that using                  15 variance normalization, where weights of the                  16 variance of the feature, gave good aesthetic                  17 results.                  18 (Reporter seeks clarification.)                  19 A. Aesthetic results.                  20 Q. And I apologize, I couldn't hear what you                  21 said. You said, "And we found out that using                  22 variance" . . .                  23 A. So you normalize each feature with its                  24 variance.                  25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)                  2 Q. Well, let me ask my -- let me get my                  3 question out first.                  4 So we talked about the features for                  5 average color before are RGB, Yiq, LAB and MTM.                  6 A. Correct.                  7 Q. And so, for example, for the RGB, you're                  8 saying that you would take the R and you would                  9 divide it by the variants of red and green, for                  10 example --                  11 A. Just variants of red.                  12 Q. Okay. And so you could do the same for                  13 the others, for Yiq or LAB?                  14 A. Exactly.                  15 Q. Okay. You do that for both the image                  16 input query and the stored image; correct?                  17 A. Correct.                  18 Q. And then you're calculating the distance                  19 between them, so determining how similar they are                  20 based on the distance?                  21 A. Yeah, or vector distance.                  22 Q. Understood.                  23 A. Two vectors of differences --                  24 (Reporter seeks clarification.)                  25 A. Two vectors with a distance calculation on</p>
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.                  2 Q. With its variance.                  3 A. And then compute the average.                  4 Q. Okay.                  5 A. Or, I'm sorry, compute the weighted sum.                  6 So red divided by the variants of red, plus green                  7 divided by the variants of green --                  8 (Reporter seeks clarification.)                  9 A. Red divided by the variants of red, green                  10 divided by the variants of green, L divided by the                  11 variants of L, that's how you combine the various                  12 features.                  13 Q. Understand. And L represents what?                  14 A. Luminance.                  15 Q. Okay. And this is -- you're talking                  16 specifically with respect to average color?                  17 A. Well, the variance normalization is well                  18 known in terms of multidimensional feature merging.                  19 Q. But for average color, you wouldn't use                  20 luminance, right, as a -- as a variant?                  21 A. Luminance would just -- you wouldn't use                  22 just luminance. You could use luminance . . .                  23 Q. Well, so the color features we talked                  24 about before would be RGB, Yiq, LAB --                  25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.                  2 Q. You're going to have to repeat that and be                  3 just a little bit louder, Mr. Flickner. Sorry.                  4 A. That's all right. Let me get my thoughts                  5 together.                  6 So we have multiple dimensional features.                  7 It's not unusual to take each dimension and                  8 normalize it by the variance because that gives                  9 you -- what that does is if you have tight variances                  10 you divide it by, you get bigger numbers. So you                  11 have more information close by.                  12 Q. What was the word you said before "close                  13 by"?                  14 A. I don't remember.                  15 THE REPORTER: Information?                  16 THE WITNESS: Information close by?                  17 BY MR. EDWARDS:                  18 Q. Okay. Okay. So now let's talk about                  19 color histograms.                  20 A. Okay.                  21 Q. Okay? Well, stop. Let's go back to                  22 average color. So is there -- you described the                  23 weighted Euclidean distance that's calculated                  24 between the query image and the database image for                  25 average color.</p>

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		<p><i>Id.</i> at 159 – 160:</p> <p>20 Q. And in the last sentence it refers to</p> <p>21 something called iterated query refinement.</p> <p>22 A. Yes.</p> <p>23 Q. And what does that refer to?</p> <p>24 A. It's a way you can refine the query.</p> <p>25 Q. So if I submit an image query for color</p> <hr/> <p>1 histogram, as an example, and I get a return, the</p> <p>2 best matches based on order of similarity?</p> <p>3 A. Um-hum.</p> <p>4 Q. Does iterated query refinement mean that I</p> <p>5 can further refine that query to search for things</p> <p>6 like shape, like a -- you know, some shape in the --</p> <p>7 in the query image, like a logo or an icon, and that</p> <p>8 will further refine the results to give me things</p> <p>9 that have that similar shape inside the results of</p> <p>10 the color histogram?</p> <p>11 A. Yes.</p> <p>12 Q. And then I can -- I can keep doing that, I</p> <p>13 can further even refine that result by using a</p> <p>14 keyword, for example?</p> <p>15 A. Yes. Or you could do it all at once.</p> <p><i>Id.</i> at 305:</p>
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		<p>7           So these articles describe various 8 features of various versions of QBIC; right? 9       A. Correct. 10       Q. Do they describe any features -- does the 11 demo you operated include any features that weren't 12 described in these articles? 13       A. That weren't described in the articles? 14 No.</p> <p><i>Id.</i> at 35: 6       Q. Okay. And the analytics that you're 7 talking about, where you extract these characters 8 from the image, that is -- those run on both the 9 query image and the images that are stored in the 10 database; is that right? 11       A. Yeah. We call them features. 12       Q. Features. Okay. 13           So when you say "features," you're talking 14 about the features that we talked about before: 15 Color, texture, shape, sketch? 16       A. For example. 17       Q. Any other ones you can think of? 18       A. Nothing comes to mind. 19       Q. But when you refer to features they at 20 least include those four; is that correct? 21       A. Yes. Well, at least includes, yeah.</p> <p><i>Id.</i> at 109-110:</p>
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		<p>12 Q. And it indicates the demo does 13 content-based search based on color histogram, color 14 position and texture. 15 Do you see that? 16 A. Yep. 17 Q. That's a limited number of the features 18 that QBIC could extract; right? 19 A. Correct. 20 Q. Was there -- for those demo applications 21 that you -- that you all created, was there a 22 conscious effort to limit the number of 23 characteristics you put on the demo? 24 A. Probably limited by the size of the CD. 25 (Reporter seeks clarification.)</p> <p style="text-align: right;">Page 110</p> <p>1 A. It was limited by the size of the CD.</p> <p><i>Id.</i> at 311:</p> <p>22 Q. Okay. The purpose of a demo is to 23 highlight the capabilities of QBIC to people 24 external to IBM; isn't that correct? 25 A. Correct.</p> <p><i>Id.</i> at 313-317:</p>
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		Page 313
1	A. Correct.	
2	Q. Exhibits 2, 3 and 10 are the papers that	
3	you co-authored. If your counsel can provide those	
4	to you just so that you have them in front of you.	
5	A. I have them here.	
6	MR. STRAUSSMAN: Okay.	
7	THE WITNESS: Okay.	
8	BY MR. EDWARDS:	
9	Q. And can you just confirm for me,	
10	Mr. Flickner, Exhibits 2, 3 and 10 were papers you	
11	co-authored?	
12	A. Yes.	
13	Q. You would have included accurate	
14	information in those -- in those papers at the time	
15	that you authored them; is that correct?	
16	MR. HANSEN: Objection; vague and ambiguous.	
17	THE WITNESS: Yes.	
18	BY MR. EDWARDS:	
19	Q. And the information in those papers	
20	accurately reflected the functionality of QBIC at	
21	the time those articles were published; is that	
22	correct?	
23	A. Correct.	

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		<p style="text-align: right;">Page 314</p> <p>1 BY MR. EDWARDS: 2 Q. And each of those papers would have been 3 peer reviewed before being published; correct? 4 A. Yes. There was peer review. 5 Q. Okay. Let's pick up Exhibit 3, please. 6 A. Okay. 7 Q. You have it -- 8 A. Yeah. 9 Q. -- handy? 10 Okay. On the first page that is 11 Bates-labeled IBM 893, in the right-hand column -- 12 and as you're going down towards the bottom of the 13 right-hand column, before you get to the line that 14 crosses the middle of the page, there are three 15 bullet points. 16 Do you see those bullet points? 17 A. Yeah. 18 Q. It says, "QBIC allows queries on large 19 image and video databases based on," bullet point 20 one, "example images." 21 Do you see that? 22 A. Yeah. 23 Q. Okay. And then also if you go to 24 page 898. 25 A. Okay.</p> <hr/> <p style="text-align: right;">Page 315</p> <p>1 Q. On the right side it says, "Representative 2 Frame Generation." 3 You see that? 4 A. Yeah. 5 Q. And for database population you can use 6 r-frames of videos just as you can still image for 7 both database population and for feature extraction 8 for a input image; is that fair? 9 MR. HANSEN: Objection; vague and ambiguous, 10 lacks foundation. 11 THE WITNESS: Yes. 12 BY MR. EDWARDS: 13 Q. Let's go to IBM 900. The bottom of the 14 left-hand column to the top of the right-hand 15 column. The bottom of the left-hand column starts, 16 "We have described a prototype system." 17 Do you see that? 18 A. Yeah. 19 Q. Okay. You keep going down, that paragraph 20 refers to the technology described in this article 21 [as read], "has been moved into a commercial 22 standalone product, IBM's Ultrimedia Manager, and is 23 part of IBM's Digital Library and DB2 series of 24 products." 25 Do you agree with that?</p>
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		<p style="text-align: right;">Page 316</p> <p>1 A. Yeah.</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Yes.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. As of the date of this article, the QBIC</p> <p>6 functionality described in this article was in IBM's</p> <p>7 Ultimedia Manager, IBM's --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 Q. Described in this article was in IBM's</p> <p>10 Ultimedia Manager, IBM's Digital library and DB2</p> <p>11 series of products; correct?</p> <p>12 MR. HANSEN: Objection; lacks foundation.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Is that right, Mr. Flickner?</p> <p>15 A. Yes.</p> <p>16 MR. HANSEN: Same objection.</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Let's pick up Exhibit 10, please.</p> <p>19 Look at page IBM 2419. It's the same -- I want to</p> <p>20 ask you about the same sentence I asked you before,</p> <p>21 where it lists the commercial products in -- at the</p> <p>22 bottom of the second full paragraph.</p> <p>23 A. Yeah.</p> <p>24 Q. See that? It says, "QBIC was developed by</p> <p>25 IBM and moved into commercial products including a</p> <hr/> <p style="text-align: right;">Page 317</p> <p>1 licensable standalone software package, IBM Digital</p> <p>2 Library, Ultimedia Manager, the Image Extender in</p> <p>3 DB2 Universal, and the MediaMiner software tool</p> <p>4 series."</p> <p>5 Do you see that?</p> <p>6 A. Yeah.</p> <p>7 Q. So as of the date of this article in 1997,</p> <p>8 the features that were described in this article and</p> <p>9 previous articles were incorporated into commercial</p> <p>10 products listed -- that I just listed; is that</p> <p>11 correct?</p> <p>12 A. Yes.</p> <p><i>Id.</i> at 321 – 322:</p>	
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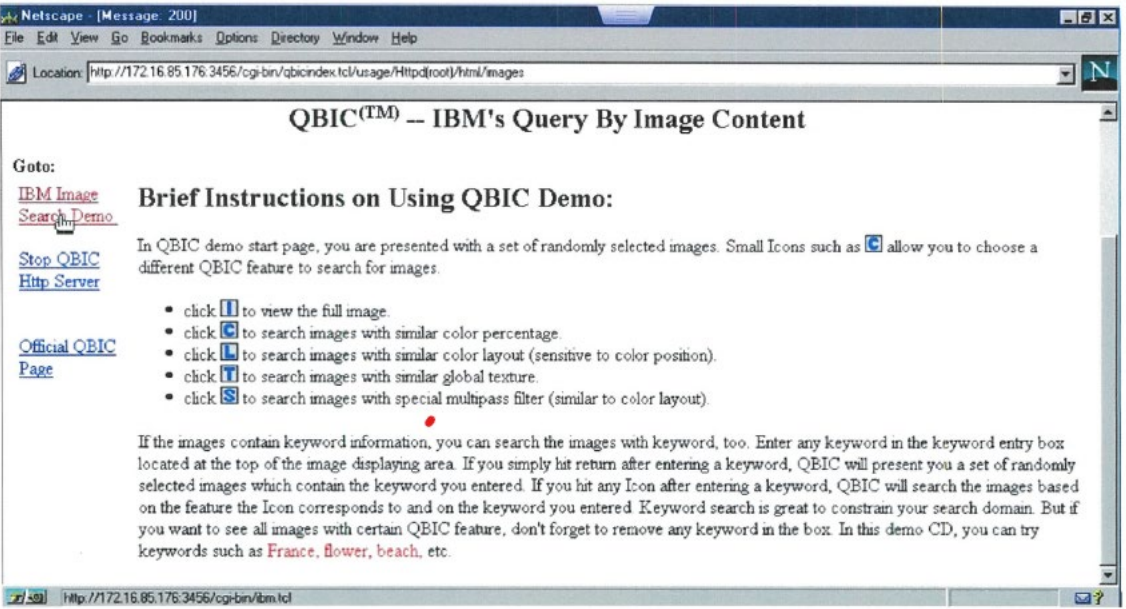
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		<p>17 Q. And for every commercial embodiment of 18 QBIC as of the 1995 IEEE article in Exhibit 3, those 19 implementations calculated a distance metric as a 20 measure of similarity for each feature between an 21 input image and a stored image; correct? 22 MR. HANSEN: Objection; lacks foundation. 23 THE WITNESS: Correct. 24 BY MR. EDWARDS: 25 Q. Okay. And a distance measure value 1 indicates how confident the system is that the 2 features of the stored image match the features of 3 the input image; correct? 4 A. Correct.</p> <p>Flickner 8/29/23 Depo at Ex. 6 at 1:</p>	
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		 <p><i>Id.</i> at 2:</p>
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The QBIC system was implemented in IBM commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. *See, e.g.*, Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.

To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references

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		identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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3. **Claim 20**

<b>Claim</b>	<b>'529 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
20	The system of claim 1 wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.	To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit G-31**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, CoolTown was made, known or used by others in the United States no later than July 10, 2000. *See generally* T. Kindberg et al., A Web-Based Nomadic Computing System; J. Barton et al., The Cooltown User Experience; cooltown developer’s network, coolbase overview; cooltown developer’s network, people, places, things: web presence for the real world. CoolTown is available as prior art at least under 35 U.S.C. § 102(a). On information and belief, HP was using CoolTown and made it available to the public in the United States by releasing the website on the Internet (and accessible to U.S. users) by at least March 2000, making the software available on the HP website by March 2000, and making available on the Internet (and accessible to U.S. users) the open source code, which reflects the functionality of CoolTown by at least March 2000. *See e.g.*, HP000043–044; HP000045–046; HP000060–061; *see also* <https://www.zdnet.com/article/hp-brings-open-source-to-cooltown/>. Therefore, HP Cooltown was at least known, used, and/or sold to the public by at least 2000. On information and belief, CoolTown is also available as prior art under 102(g). BofA is diligently investigating CoolTown and will supplement with additional information, if necessary.

As shown in the chart below, CoolTown anticipates asserted claims 4 and 20 of the ’529 Patent. To the extent CoolTown is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent CoolTown is found not to anticipate any asserted claims or claim elements of the ’529 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR

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2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 1**

Element	'529 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A system comprising:	<p>CoolTown discloses a system.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p style="padding-left: 40px;">The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1  <b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology, wireless networks and portable devices. This paper describes how CoolTown ties web resources to physical objects and places, and how users interact with resources using the information appliances they carry, from laptops to smart watches. Enabling the automatic discovery of URLs from our physical surroundings, and using localized web servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure we leverage device connectivity to support communication services.</p> <p>Coolbase<sup>1</sup> Overview at 1</p>

<sup>1</sup> See <https://web.archive.org/web/20011030090650/http://cooltown.hp.com/dev/coolbase-overview.asp>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		coolbase overview  The coolbase platform consists of several sub-projects which combine to form a coherent framework for bringing together all the elements necessary to build a cooltown service or application. These sub-projects include software for enabling smart, connected web devices; software for representing people, places and things and their contextual relationships; some supporting hardware and software elements; and sample applications that illustrate the use of these various elements.
[1A]	a camera that captures an image;	CoolTown discloses a camera that captures an image.  The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:

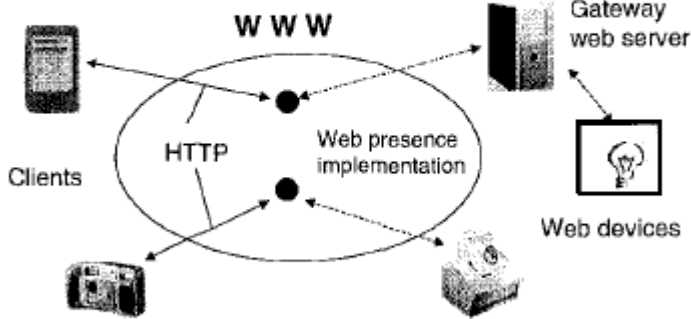
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p>

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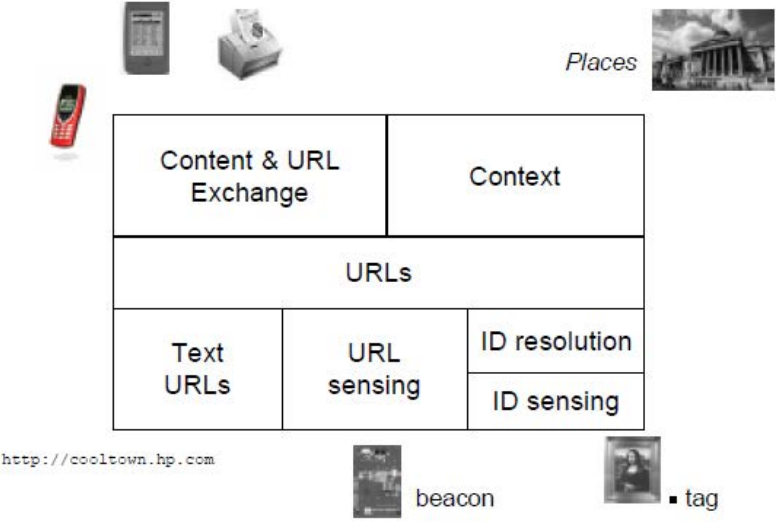
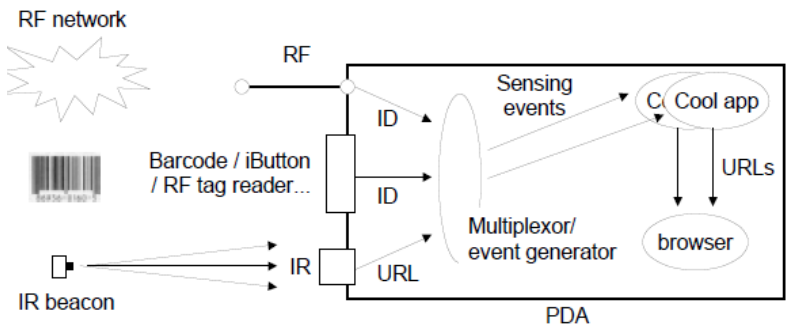
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p style="padding-left: 40px;">The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</p> <p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the "web server" level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like a barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic users carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

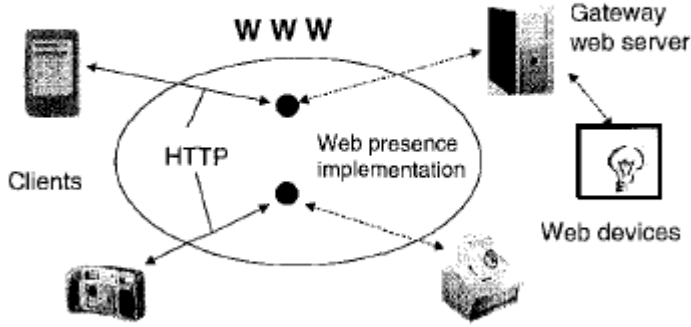
*Nantworks, LLC v. Bank of America Corporation*  
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Element	'529 Claim Recitation	Exemplary Citations in Reference
[1B]	a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service;	<p>CoolTown discloses a network-enabled device that conducts a data processing operation on at least a portion of the image to produce data, and sends the data to a service.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</p> <p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 24:</p>

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		<p><b>3.4. Infrastructure for things; ChaiServer and eSquirt</b></p> <p>Given a URL from one of the lower-layer services, we</p>  <p><b>Figure 5. Devices (printer, light), with and without embedded web servers.</b></p> <p>Figure 5 shows interactions between two clients and their respective web devices. It shows a digital camera that interacts with a printer via HTTP operations on the</p>

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		<p>printer's point of web presence. The URL for the printer resolves to its network address. The camera first interrogates the printer to find out the formats it accepts. The printer can supply this as an HTML page or as an XML document that describes it. Then the camera sends the image as, for example, JPEG encoded data. Figure 5 also shows lights connected to a home PC by a controller unit. The home PC acts as a gateway to the lighting unit. A remote user issues HTTP operations via a web browser on a PDA; the programs on the PC that handle HTTP operations directed to the light's URL manipulate the lighting unit accordingly.</p> <p>The Cooltown User Experience (HP000088 – 093) at 1:</p> <p>The Cooltown project at HP Labs applies Web technology to develop systems that support the users of wireless, handheld devices interacting with their environment, anywhere they may be. The basic elements of Web technology useful for ubiquitous computing are described in several papers and on-line resources from the Cooltown project [1-5]. Here we will give a flavor of the Cooltown user experience, discuss ways that context can be used in web systems, and explain why we think a web-based system for ubiquitous computing can achieve network effects. In our conclusion we will mention some of the many remaining challenges and our initial user studies platform.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 1</p>

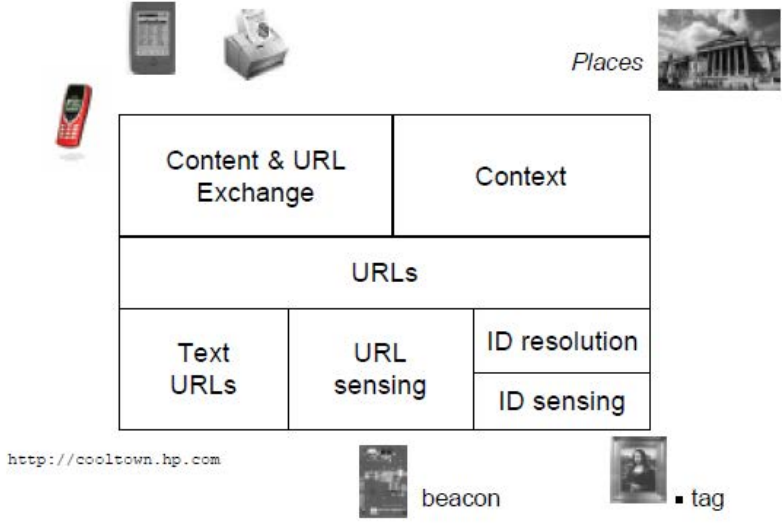
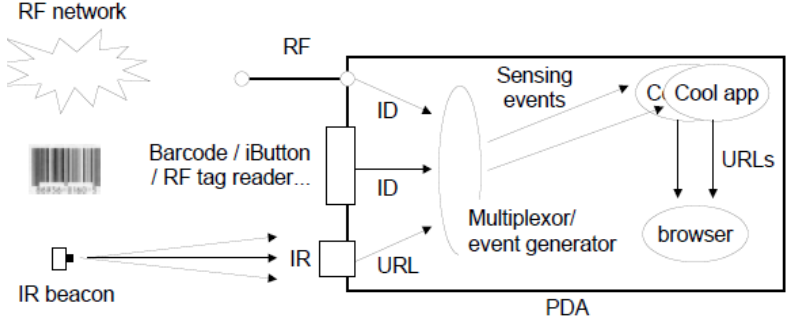
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>Abstract</b></p> <p>CoolTown offers a web model for supporting nomadic users, based on the convergence of web technology, networks and portable devices. This paper describes how CoolTown ties web resources to physical places, and how users interact with resources using the information appliances they carry, from laptops to PDAs and watches. Enabling the automatic discovery of URLs from our physical surroundings, and using servers for directories, we create location-aware but ubiquitous systems. On top of this infrastructure, we provide device connectivity to support communication services.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 2</b></p> <p>The CoolTown work is not on the devices or wireless communication layers, but rather on the layer of infrastructure that is needed to support nomadic users with portable devices. We work at the “web server” level and we see our work as extending web models to new arenas.</p> <p>As a consequence of the above assumptions, most of our demonstration scenarios use a sensing mechanism, like a barcode reader or a short-range networking subsystem such as infrared, combined with long-range or wired web access. The sensor is used to obtain addresses (URLs) to access web resources. So we imagine our nomadic users carrying devices like:</p> <ul style="list-style-type: none"> <li>• PDAs with 802.11 network access and barcode or other sensors, or</li> <li>• Cellular telephones with additional short-range networking, or</li> <li>• Cameras with short-range networks that interact with Internet-connected kiosks.</li> </ul> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p> <p>Present-day users of portable wireless devices view them as either adjuncts to larger desktop or workstation computers or as portable communications devices (phones or for e-mail). We view them as portable viewers of web pages and as sources of content, or as clipboards for URLs pointing to discovered content. Then we add support for obtaining location-dependent web pages and for moving content between mobile and fixed but online devices. Figure 2 shows how this support is organized.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p>

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		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>



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		<p><b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>∇ <i>IR &amp; RF</i>. The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>∇ <i>Barcodes</i>. Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>∇ <i>Electronic tags</i>. A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>∇ <i>Optical recognition</i>. The user’s device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b>                      In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 8</b>                      To accomplish direct content transfer we need only have a simple push interaction: the content source opens a connection to the sink and writes the content (See Figure 5a). The only agreement we need between sources and sinks is the format of the data. Many imaging devices support JPEG format: it serves as the common format for images today. Since devices may use other common formats and since formats do evolve, effective interaction requires some introductory content preceding the data that identifies its format. The format of this introductory or</p> <p><b>The Cooltown: People, Places, Things Web Presence for the Real World (HP000025 – 34) at 20:</b></p>



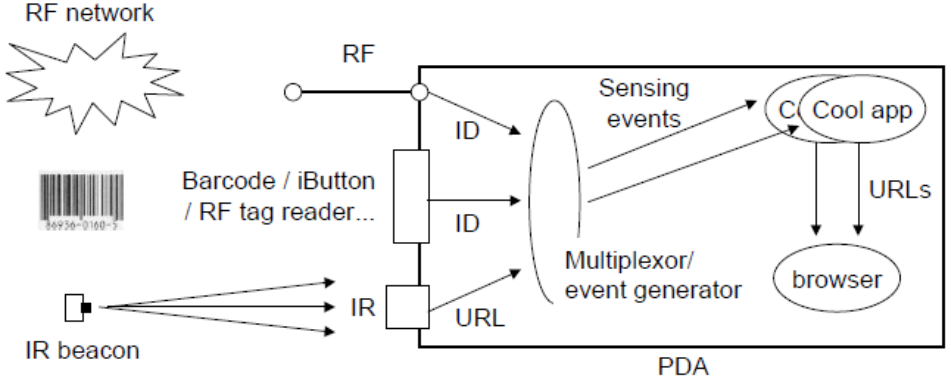
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		<p><i>Ubiquitous access.</i> The Web derives its power from a design that has led to widespread accessibility. The rising quality and reach of the Web increases the probability of Web access in mobile venues. People use the Web at work and at home today; increasingly they will find it available when they shop or travel; eventually they will find adequate access "everywhere" they want electronic connections. The Web offers accessibility that supports mobility in two senses. First, resources on the Web can be accessed from any device that supports the standard HTTP protocol [18]. This includes devices that the user carries: general-purpose devices such as personal digital assistants (PDAs) and laptops, and information "appliances" dedicated to a specific function, such as digital cameras. Equally, it is a simple matter to put HTTP <i>server</i> support in devices [10] that nomadic users encounter, such as printers and projectors. Second, the Web supports mobile users by allowing them transparent access to resources outside their current environment. That is, the Web runs over the Internet, the Internet is widely accessible, and the Web runs the same way at all points of the Internet. We shall discuss ways of bridging devices that are <i>not</i> IP-capable to the Web.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success</p>

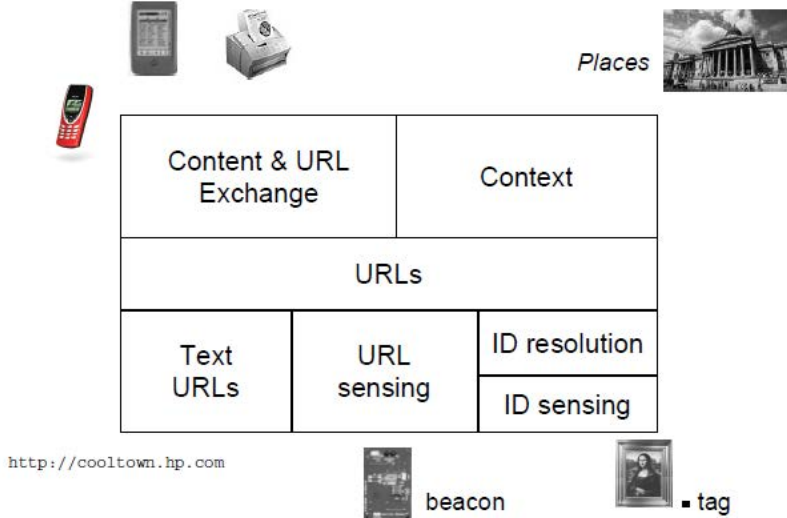
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		for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1C]	the service programmed to receive the data;	CoolTown discloses the service programmed to receive the data.  A Web-Based Nomadic Computing System (HP000074 – 87) at 4  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p>

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		 <p><a href="http://cooltown.hp.com">http://cooltown.hp.com</a></p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b></p> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p>

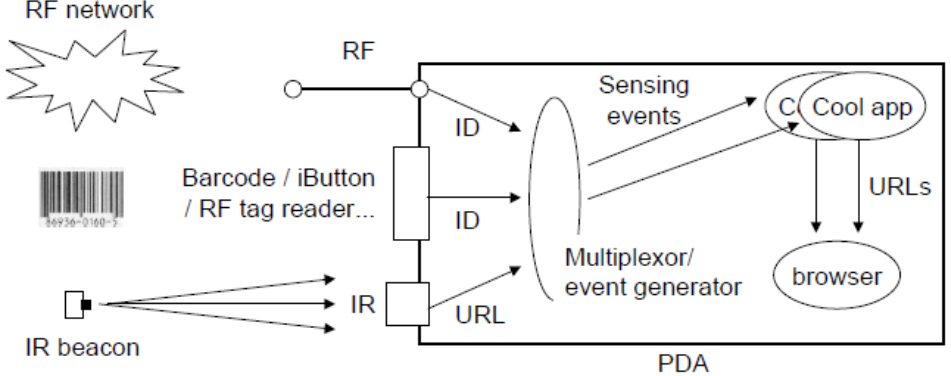
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		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>identify an object within the image:</p>	<p>CoolTown discloses identify an object within the image.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 3  <b>3. Sensing</b></p> <p>In this section, we describe the bottom layer of our infrastructure, which enables the user to acquire URLs from their surroundings or from the physical entities in their surroundings. An obvious mechanism, with equally obvious drawbacks, is to write the URL on a label and attach it to the object. The user reads the label and types the URL into their browser.</p> <p>Rather than being forced to use that cumbersome method, users should be able to identify conveniently what it is that interests them in their surroundings and obtain the corresponding URL <i>automatically</i>. To achieve this, their PDA is equipped with at least one short-range device that allows them to read URLs and other identifiers associated with places and individual objects in their surroundings, by pointing or positioning the device. We call this URL <i>sensing</i>.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

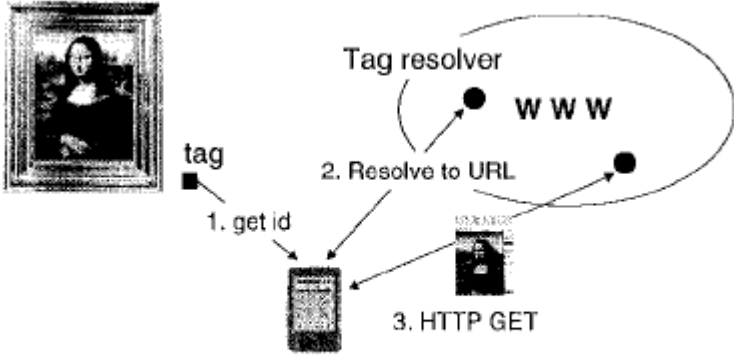
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		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p> <p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings’ URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore’s web portal and which runs service discovery and registration services.</p>

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		<p><b>Indirect sensing.</b> In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>  <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p>

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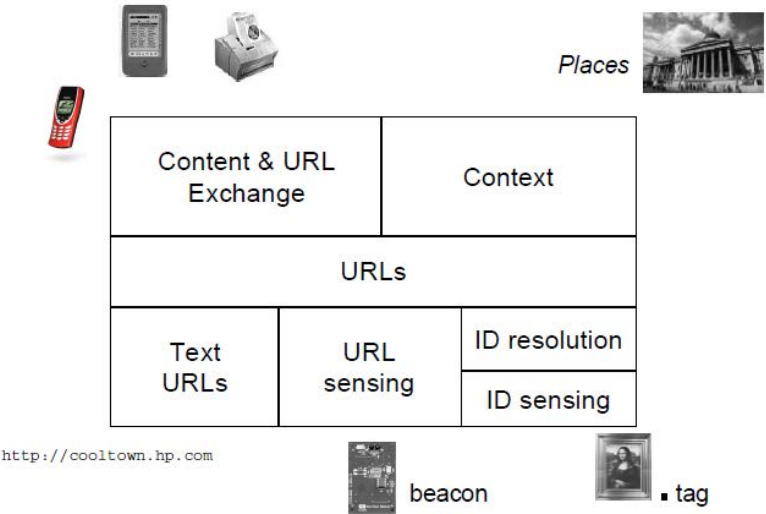
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		<p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>



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[1E]	distinguish an object present in the image from others using a database that stores data characteristics of target objects;	<p>CoolTown discloses distinguish an object present in the image from others using a database that stores data characteristics of target objects.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>  <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Some options for sensing include:</p> <ul style="list-style-type: none"> <li>• <i>IR &amp; RF.</i> The infrared transceiver available on most PDAs and laptops can sense by communicating with a small, low-power ‘beacon’ device mounted at the place or on the object. Our beacon emits the identifier in infrared packets in the form of XML specifying a URL [15]. IR beacons can be configured to have a range of several meters. Similarly, short-range RF could be used.</li> <li>• <i>Barcodes.</i> Barcode scanners are increasingly found integrated into PDAs, and are available as wands and other hand-held formats. Many objects are manufactured with barcodes – both generic ones and ones encoding their serial number; where they do not, barcodes can easily be printed and attached to objects.</li> <li>• <i>Electronic tags.</i> A variety of small electronic tags exist containing a unique identifier with ~100 bits. All are available at relatively low cost. RFID tags can be read from a distance of about 10 cm with a hand-held reader. There are also tags such as iButtons [18] that are read on contact, which can be advantageous if tags lie close together.</li> <li>• <i>Optical recognition.</i> The user's device may have a camera attached, in which case the identifier can be encoded in a form such as a ‘glyph’ [23] or digital watermark that is amenable to recognition software.</li> </ul> <p>In <i>direct sensing</i>, the beacon or tag directly presents the URL of a web resource. In <i>indirect sensing</i>, it presents an identifier such as an ISBN or a UPC barcode. Then to obtain a URL we need a <i>resolver</i>, a service that returns a URL when given an identifier.</p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b>                      Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard ‘sensing events’, bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in the current activity, so that users can ‘retrace their steps’.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>To get an idea of some of the issues in defining place contexts, imagine that Acme Software Inc. sets up a stand the Wireless Web World exhibition (Figure 4). Acme has to define its own context within the exhibition, which uses to provide information, printing, purchasing and other services to users who walk up to the stand. Visitors may be able to discover the Acme context when they walk up, distinguish it from that of neighboring exhibits, and through their devices, these visitors must be able to browse and access the resources that Acme provides within the context. We are mainly interested here in resources that are based around the physical entities found at the exhibition stand. When the visitor reads a barcode attached, say, to a printer or a guest book on display, they are automatically shown the Acme web page offering them a service connected with it.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The point of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programmatically, using lookup by identifier, and lookup by service type and other attributes. The ‘local resolver’ that we described in the previous section is an example of a resource that can be looked up automatically from the place’s context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p><b>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 8</b></p> <p><b>Indirect Sensing</b></p> <p>In the case of indirect sensing, the user’s client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be ‘sensed’ as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place’s Web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding Web page.</p> <p><b>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</b></p>

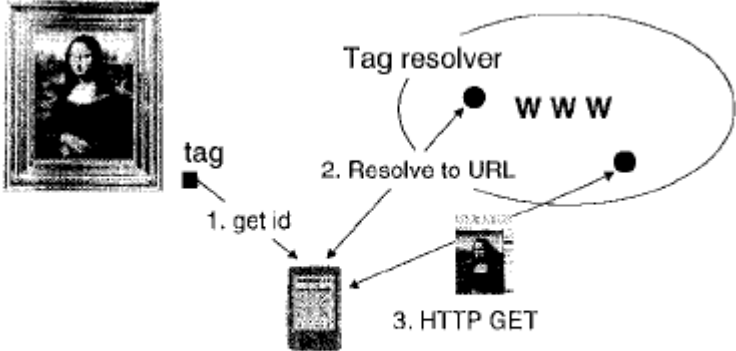
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		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

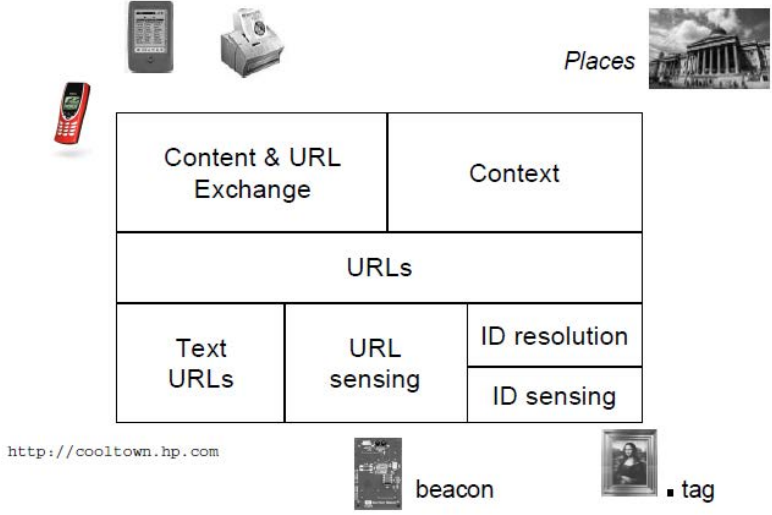
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		<p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1F]	associate the object with information; and	<p>CoolTown discloses associate the object with information.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>

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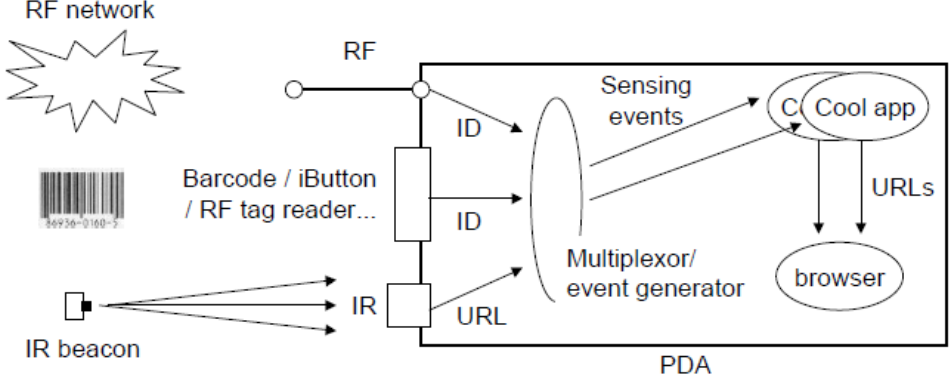
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		 <p>The diagram illustrates the flow of information from physical sources to digital content. At the top, icons for a mobile phone, a PDA, and a printer are shown. Below them, a central box is divided into 'Content &amp; URL Exchange' and 'Context'. A horizontal bar labeled 'URLs' sits between these two boxes. Below the 'URLs' bar, three boxes represent sources: 'Text URLs', 'URL sensing', and 'ID resolution'. 'ID resolution' is further divided into 'ID sensing'. Below these boxes, a URL 'http://cooltown.hp.com' is shown, along with icons for a 'beacon' and a 'tag'. To the right, the word 'Places' is written above an image of a classical building.</p> <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolved tags point to context or content.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 3</b></p> <p>The critical element of the system is the movement of URLs acting as Internet pointers. Components in the lower parts of the diagram provide addresses used in the upper layers. Keyboards and beacons provide URLs directly; tags on objects in the physical world are “resolved” to produce URLs. This layer is discussed in Section 3. The resolution of identifiers into URLs is context dependent and some of the URLs sensed in the environment lead to web server</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</b></p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 4–5</b></p> <p>Direct sensing is the most concrete: it requires no resolver. An advantage of indirect sensing is that the same identifier can be looked up in different resolvers with different, context-dependent results. For example, sensing a book's ISBN barcode could lead to the local library's entry for the book, if the resolver for the ISBN is the local library. It could lead to a catalog entry if resolved with the user's favorite bookseller's resolver. Or it could lead to the publisher's description of the book if resolved at the publisher's resolver.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p><b>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 20 – 21</b></p> <p><b>2.1. Visiting the Cooltown Museum.</b></p> <p>The Cooltown Museum and Bookstore offers visitors a Web-enhanced experience. As visitors tour the museum, their portable digital assistant (PDA) can receive Web URLs from wireless "beacons". These beacons are small infrared transceivers located close to pictures or</p>



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		<p>sculptures; the URLs link into a Web of information about the items. Using the PDA's Web browser, visitors can read or hear about the artist or the work and about related art works in the museum. The URLs can also be stored as bookmarks for further study or they can be used to select reproductions of the artwork from the museum's online store. The museum staff uses the same URLs for inventory control as the URLs point to the object's point of Web presence.</p> <p>As visitor move into the Cooltown Museum bookstore they can use their PDAs to sense the URLs associate with books, calendars, and posters for sale (Figure 2). These URLs will give them book reviews, available inventory of calendars, and other colors of posters for examples. The museum bookstore's Web portal provides services to assist in buying books, including a service to order books that are not available. In addition, the bookstore offers a printing service, for visitors to print out Web pages that they collected during their visit or even order reproductions of paintings to be printed just in time for purchase at the exit.</p> <p>Cooltown Developer's Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

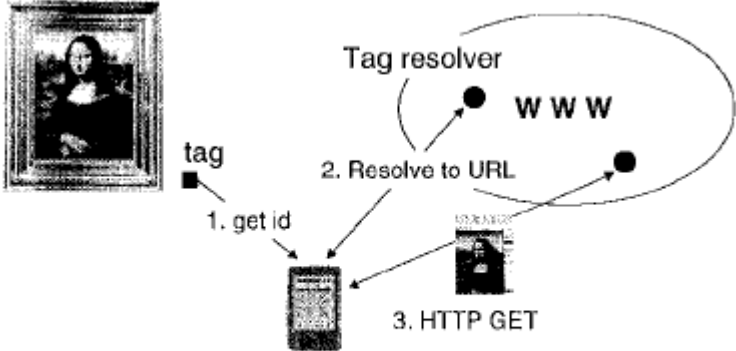
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		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>

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		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

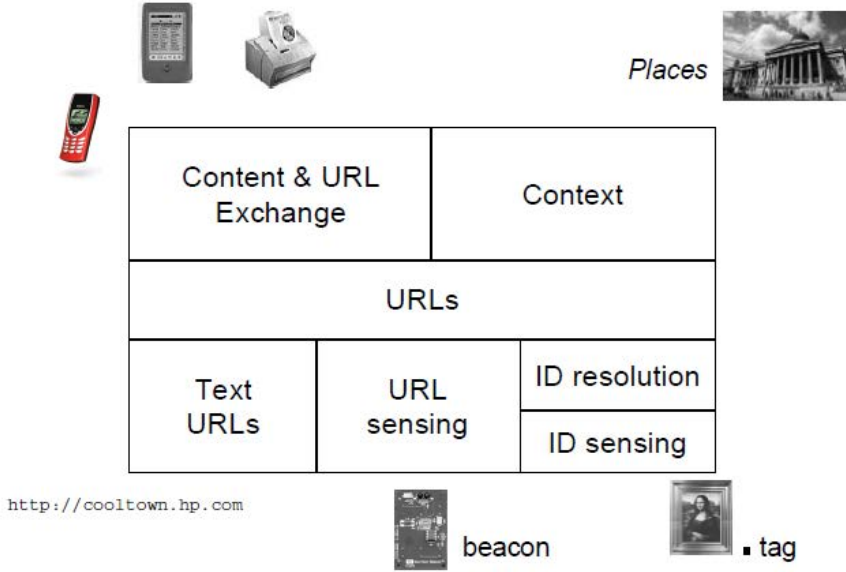
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		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1G]	return the information to the network-enabled device; and	<p>CoolTown discloses return the information to the network-enabled device.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at Fig. 2</p>

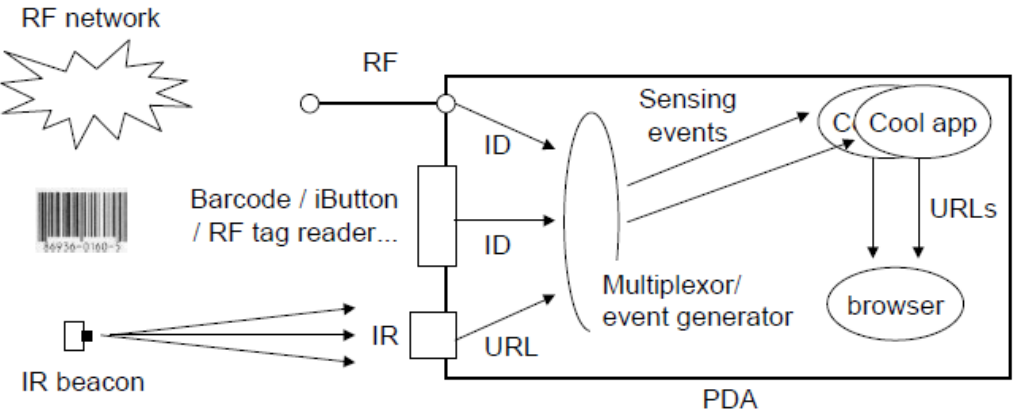
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		 <p>Figure 2. Component relationships. Sources of URLs, including keyboards, beacons, and resolve tags point to context or content.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 5</b></p> <p>One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p><b>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</b></p>



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		<p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 5</p> <p><b>2.4 The Common User Experience in Cooltown.</b></p> <p>The three examples above explore various aspects of web presence but they also show a common theme. The typical user experience we seek with web presence is that of collecting links to points of web presence as they are encountered them in the physical world. One could even think of the physical world as a web page, with links at certain physical points. Of course the links are URLs presented on the user’s client device and the result of clicking on such a link will be a real web page, delivered to the user’s screen. The user can then travel through the virtual space of the web page with normal Web techniques or the user can travel through the physical space to find a different point of web presence. The user understands URLs as pointers to meta-information about objects at the same level that users of Web browsers now understand URLs as bookmarks for Web content. While this physical/virtual browsing is a typical scenario, we imagine other usage scenarios for web present things, in the same way that the Web supports many usage scenarios in addition to Web browsing.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p>

*Nantworks, LLC v. Bank of America Corporation*  
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 Invalidity Chart for U.S. Patent 7,881,529 based on

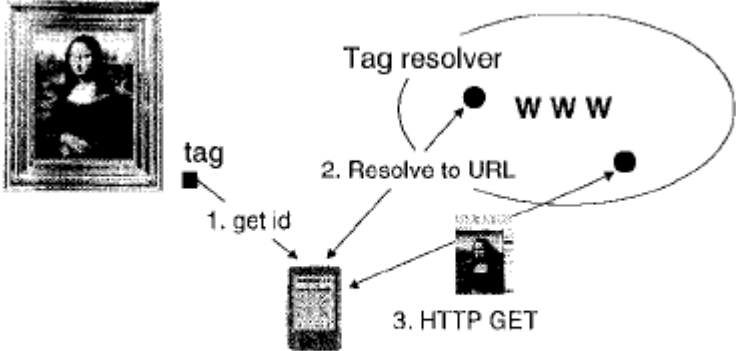
Invalidity Chart for U.S. Patent 7,881,529 based on Hewlett-Packard CoolTown System (“CoolTown”)

Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings' URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore's web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user's client device obtains a value that it has to look up to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		 <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p> <p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p>

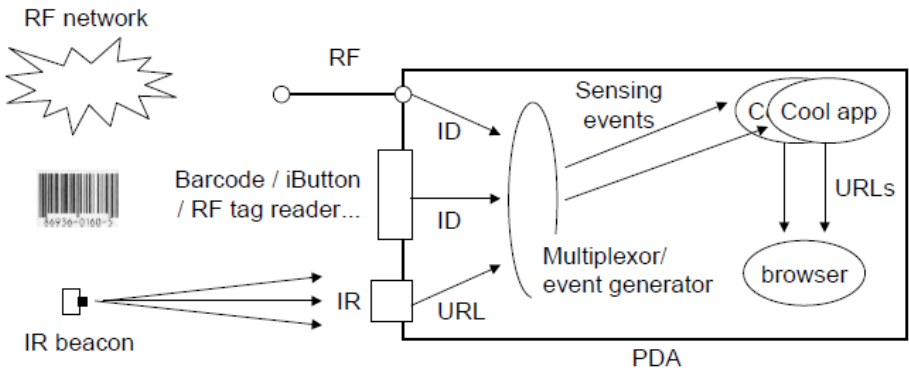
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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p> <p><b>Place Managers</b></p> <p>Our implementation of place context is as a web server with appropriate content describing the place [6]. The points of web presence of the designated objects will appear as links in the place’s web pages. They will also be discoverable programatically, using lookup by identifier, and lookup by service type and other attributes. The 'local resolver' that we described in the previous section is an example of a resource that can be looked up automatically from the place's context.</p> <p>A <i>place manager</i> provides access to and configuration of the data associated with one or more places. In the example of the exhibition hall, we shall assume that there is one place manager, which holds data about all the places within the exhibition hall. Different places are managed as separate objects. If this is not satisfactory from a security point of view, then the operators of a stand can supply their own manager for their place.</p> <p>The place manager has the following functions:</p> <ul style="list-style-type: none"> <li>• It maintains directories of the resources in each place, and provides an interface by which resources may be added, queried and removed.</li> <li>• It acts as a resolver for each place, for looking up resources from their identifier.</li> </ul> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1H]	the network-enabled device further programmed to present the information related to the object to	CoolTown discloses the network-enabled device further programmed to present the information related to the object to a user.

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	<p>a user.</p>	<p>A Web-Based Nomadic Computing System (HP000074 – 87) at 4</p>  <p>Figure 3. A sketch of a PDA equipped for sensing URLs and identifiers.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 5          Figure 3 sketches a PDA with several sensing mechanisms (IR, barcode and RF) similar to prototypes we have developed in the CoolTown project. The device runs a web browser, and one or more CoolTown applications. The latter are simple applications that obtain URLs and present them as links, using the standard browser to display the corresponding web resources. As the figure shows, URLs and identifiers that are read by one or other of the sensing devices are multiplexed and announced within the device as standard 'sensing events', bearing the URL or other identifier and its source. The applications consume the events and handle them in various ways. All have a capacity for storing URLs and other identifiers as a record of what the user has physically encountered while engaged in their current activity, so that users can 'retrace their steps'.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 5          One of those CoolTown applications provides indirect sensing. It can be configured to use any resolver of the user's choosing, but in particular it can automatically discover which is the local resolver when the user has designated which is the local context (see next section). When the user scans a tag such as a barcode, the application handles the sensing event by constructing a URN [3] from the identifier (if it is not in that form already). It uses the standard THHTTP protocol [8] to request the local resolver to turn the URN into the URL of a resource. This URL is then made available to the browser.</p> <p>A Web-Based Nomadic Computing System (HP000074 – 87) at 6</p>

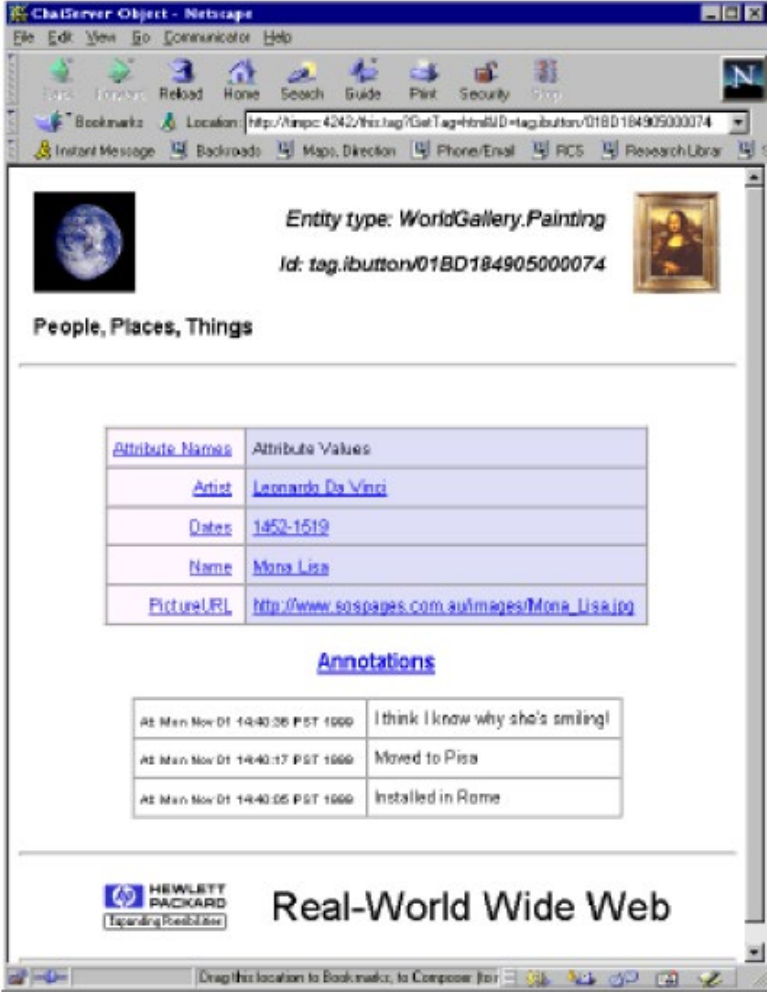
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		<p><b>Discovery:</b> Discovery is the acquisition of contexts and resources within contexts. Places are discovered in much the same way as individual physical objects, although they are typically extended and so may require several beacons or tags. Prominent “You Are Here” beacons or barcodes (or any other type of tag) attached to the Acme exhibition stand enable the user to pick up that place’s context. The user points the device at the beacon or scans the barcode. The result is the URL of the place: a set of web pages containing information and services that the user can browse on their device, and which devices can query.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 5</p> <p><b>2.4 The Common User Experience in Cooltown.</b></p> <p>The three examples above explore various aspects of web presence but they also show a common theme. The typical user experience we seek with web presence is that of collecting links to points of web presence as they are encountered them in the physical world. One could even think of the physical world as a web page, with links at certain physical points. Of course the links are URLs presented on the user’s client device and the result of clicking on such a link will be a real web page, delivered to the user’s screen. The user can then travel through the virtual space of the web page with normal Web techniques or the user can travel through the physical space to find a different point of web presence. The user understands URLs as pointers to meta-information about objects at the same level that users of Web browsers now understand URLs as bookmarks for Web content. While this physical/virtual browsing is a typical scenario, we imagine other usage scenarios for web present things, in the same way that the Web supports many usage scenarios in addition to Web browsing.</p> <p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) at 9</p>

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		 <p>Figure 5. A Web presence for <i>Mona Lisa</i>.</p>

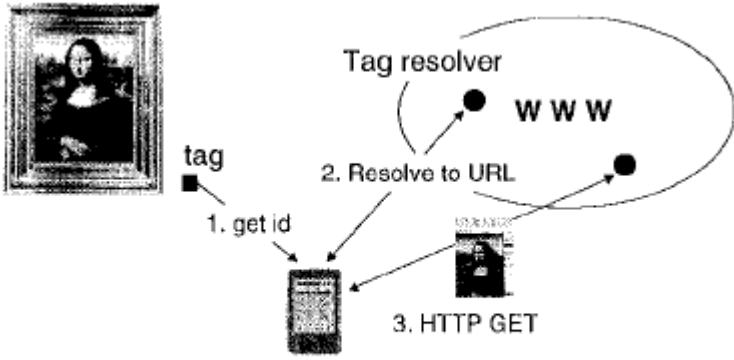
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		<p>Cooltown Developer’s Network, People, Place, and Things: web presence for the real world (HP000025–34) (HP000025–34) at 23</p> <p><b>Direct sensing.</b> In our "art gallery" implementation, we laid out a room with pictures on the walls and situated the "bookstore" nearby. We implemented web presence for these entities using active, URL-emitting devices (beacons). We call this form of discovery <i>direct sensing</i>. Next to each painting and in the bookstore we placed infra-red beacons that supply PDAs with the URL of the corresponding point of web presence. The paintings’ URLs are those of pages supplied by the Van Gogh museum. The URL of the bookstore resolves to a "place manager" server (discussed in Section 3.2.3), which provides the bookstore’s web portal and which runs service discovery and registration services.</p> <p><b>Indirect sensing.</b> In the case of indirect sensing, the user’s client device obtains a value that it has to look up</p>

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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>to obtain a URL. There are many types of value that can be 'sensed' as the user travels through the physical world. For example, the device could obtain latitude and longitude coordinates from a GPS sensor, which could then be translated into a zip code and hence into the URL of a place's web portal provided by Yahoo, for example. The device could even perform image recognition against a database of tourist sites to provide the URL of a corresponding web page.</p> <p>We have been experimenting with indirect sensing where the sensed value is obtained from a <i>tag</i>. There are electronic tags like RFID tags [33] and iButtons [22] – small devices that supply a unique identification string to a sensor placed near them or in contact with them.</p>  <p><b>Figure 4. Indirect sensing: the web presence for a painting.</b></p>



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Element	'529 Claim Recitation	Exemplary Citations in Reference
		<p>Barcodes can be used instead of an electronic tag.</p> <p>Figure 4 shows a different art gallery demonstrator in which a PDA client senses a painting’s tag. A correlated web page is resolved from the tag identifier and the client presents it to the user.</p> <p>We have produced a prototype implementation for sensing tagged things and displaying a corresponding context-dependent web page. The sensing device knows the URL of a <i>resolver</i>. When the client senses a tag, it sends the identifier to the resolver. If the resolver has an entry for the identifier, it sends back the corresponding URL. The user may choose a resolver that reflects his or her personal requirements, or those of a group of users with interests or tasks in common. For example, visitors to an art gallery could be offered resolvers that provide the URLs of pages in their native language, or pages provided by the art school at which they study.</p> <p>.....</p> <p>To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>



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**2. Claim 20**

Claim	'529 Claim Recitation	Exemplary Citations in Reference
20	The system of claim 1, wherein the data processing operation is selected from the group consisting of contrast enhancement, noise removal, and de-blurring.	To the extent it is found that CoolTown does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that CoolTown does not anticipate this claim, CoolTown renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine CoolTown with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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### **Exhibit H-3**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Rhoads was filed on May 15, 2000, claiming the priority date of May 19, 1999. Rhoads published at least as of September 20, 2005, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Rhoads anticipates asserted claims 25, 30, 33–34, and 39 of the ’897 Patent. To the extent Rhoads is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Rhoads is found not to anticipate any asserted claims or claim elements of the ’897 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiff’s “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiff’s “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiff’s Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiff’s proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiff is permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs’ of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 25**

Element	'897 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method of conducting a transaction with an interactive system, the method comprising	<p>Rhoads at Abstract</p> <ul style="list-style-type: none"> <li>• “A cell phone is equipped with a 2D optical sensor, enabling a variety of applications. For example, such a phone may also be provided with a digital watermark decoder, permitting decoding of steganographic data on imaged objects. Movement of a phone may be inferred by sensing movement of an imaged pattern across the optical sensor's field of view, allowing use of the phone as a gestural input device through which a user can signal instructions to a computer-based process. A variety of other arrangements by which electronic devices can interact with the physical world are also detailed, e.g., involving sensing and responding to digital watermarks, bar codes, RFIDs, etc.”</li> </ul> <p>Rhoads at 5:54-56.</p> <ul style="list-style-type: none"> <li>• “Basically, the technology detailed in this disclosure may be regarded as enhanced systems by which users can interact with computer-based devices.”</li> </ul> <p>Rhoads at 9:35–41</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.”</li> </ul> <p>Rhoads at Fig. 2 (and accompanying description)</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 49:15-18</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 2, a system 10 according to the exemplary embodiment includes an originating device 12, a router/server 14, a product handler 16, a registration database 17, and one or more remote resources 18.”</li> </ul> <p>Rhoads at 50:21-48.</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).</p> <p>In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p>
[1A]	providing access to a device having a display;	Rhoads discloses providing access to a device having a display.

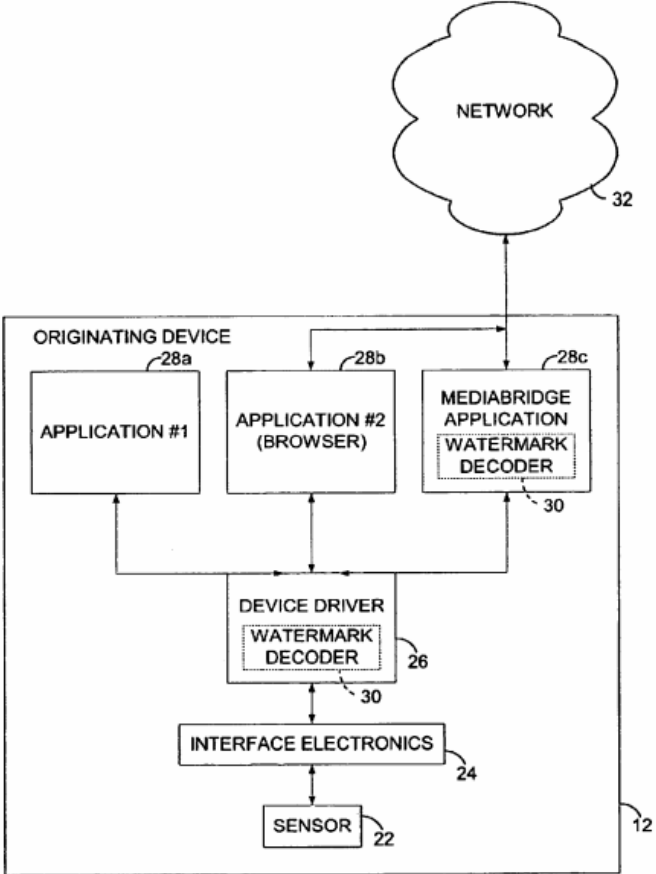
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"> <li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li> </ul> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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[1B]	displaying a displayed image on the display of the device;	<p><b>FIG. 2</b></p> <p>Rhoads at 49:24-27</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc.”</li> </ul> <p>Rhoads at Fig. 3</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		 <p><b>FIG. 3</b></p> <p>Rhoads at 7:24-42</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of</li> </ul>



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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</p> <ul style="list-style-type: none"> <li>• When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28.”</li> </ul> <p>Rhoads at 7:13-29</p> <ul style="list-style-type: none"> <li>• “Referring to FIG. 11, a basic embodiment 110 of the present technology includes an optical sensor 112, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are analyzed by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>Rhoads at 9:35–10:10</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object's boundaries.</p> <p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p>

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		<p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.”</p> <p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"> <li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li> </ul> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	presenting the displayed image proximate to an optical sensor; and	Rhoads discloses presenting the displayed image proximate to an optical sensor.

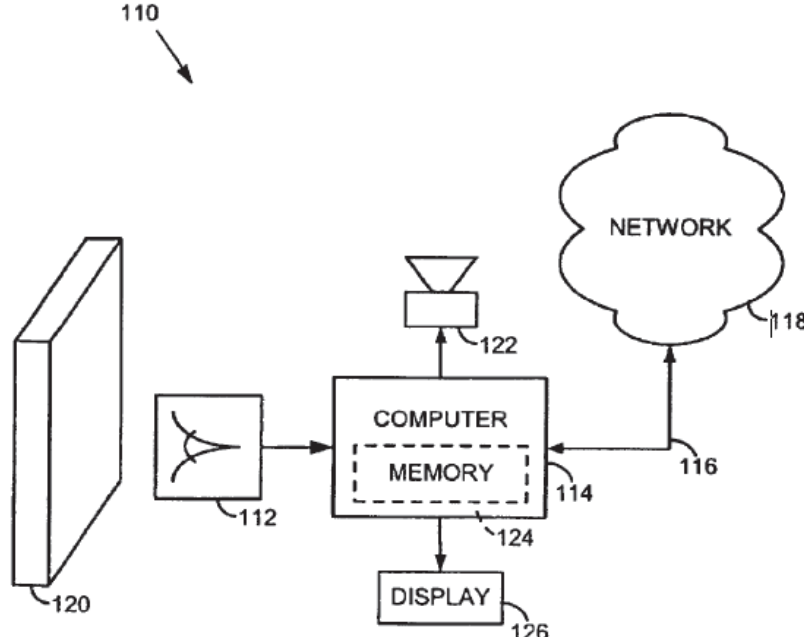
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		<p>Rhoads at Fig. 2</p> <p style="text-align: center;"><b>FIG. 2</b></p> <p>Rhoads at 3:41–51</p> <ul style="list-style-type: none"> <li>• “According to another aspect, the invention includes a promotional method comprising: (a) presenting an object within the field of view of an optical sensor device, the object being selected from the list consisting of a retail product, packaging for a retail product, or printed advertising; (b) acquiring optical data corresponding to the object; (c) decoding plural-bit digital data from the optical data; (d) submitting at least some of said decoded data to a remote computer; and (e) determining at the remote computer whether a prize should be awarded in response to submission of said decoded data.”</li> </ul>

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		<p>Rhoads at 7:24-42</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</li> </ul> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28.”</p> <p>Rhoads at Fig. 11</p>

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		 <p style="text-align: center;"><b>FIG. 11</b></p> <p>Rhoads at 7:13-29</p> <ul style="list-style-type: none"> <li>“Referring to FIG. 11, a basic embodiment 110 of the present technology includes an optical sensor 112, a computer 114, and a network connection 116 to the internet 118. The illustrated optical sensor 112 is a digital camera having a resolution of 320 by 200 pixels (color or black and white) that stares out, grabbing frames of image data five times per second and storing same in one or more frame buffers. These frames of image data are</li> </ul>

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		<p>analyzed by a computer 114 for the presence of Bedoop data. (Essentially, Bedoop data is any form of plural-bit data encoding recognized by the system 110—data which, in many embodiments, initiates some action.) Once detected, the system responds in accordance with the detected Bedoop data (e.g., by initiating some local action, or by communication with a remote computer, such as over the internet, via an online service such as AOL, or using point-to-point dial-up communications, as with a bulletin board system).”</p> <p>Rhoads 8:66 – 9:12</p> <ul style="list-style-type: none"> <li>• “In still other embodiments, the camera (or other sensor) can be equipped with one or more auxiliary fixed-focus lenses that can be selectively used, depending on the particular application. Some such embodiments have a first fixed focused lens that always overlies the sensor, with which one or more auxiliary lenses can be optically cascaded (e.g., by hinge or slide arrangements). Such arrangements are desirable, e.g., when a camera is not a dedicated Bedoop sensor but also performs other imaging tasks. When the camera is to be used for Bedoop, the auxiliary lens is positioned (e.g., flipped into) place, changing the focal length of the first lens (which may be unsuitably long for Bedoop purposes, such as infinity) to an appropriate Bedoop imaging range (such as one foot).”</li> </ul> <p>Rhoads at 17:46–54</p> <ul style="list-style-type: none"> <li>• “The building can be provided with an image sensor (such as a video camera or the like), an associated Bedoop. detection system, and the proximity detector. When a user wearing the badge approaches, the proximity detector signals the camera to capture image data. The Bedoop detection system identifies the badge photograph (e.g., by clues as are described in the prior applications, or without such aids), captures optical</li> </ul>

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		<p>data, and decodes same to extract the steganographically-embedded data hidden therein.”</p> <p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"> <li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li> </ul> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).                      In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.                      In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing </li></ul>



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		<p>or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12). In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features,	Rhoads discloses enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.

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	<p>association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p>	<p>Rhoads at Fig. 2 (and accompanying description)</p> <p><b>FIG. 2</b></p> <p>Rhoads at 9:35–10:21</p> <ul style="list-style-type: none"> <li>• “The Steganographic decoding process may entail three Steps. In the first, the object is located. In the Second, the objects orientation is discerned. In the third, the Bedoop data is extracted from the image data corresponding to the Bedoop object.</li> </ul> <p>The first step, object location, can be assisted by various clues. One is the placement of the object; typically the center of the image field will be a point on the object. The surrounding data can then be analyzed to try and discern the object’s boundaries.</p>

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		<p>Another location technique is slight movement. Although the user will typically try to hold the object still, there will usually be some jitter of the Bedoop object within the image frame (e.g., a few pixels back and forth). Background visual clutter, in contrast, will typically be stationary. Such movement may thus be sensed and used to identify the Bedoop object from within the image data.</p> <p>Still another object-location clue is object shape. Many Bedoop objects are rectangular in shape (or trapezoidal as viewed by the camera). Straight edge boundaries can thus be used to define an area of likely Bedoop data. Color is a further object identification clue that may be useful in some contexts.</p> <p>Yet another object location clue is spatial frequency. In imaging systems with well defined focal zones, undesired visual clutter may be at focal distances that results in blurring. The Bedoop object, in contrast, will be in focus and may be characterized by fine detail. Analyzing the image data for the high frequencies associated with fine detail can be used to distinguish the intended object from others.</p> <p>Characteristic markings on the object (as discussed below in connection with determining object orientation) can also be sensed and used in locating the object.</p> <p>Once the Bedoop object has been located within the image data, masking can be applied (if desired) to eliminate image data not corresponding to the intended object.</p> <p>The next step in the decoding process, determining orientation of the Bedoop data, can likewise be discerned by reference to visual clues. For example, some objects include subliminal graticule data, or other</p>

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		<p>calibration data, steganographically encoded with the Bedoop data to aid in determining orientation. Others can employ overt markings, either placed for that sole purpose (e.g. reference lines or fiducials), or serving another purpose as well (e.g. lines of text), to discern orientation. Edge-detection algorithms can also be employed to deduce the orientation of the object by reference to its edges.”</p> <p>Rhoads at 16:66 – 17:10</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e.g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)”</li> </ul> <p>Rhoads at 22:9–27</p> <ul style="list-style-type: none"> <li>• “To aid in identification, the Bedoop objects (e.g., badges) can be colored a distinctive color, permitting the system to more easily identify candidate objects from other items within the optical capture devices' field of view. Or the object can be provided with a retro-reflective coating, and the elevator can be equipped with one or more illumination sources of known spectral or temporal quality (e.g., constant infra red, or constant illumination with a single- or multi-line spectrum, or a pulsed light source of known periodicity; LEDs or semiconductor lasers, each with an associated diffuser, can be used for each the foregoing and can be paired with the image capture devices). Other such tell-tale clues can likewise be</li> </ul>

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		<p>used to aid in object location. In all such cases, the optical capture device can sense the tell-tale clue(s) using a wide field of view sensor. The device can then be physically or electronically steered, and/or zoomed, to acquire a higher resolution image of the digitally-encoded object suitable for decoding.”</p> <p>Rhoads at 23:33–54</p> <ul style="list-style-type: none"> <li>• “When a recipient of a business card holds it in front of a Bedoop sensor, the operating system on the local system launches a local Bedoop application. That local Bedoop application, in turn, establishes an external internet connection to a remote business card server. The address of that server may already be known to the local Bedoop application (e.g., having been stored from previous use), or the local Bedoop system can traverse the above-described public network of DNS servers to reach the business card server.</li> </ul> <p>A database on the business card name server maintains a large collection of business card data, one database record per UID. When that server receives Bedoop data from a local Bedoop system, it parses out the UID and accesses the corresponding database record. This record typically includes more information than is commonly printed on conventional business cards. Sample fields from the record may include, for example, name, title, office phone, office fax, home phone, home fax, cellular phone, email address, company name, corporate web page address, personal web page address, secretary's name, spouse's name, and birthday. This record is transmitted back to the originating Bedoop system.”</p> <p>Rhoads at 48:32–53</p> <ul style="list-style-type: none"> <li>• “As noted, the following disclosure focuses on one particular application—a system for linking print media to electronic content It should be reiterated,</li> </ul>

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		<p>however, that the technology is not so limited, and may more generally be viewed as a system for linking any object (physical or electronic) to a corresponding networked or local resource.</p> <p>In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards. This identifier is read by software in a user's computing device and forwarded to a remote database. The remote database identifies a URL corresponding to the identifier, and provides the URL back to the user's computer—permitting a browser on the user's computer to display the URL-identified web page. That web page can provide additional information or services—more timely and/or more extensive than that provided by the print material. By such arrangement, more efficient internet navigation and access is provided to consumers, and more effective means for linking readers to e-commerce points of sale is provided to advertisers.”</p> <p>Rhoads at 49:3-14:</p> <ul style="list-style-type: none"> <li>• “Detection is the complementary operation to embedding, i.e., discerning a digital identifier from an object.</li> </ul> <p>Response refers to the action taken based on the discerned identifier. The middle two steps—embedding and detection—can employ any of myriad well-known technologies, including 1D and 2D barcodes, magnetic ink character recognition (MICR), optical character recognition (OCR), optical mark recognition (OMR), radio frequency identification (RF/ID), data glyphs, organic transistors, magnetic stripe, metadata, file header information, UV/IR identifiers, and other machine-readable indicia and techniques for associating plural-bit digital data with an electronic or physical object. The detailed embodiment employs watermarking</p>

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		<p>technology, although this is illustrative only.”</p> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"> <li>• “As more particularly detailed below, the <b>handler 16</b> provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider).                      In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark. <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).                      In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> </li> </ul>

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		<p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 51:18-37</p> <ul style="list-style-type: none"> <li>• “When shown a watermarked image, the application 28 c analyzes the image and extracts the embedded watermark payload (more particularly detailed below) from the image. The application sends some or all of this information in a message format to the router 14.</li> </ul> <p>The router 14 decodes the received message, looking for vendor and product information. Based on this information, it passes the message to a corresponding product handler 16.</p> <p>The product handler receives the message and attempts to match the detected watermark serial number to a registered watermark serial number earlier stored in the database 17. If a match is found, the product handler performs the desired action. As noted, typical actions include returning a URL for web redirection, serving up an HTML page for initial user navigation, initiating software downloads, etc. If a match is not found, the product handler returns an error code and message to the application 28 c. If a match is found, but the corresponding action is unavailable, incomplete, inactive or invalid, the product handler returns an error code and message to the calling application.”</p> <p>Rhoads at 84:11 – 17</p> <ul style="list-style-type: none"> <li>• “B55. A method comprising:</li> </ul>



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		<p>presenting an object to an optical sensor, the optical sensor producing image data, the object being steganographically encoded with plural bits of digital data;</p> <p>decoding said digital data from the image data; and</p> <p>in response to said digital data, displaying an image of a like object.”</p> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 30**

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30	The method of claim 25, wherein the step of displaying the displayed image includes displaying a time varying image.	<p>Rhoads discloses the step of displaying the displayed image includes displaying a time varying image.</p> <p>Rhoads at 7:24-42</p> <ul style="list-style-type: none"> <li>• “Device 12 interacts with an object 20. The object can be electronic or not. Electronic objects can include computer files, representations of audio, video, or still imagery (e.g., files or in streaming form), etc. Non-</li> </ul>

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		<p>electronic objects can include physical objects such as newspapers, magazine pages, posters, product packaging, event tickets, credit cards, paper currency, etc. Non-electronic objects can also include sounds produced by loudspeakers.</p> <p>When used with nonelectronic objects, device 12 (FIG. 2) typically includes some form of sensor or transducer 22 to produce electronic signals or data corresponding to the object. Examples include CCD- or CMOS-based optical sensors (either as part of still- or video cameras, flatbed scanners, mice, or otherwise), microphones, barcode scanners, RF ID sensors, mag stripe readers, etc. In such cases, the sensor 22 may be coupled to associated interface electronics 24, which in turn may be coupled to device driver software 26, which in turn may be coupled to one or more application programs 28.”</p> <p>Rhoads at 17:46–54</p> <ul style="list-style-type: none"><li>• “The building can be provided with an image sensor (such as a video camera or the like), an associated Bedoop. detection system, and the proximity detector. When a user wearing the badge approaches, the proximity detector signals the camera to capture image data. The Bedoop detection system identifies the badge photograph (e.g., by clues as are described in the prior applications, or without such aids), captures optical data, and decodes same to extract the steganographically-embedded data hidden therein.”</li></ul> <p>Rhoads at 46:47-53</p> <ul style="list-style-type: none"><li>• “The provision of image Sensors in cell phones enables other functionality. One is the capture of still or video imagery. Such image data can be compressed (typically by lossy processes such as MPEG, JPEG, or the like, implemented with dedicated hardware CODECs) and transmitted with the audio data. The Screens on Such phones can likewise be used for display of incoming image or Video data.”</li></ul>
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		<p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 33**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
33	<p>The method of claim 25, wherein the step of enabling performance of the transaction includes initiating a verification.</p>	<p>Rhoads discloses the step of enabling performance of the transaction includes initiating a verification.</p> <p>Rhoads at 16:66 – 17:16</p> <ul style="list-style-type: none"> <li>• “Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)</li> </ul>

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		<p>The guard checks the name returned by the Bedoop System with the name printed on the badge. On Seeing that the printed and Bedoop-decoded names match (and optionally checking the door log to see that a person of that name was authorized to enter and did So), the Security guard can let the candidate pass.”</p> <p>Rhoads at 17:46–54</p> <ul style="list-style-type: none"><li>• “The building can be provided with an image sensor (such as a video camera or the like), an associated Bedoop. detection system, and the proximity detector. When a user wearing the badge approaches, the proximity detector signals the camera to capture image data. The Bedoop detection system identifies the badge photograph (e.g., by clues as are described in the prior applications, or without such aids), captures optical data, and decodes same to extract the steganographically-embedded data hidden therein.”</li></ul> <p>Rhoads at 50:21-48.</p> <ul style="list-style-type: none"><li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider). In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</li></ul>
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		<p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these</p>
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		references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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**4. Claim 34**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
34	The method of claim 25 wherein the step of enabling performance of the transaction includes initiating an authorization.	<p>Rhoads discloses the step of enabling performance of the transaction includes initiating an authorization.</p> <p>Rhoads at 16:66 – 17:16</p> <ul style="list-style-type: none"> <li>“Inside the building the candidate may encounter a security guard. Seeing an unfamiliar person, the guard may visually compare the photo on the badge with the candidate's face. Additionally, the guard can present the badge to a portable Bedoop device, or to one of many Bedoop systems scattered through the building (e g., at every telephone). The Bedoop system extracts the Bedoop data from the card (i.e., from the DMV photograph), interrogates the DMV's DNS server with this Bedoop data, and receives in reply the name of the person depicted in the photograph. (If the Bedoop system is a telephone, the name may be displayed on a small LCD display commonly provided on telephones.)</li> </ul> <p>The guard checks the name returned by the Bedoop System with the name printed on the badge. On Seeing that the printed and Bedoop-decoded names match (and optionally checking the door log to see that a person of that name was authorized to enter and did So), the Security guard can let the candidate pass.”</p> <p>Rhoads at 19:6–8</p> <ul style="list-style-type: none"> <li>“In another example, the UID field serves an authentication purpose, e.g., to verify that the printed medium actually was printed at a particular place, or by a particular user or at a particular time.”</li> </ul>

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		<p>Rhoads at 35:15–29</p> <ul style="list-style-type: none"><li>• “A shopper's credit card can be Bedoop-encoded so as to lead Bedoop systems of particular stores (i.e., stores pre-authorized by the shopper) to a profile on the shopper (e.g., containing size information, repeat purchase information, return history, style/color preferences, etc.).</li></ul> <p>Credit Card Purchases</p> <p>When a consumer visits a commercial web site and wishes to purchase a displayed product, the transaction can be speeded simply by presenting a Bedoop-encoded credit card to a Bedoop sensor on the user's computer. The Bedoop data on the card leads to a database entry containing the credit card number and expiration date. The Bedoop application then sends this information (optionally after encrypting same) to the web site with instructions to purchase the depicted product.”</p> <p>Rhoads at 46:46-53</p> <ul style="list-style-type: none"><li>• “Another function enabled by image sensors in cell phones is user-verification, e.g., by retinal scanning or other optically-sensed biometrics, before the phone will permit a call to be placed. A great number of such biometric verification techniques are known.”</li></ul> <p>Rhoads at 50:21-48</p> <ul style="list-style-type: none"><li>• “As more particularly detailed below, the handler 16 provides a response in accordance with the particular watermark payload. The response may be provided directly by the product handler to the device 12, or the handler may respond by communicating with a remote resource 18 (which may be, e.g., a data repository or service provider). In the former case, the handler 16 may identify a URL corresponding to the watermark (using the database 17), and return the URL to the application 28 c. Application 28 c can then pass the URL to a web</li></ul>
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		<p>browser 28 b in the device 12, and initiate a link to the internet site identified by the URL. Or the handler may have some locally stored data (e.g., audio or video, or software updates) and send it to the device 12 in response to the watermark.</p> <p>In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</p> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final</p>
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		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 38**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
38	<p>The method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.</p>	<p>Rhoads discloses the step of enabling performance of the interaction includes initiating a transaction with an account.</p> <p>Rhoads at 50:24-48</p> <ul style="list-style-type: none"> <li>• “In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user’s personal music library, or to update software installed on device 12).</li> </ul> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a</p>

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		<p>remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 30:4-7</p> <ul style="list-style-type: none"><li>• “Bank cards (debit, credit, etc.) can similarly be encoded with Bedoop data to permit the holder to access bank records corresponding to the bank card account. (Entry of a PIN code may be required to assure privacy.)”</li></ul> <p>Rhoads at 48:37-42</p> <ul style="list-style-type: none"><li>• “In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards.”</li></ul> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to</p>
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		address similar known problems, according to known methods which would yield predictable results.
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**6. Claim 39**

Claim	’897 Claim Recitation	Exemplary Citations in Reference
39	The method of claim 38, wherein the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account.	<p>Rhoads discloses the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account.</p> <p>Rhoads at 35:15–29</p> <ul style="list-style-type: none"> <li>• “A shopper's credit card can be Bedoop-encoded so as to lead Bedoop systems of particular stores (i.e., stores pre-authorized by the shopper) to a profile on the shopper (e.g., containing size information, repeat purchase information, return history, style/color preferences, etc.).</li> </ul> <p>Rhoads at 50:24-48</p> <ul style="list-style-type: none"> <li>• “In the latter case, the handler 16 does not respond directly to the device 12. Instead, the handler responds by communicating with a remote resource 18. The communication can be as simple as logging receipt of the watermark message in a remote repository. Or it can be to authenticate device 12 (or a user thereof) to a remote resource in anticipation of a further transaction (e.g., the communication can form part of an on-line licensing or digital rights management transaction). Or the communication can request the remote resource to provide data or a service back to device 12 or to another destination (e.g., to initiate an FTP file transfer, or to request that a song selection identified by the watermark be downloaded to a user's personal music library, or to update software installed on device 12).</li> </ul> <p>In still other cases, hybrids of the two foregoing cases can be employed, e.g., handler 16 can send some data back to device 12, while also</p>

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		<p>communicating with a remote resource 18.</p> <p>In some cases, the response returned to the device 12 by handler 6 (or a remote resource 18) can serve to trigger some further action by the device 12. For example, the response returned to device 12 can include a WindowsMedia audio file, together with a request that the device 12 launch the WindowsMedia player installed on the device. (The launching of a browser pointed to a URL is another example of such triggering.)”</p> <p>Rhoads at 30:4-7</p> <ul style="list-style-type: none"><li>• “Bank cards (debit, credit, etc.) can similarly be encoded with Bedoop data to permit the holder to access bank records corresponding to the bank card account. (Entry of a PIN code may be required to assure privacy.)”</li></ul> <p>Rhoads at 48:37-42</p> <ul style="list-style-type: none"><li>• “In accordance with an exemplary application of the below-detailed technology, digital watermarking is employed to convey a plural bit identifier within print media, such as magazine advertisements or articles, direct mail coupons or catalogs, bank- or credit-cards, and business cards.” 48:37-42.</li></ul> <p>To the extent it is found that Carlton does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Carlton does not anticipate this claim, Carlton renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Carlton with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to</p>
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		address similar known problems, according to known methods which would yield predictable results.
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### **Exhibit H-5**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Sizer was filed on March 28, 1997. Sizer published at least as of March 14, 2000, and is available as prior art at least under 35 U.S.C. § 102(a), (b) and (e).

As shown in the chart below, Sizer anticipates asserted claims 25, 30, 33, 34, and 39 of the ’897 Patent. To the extent Sizer is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Sizer is found not to anticipate any asserted claims or claim elements of the ’897 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 25**

Element	'897 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method of conducting a transaction with an interactive system, the method comprising	<p>Sizer discloses a method of conducting a transaction with an interactive system.</p> <p>Sizer at Abstract:</p> <ul style="list-style-type: none"> <li>In accordance with the present invention, an apparatus initiates a transaction and includes a capture device for capturing transaction data from marks contained on an object. The marks have a code corresponding to transaction data for initiating a transaction. The capture device includes a scanner, operable by a user, for reading marks contained on the object. A controller interprets the marks and retrieves the transaction data embedded in the marks. The capture device originates a telephone call and transfers at least a portion of the transaction data to a desired destination for initiating a transaction.</li> </ul> <p>Sizer at 12:62-13:12</p> <ul style="list-style-type: none"> <li>In accordance with the present invention, a capture device now can initiate a transaction by capturing transaction data from marks contained on an object, such as a magazine advertisement, where the marks have embedded therein a code corresponding to transaction data for initiating a transaction. The capture device includes a scanner, operable by a user, for reading marks contained on the object and a controller for interpreting the marks and retrieving transaction data embedded in the marks. Through associated apparatus as described above, a telephone call can be originated by information contained in the transaction data in at least a portion of the transaction data transferred to a desired destination for initiating a transaction. As a result, it is now possible now for magazines, newspapers, printed media and many other objects to contain marks relating to an advertisement or solicitation which can be easily scanned and a transaction</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		completed to the vendor of the advertisement or solicitation. This saves much time and allows easier access to services and products.
[1A]	providing access to a device having a display;	<p>Sizer discloses providing access to a device having a display.</p> <p>Sizer at FIG. 1</p> <p>Sizer at 5:3-20</p> <ul style="list-style-type: none"> <li>“Briefly, it was found using a spectrum analyzer on a typical video signal, that there are comparatively large frequency components at the line rate and at the frame rate and its harmonics, but that between these frequencies,</li> </ul>



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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>there are other frequency bands in which little information is carried. One such frequency band is between 15 and 30 kHz. By adding a low level carrier signal or tone at a frequency in this band, say 25 kHz, the video image is not degraded, but a properly tuned decoder can receive and decode the encoded information. In this way, digital information can be subliminally inserted in a video signal by adding to the video signal an amplitude shift keyed (ASK) or frequency shift keyed (FSK) carrier signal, and the digital information can later be recovered using ASK or FSK decoding. Encoded data can also be inserted in a television signal and recovered by a receiver that responds to the picture displayed on the television, in the manner described in U.S. Pat. No. 4,807,031 cited above.”</p> <p>Sizer at 5:23-26</p> <ul style="list-style-type: none"> <li>• “If any non-discernible encoded data is part of a video signal, such sensing takes the form of light from display area being collected by an optical lens 117.”</li> </ul> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1B]	displaying a displayed image on the display of the device;	Sizer discloses displaying a displayed image on the display of the device.  Sizer at FIG. 1  <p>FIG. 1</p> <p>The diagram illustrates a system for displaying a displayed image on the display of a device. A mobile device (60) with an optical lens (117) scans a 'B'-BAR CODE (52a) on a MAGAZINE (M). The device is connected to an MTSO (140) and a TELEPHONE BASE (109) via a TELEPHONE LINE (111). The device is also connected to a TELECOMMUNICATIONS NETWORK (115) which includes a VOICE RESPONSE UNIT (132), a SWITCH MATRIX (131), and two AGENT TERMS (120, 121). The network is connected to an INTERACTIVE SERVICE PLATFORM (130) containing a DATA BASE (133), a PROCESSOR (134), and a SCANNER PEN (52c).</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at 2:60-62</p> <ul style="list-style-type: none"> <li>• At least a portion of the transaction data can be displayed on a LCD or similar type of display.</li> </ul> <p>Sizer at 5:3-20</p> <ul style="list-style-type: none"> <li>• “Briefly, it was found using a spectrum analyzer on a typical video signal, that there are comparatively large frequency components at the line rate and at the frame rate and its harmonics, but that between these frequencies, there are other frequency bands in which little information is carried. One such frequency band is between 15 and 30 kHz. By adding a low level carrier signal or tone at a frequency in this band, say 25 kHz, the video image is not degraded, but a properly tuned decoder can receive and decode the encoded information. In this way, digital information can be subliminally inserted in a video signal by adding to the video signal an amplitude shift keyed (ASK) or frequency shift keyed (FSK) carrier signal, and the digital information can later be recovered using ASK or FSK decoding. Encoded data can also be inserted in a television signal and recovered by a receiver that responds to the picture displayed on the television, in the manner described in U.S. Pat. No. 4,807,031 cited above.”</li> </ul> <p>Sizer at 5:23-26</p> <ul style="list-style-type: none"> <li>• “If any non-discernible encoded data is part of a video signal, such sensing takes the form of light from display area being collected by an optical lens 117.”</li> </ul> <p>Sizer at 5:36-48</p> <ul style="list-style-type: none"> <li>• In addition to receiving non-discernible encoded data from the scanner pen, the capture device 110 has the capability of (a) storing the encoded data, (b) transmitting (or otherwise outputting) the encoded data (or</li> </ul>

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		<p>information retrieved using such data) to a remote location or device, and (c) displaying the encoded data to a user. The data may include information for initiating a transaction or originating a telephone call, as well as additional information (e.g., price and ordering information) associated with the scanned material. The remote location can be agent terminals 120 or 121, interactive service platform 130, or a point of sale system, and the communication between the capture device 110 and the remote location may be one-way or two-way.</p> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</li> </ul> <p>Sizer at 7:12-16</p> <ul style="list-style-type: none"> <li>• The captured data may also be displayed on a display 225, such as a liquid crystal display, so that a user will be aware of exactly what information was captured.</li> </ul> <p>Sizer at 9:14-19</p> <ul style="list-style-type: none"> <li>• During the SEND DATA function, the information being output may also be displayed on display 225. This allows a person using the capture device to identify the information that was captured, and use the information in an actual transaction.</li> </ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a</li> </ul>

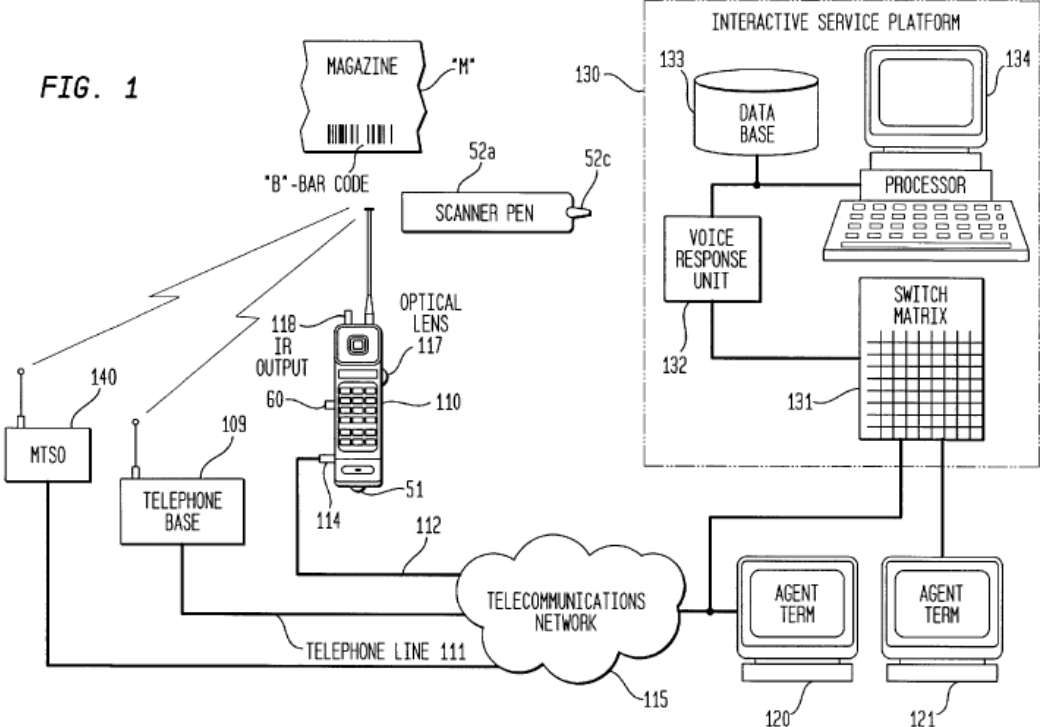
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		<p>subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination</p>

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		with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[1C]	presenting the displayed image proximate to an optical sensor; and	Sizer discloses presenting the displayed image proximate to an optical sensor.  Sizer at FIG. 1

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p><b>FIG. 1</b></p>  <p>Sizer at 5:3-20</p> <ul style="list-style-type: none"> <li>“Briefly, it was found using a spectrum analyzer on a typical video signal, that there are comparatively large frequency components at the line rate and at the frame rate and its harmonics, but that between these frequencies, there are other frequency bands in which little information is carried. One such frequency band is between 15 and 30 kHz. By adding a low level carrier signal or tone at a frequency in this band, say 25 kHz, the video image is not degraded, but a properly tuned decoder can receive and decode the encoded information. In this way, digital information can be</li> </ul>



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		<p>subliminally inserted in a video signal by adding to the video signal an amplitude shift keyed (ASK) or frequency shift keyed (FSK) carrier signal, and the digital information can later be recovered using ASK or FSK decoding. Encoded data can also be inserted in a television signal and recovered by a received that responds to the picture displayed on the television, in the manner described in U.S. Pat. No. 4,807,031 cited above.”</p> <p>Sizer at 5:23-26</p> <ul style="list-style-type: none"> <li>• “If any non-discernible encoded data is part of a video signal, such sensing takes the form of light from display area being collected by an optical lens 117.”</li> </ul> <p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.</li> </ul> <p>On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>Sizer at 9:33-53</p> <ul style="list-style-type: none"> <li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</li> </ul> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"> <li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device 110 may be in a "wait state" 505.”</li> </ul>

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		<p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	<p>enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p>	<p>Sizer discloses enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p> <p>Sizer at FIG. 2</p>

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		<p><b>FIG. 2</b></p> <p>Sizer at 2:36-42</p> <ul style="list-style-type: none"> <li>• It would be advantageous if select pieces of information concerning the advertisement or solicitation could be retrieved to initiate a transaction by dialing a telephone number concerning the vendor of that particular advertisement or solicitation and then initiating a transaction automatically.</li> </ul> <p>Sizer at 4:45-64</p> <ul style="list-style-type: none"> <li>• It should be understood that the data could also be received from a light emitting device such as a television or audio signal from a speaker. In</li> </ul>

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		<p>that instance, in a television signal would be received by a television via over-the-air transmission, as from transmission tower via a transmission link, or alternatively supplied by a cable TV connection, or from a VCR/video-tape. The video portion of the television signal could be displayed on the picture tube or other visual display area of a monitor, computer or a television, while the audio portion of the television signal is played from speaker. Associated with the program that is seen and possibly heard by a viewer/listener could be non-discernible encoded data that is transmitted as part of the video and possibly audio signal. For example, the program may be an advertisement for a service or product, and the indiscernible data may create a subliminal visual pattern on the visual display area, that when properly received and decoded, contains information needed to order those services or products, including prices, delivery intervals, shipping details, coupon offers, and so-on.</p> <p>Sizer at 6:18-38</p> <ul style="list-style-type: none"> <li>• “If an outgoing telephone call is initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.</li> </ul> <p>For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected,</p>

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		<p>or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</p> <p>Sizer at 6:41-62</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.</li> </ul> <p>On the other hand, if the encoded non-perceptible data is inserted in the audio portion of a television signal, e.g. the output from a speaker is captured by a microphone 211 and an associated amplifier 213, which is arranged to supply an electrical signal to filter/receiver 215 representing the sound energy. In either event, the encoded non-perceptible data is decoded in the filter/receiver 215 in a manner consistent with the manner in which the original data was encoded. Thus, filter/receiver 215 can be arranged to perform the same functionality as the elements illustrated in FIG. 4 of the above referenced Broughton et al. patent, or, alternatively, the operation of filter/receiver 215 can be as described in conjunction with FIGS. 4 or 7 in the copending application of T. Sizer.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"> <li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li> </ul> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"> <li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to</li> </ul>

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		<p>effectuate a transaction.”</p> <p>Sizer at 12:62-13:12</p> <p>In accordance with the present invention, a capture device now can initiate a transaction by capturing transaction data from marks contained on an object, such as a magazine advertisement, where the marks have embedded therein a code corresponding to transaction data for initiating a transaction. The capture device includes a scanner, operable by a user, for reading marks contained on the object and a controller for interpreting the marks and retrieving transaction data embedded in the marks. Through associated apparatus as described above, a telephone call can be originated by information contained in the transaction data in at least a portion of the transaction data transferred to a desired destination for initiating a transaction. As a result, it is now possible now for magazines, newspapers, printed media and many other objects to contain marks relating to an advertisement or solicitation which can be easily scanned and a transaction completed to the vendor of the advertisement or solicitation. This saves much time and allows easier access to services and products.</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**2. Claim 30**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
30	The method of claim 25, wherein the step of displaying the displayed image includes displaying a time varying image.	<p>Sizer discloses the step of displaying the displayed image includes displaying a time varying image.</p> <p>Sizer at 5:3-20</p> <ul style="list-style-type: none"> <li>• “Briefly, it was found using a spectrum analyzer on a typical video signal, that there are comparatively large frequency components at the line rate and at the frame rate and its harmonics, but that between these frequencies, there are other frequency bands in which little information is carried. One such frequency band is between 15 and 30 kHz. By adding a low level carrier signal or tone at a frequency in this band, say 25 kHz, the video image is not degraded, but a properly tuned decoder can receive and decode the encoded information. In this way, digital information can be subliminally inserted in a video signal by adding to the video signal an amplitude shift keyed (ASK) or frequency shift keyed (FSK) carrier signal, and the digital information can later be recovered using ASK or FSK decoding. Encoded data can also be inserted in a television signal and recovered by a receiver that responds to the picture displayed on the television, in the manner described in U.S. Pat. No. 4,807,031 cited above.”</li> </ul> <p>Sizer at 5:23-26</p> <ul style="list-style-type: none"> <li>• “If any non-discernible encoded data is part of a video signal, such sensing takes the form of light from display area being collected by an optical lens 117.”</li> </ul> <p>Sizer at 6:42-47</p> <ul style="list-style-type: none"> <li>• “If the encoded non-perceptible data is inserted in the video portion of a television signal, the images displayed on a visual display area a monitor or television are captured by optical lens 117 and an associated photo-</li> </ul>



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		<p>detector 203, which is arranged to supply an electrical signal to a filter/receiver 215 representing the image.”</p> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"><li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</li></ul> <p>Sizer at 10:27-37</p> <ul style="list-style-type: none"><li>• In the active mode, a user operates capture device 110 in real time, typically while scanning a product or bar code, or in more complicated devices viewing a video display or listening to an audio presentation. Scanning a product or bar code, or in more complicated devices the user activates the SAVE button 241. When button 241 is activated, a positive result occurs in step 503, thereby capturing the encoded data, displaying all or a portion of the data on display 225, and storing same in memory 221, all in step 507. Until the SAVE button is activated, capture device</li></ul>
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		<p>110 may be in a "wait state" 505.”</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 33**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
33	The method of claim 25, wherein the step of enabling performance of the transaction includes initiating a verification.	<p>Sizer discloses the step of enabling performance of the transaction includes initiating a verification.</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success</p>

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		for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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**4. Claim 34**

<b>Claim</b>	<b>'897 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
34	The method of claim 25 wherein the step of enabling performance of the transaction includes initiating an authorization.	Sizer discloses the step of enabling performance of the transaction includes initiating an authorization.  Sizer at 6:18-38 <ul style="list-style-type: none"> <li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction.                          For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</li> </ul> To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate

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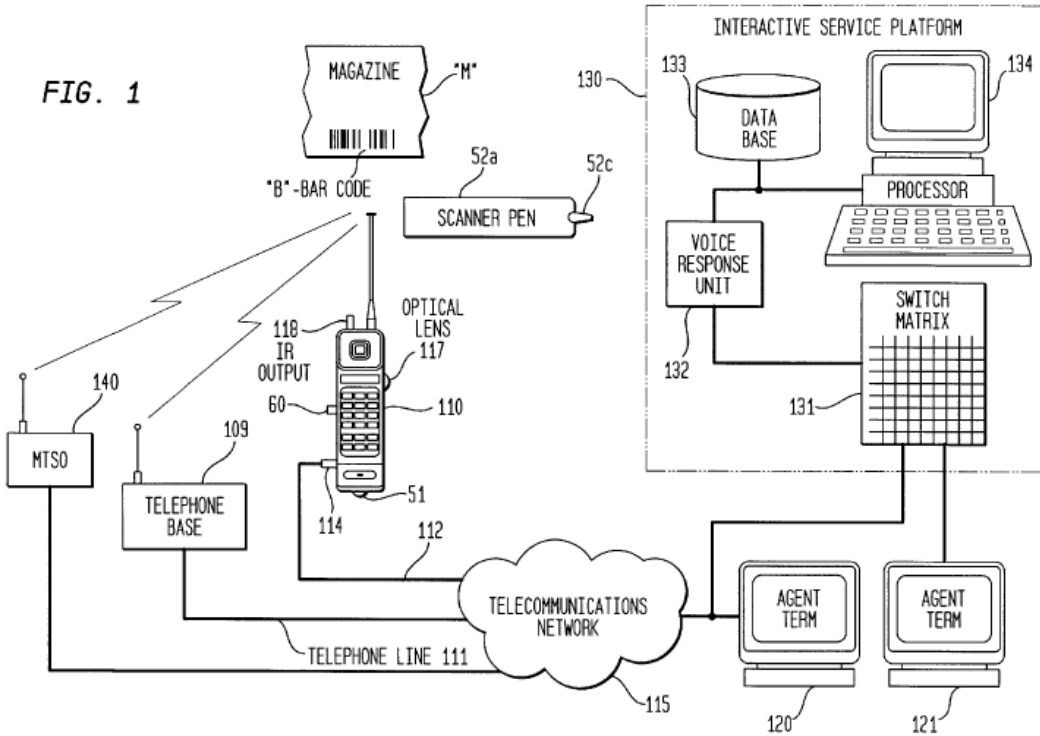
		<p>this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 38**

<b>Claim</b>	<b>'897 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
38	<p>The method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.</p>	<p>Sizer discloses the step of enabling performance of the interaction includes initiating a transaction with an account.</p> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**6. Claim 39**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
39	The method of claim 38, wherein the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account.	Sizer discloses the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account.  Sizer at FIG. 1   <p style="text-align: center;">Sizer at 6:18-38</p>

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		<ul style="list-style-type: none"><li>• “If an outgoing telephone call in initiated by capture device 110, the call can illustratively be routed through telecommunications network 115 directly to an agent terminal 120, or to an interactive service platform 130, which is connected to another agent terminal 121. When a connection is completed to platform 130, the call may be routed by a switch matrix 131 to a voice response unit 132 that operates under the control of a processor 134. Information included in the captured encoded can be provided to the attendants, or processor 134 can perform a look-up and retrieval operation in database 131, using encoded data as a key, in order to effectuate a desired transaction. For certain transactions, information connected with a transaction may also be transmitted from service platform 130 to capture device 110, either for display to a user, storage for later use, or output to a point of sale system or device. This information may, for example, be confirmation information, indicating that a transaction has been effected, or details regarding a just completed transaction, such as ticket information relating to a travel reservation.”</li></ul> <p>Sizer at 9:33-53</p> <ul style="list-style-type: none"><li>• “For background purposes, a televised advertisement for a product could include additional ordering or "coupon" information embedded in a subliminal visual pattern within the video image displayed on a television. The coupon information describes the item(s) offered for sale, the regular price, the coupon value, and contains additional information needed for ordering. This embedded information could be transmitted between a television and capture device at a rate of about 60 bits per second, that is sufficient such that the necessary information can be transmitted in a very brief period of time. In the application just described, the embedded product information, dialing number, coupon information and necessary checkbits together comprise approximately 2,000 bits of information, so that between three and four seconds would be required for transmission. Once the coupon</li></ul>
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		<p>information is stored in capture device 110, the user of the capture device can supplement the coupon information with user entered data which can be entered using keypad 247. This supplemental information may include credit card or other billing information pertaining to the user, as an example.”</p> <p>Sizer at 10:45-49</p> <ul style="list-style-type: none"><li>• “A call is then originated launch, such by transmitting the dialing information from memory 221 through base station interface 250 to base station 109 and thence to telephone line 111 and telecommunications network 115 to interactive service platform 130.”</li></ul> <p>Sizer at 12:41-43</p> <ul style="list-style-type: none"><li>• “The call may be placed to an interactive service platform, and additional captured data, such as coupon or similar information, can then be used to effectuate a transaction.”</li></ul> <p>To the extent it is found that Sizer does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Sizer does not anticipate this claim, Sizer renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Sizer with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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Invalidity Chart for U.S. Patent 8,520,897 based on  
U.S. Patent No. 6,666,377 to Harris (“Harris”)

### **Exhibit H-6**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Harris was filed on July 18, 2000. Harris published at least as of December 23, 2003, and is available as prior art at least under 35 U.S.C. § 102(e).

As shown in the chart below, Harris anticipates asserted claims 25, 30,, 33, 34, and 39 of the ’897 Patent. To the extent Harris is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Harris is found not to anticipate any asserted claims or claim elements of the ’897 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cover pleading. These Final Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

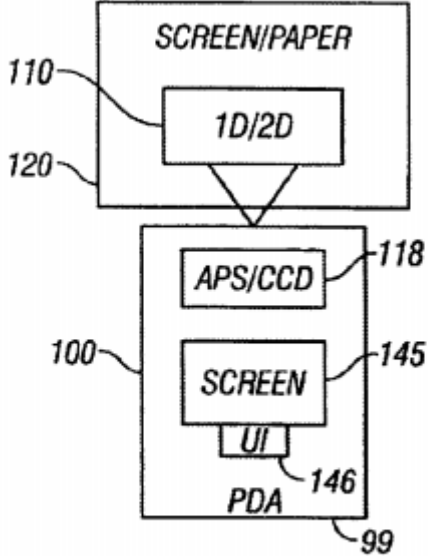
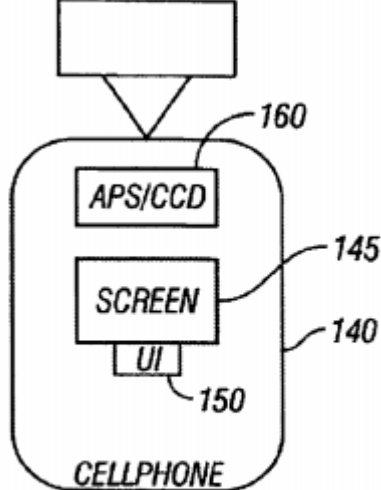


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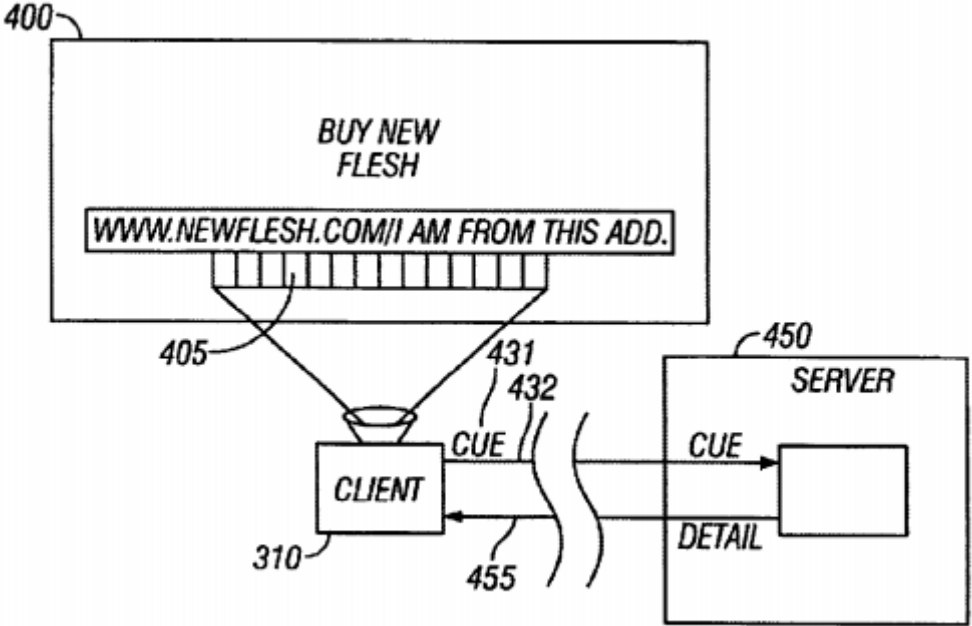
**1. Claim 25**

Element	'897 Claim Recitation	Exemplary Citations in Reference
[1Pre]	A method of conducting a transaction with an interactive system, the method comprising	Harris discloses a method:  Harris at 2: 3-19 <ul style="list-style-type: none"> <li>• “The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using a personal digital assistant 100 as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being a cellular telephone which also may include a screen 145 and user interface 150. The cellular telephone can be associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</li> </ul>
[1A]	providing access to a device having a display;	Harris discloses providing access to a device having a display.  Harris at FIG. 1A and FIG. 1B

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>“The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using a personal digital assistant 100 as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being a cellular telephone which also may include a screen 145 and user interface 150. The cellular telephone can be</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>  <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

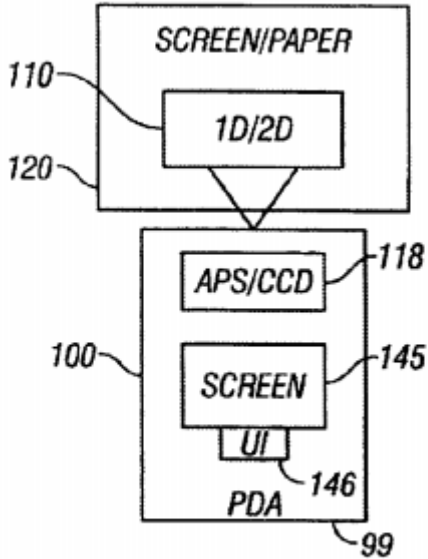
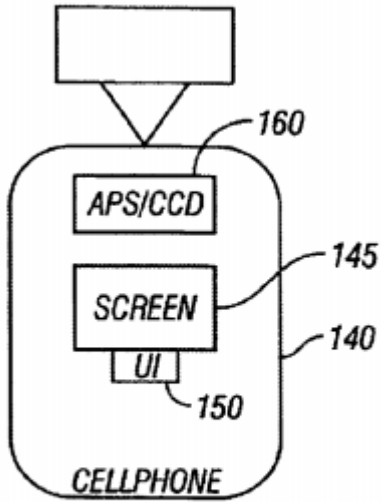
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.</p> <p>In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1B]	displaying a displayed image on the display of the device;	<p>Harris discloses displaying a displayed image on the display of the device.</p> <p>Harris at 4: 9-15</p> <ul style="list-style-type: none"> <li>• “Another embodiment shown in FIG. 4 uses bar codes to enter information into the computer. The FIG. 4 embodiment stores scannable non-alphanumeric information, e.g. bar code information, as some part of a communication—here an advertisement. The advertisement can be a</li> </ul>

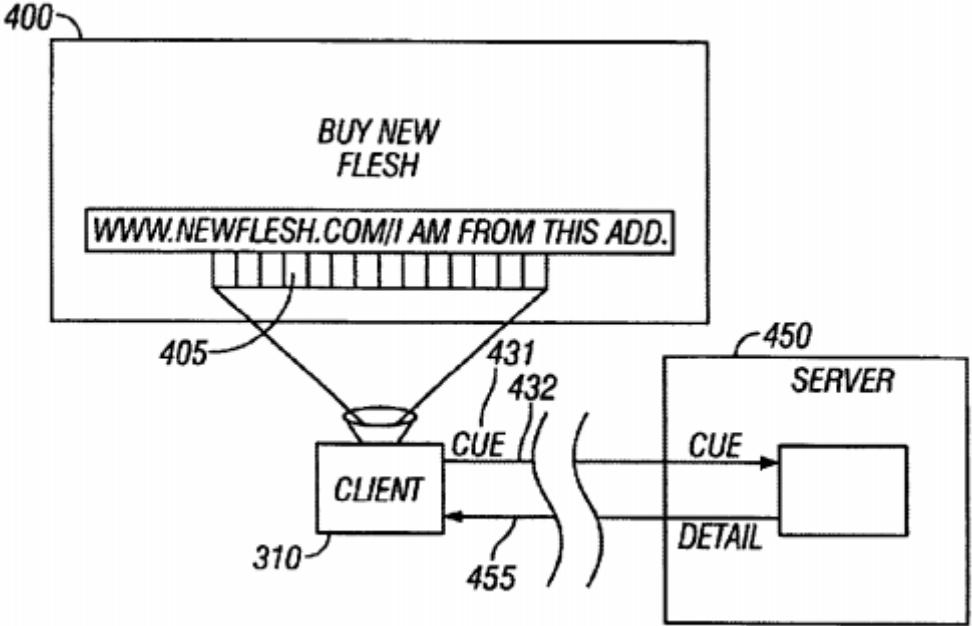
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>print advertisement, a television advertisement, or an Internet advertisement for example.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1C]	presenting the displayed image proximate to an optical sensor; and	<p>Harris discloses presenting the displayed image proximate to an optical sensor.</p> <p>Harris at FIG. 1A and FIG. 1B</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>FIG. 1A</b></p> </div> <div style="text-align: center;">  <p><b>FIG. 1B</b></p> </div> </div> <p>Harris at 2: 3-19</p> <ul style="list-style-type: none"> <li>“The bar codes can be imaged/scanned in a number of different ways. One embodiment discloses using a camera to input and decode these bar codes. The embodiments are shown in FIGS. 1A and 1B. FIG. 1A describes using a personal digital assistant 100 as the input device. One preferred input device of this type is the Palm V(TM) type hand held computer. A bar code scanner can be used, such as the commercially available Symbol Technology SPT 1700. Alternatively, a camera add-on unit can be added to the Palm V and used as described herein. The PDA includes a screen 145 and user interface 146 all within the same housing 99. FIG. 1B shows the client being a cellular telephone which also may include a screen 145 and user interface 150. The cellular telephone can be</li> </ul>

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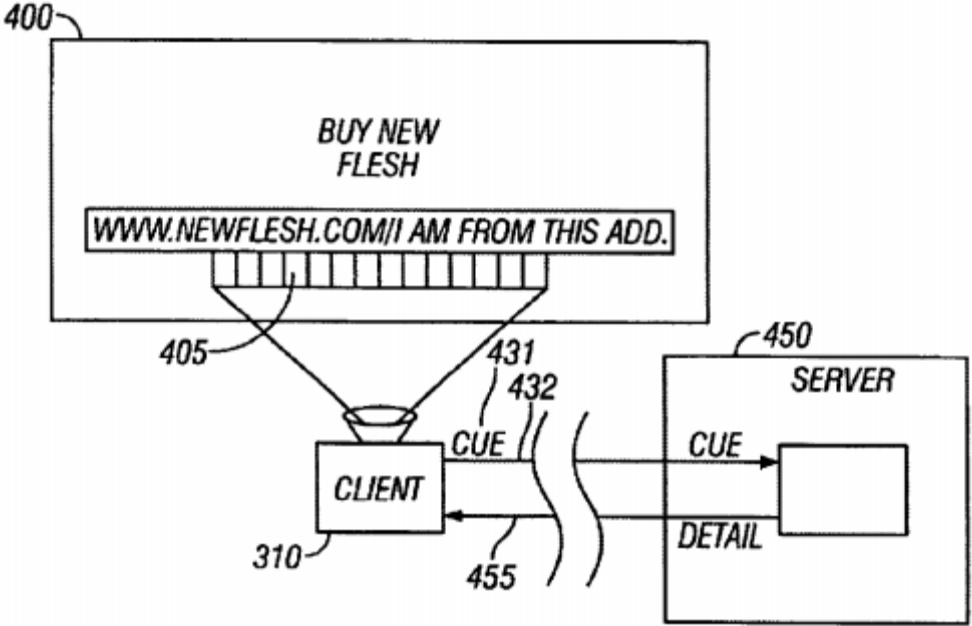
Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>associated with either a dedicated bar code scanner or an image sensor 160 of the type used to obtain photographs for video telephony.”</p> <p>Harris at FIG. 4</p>  <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>like which is an importable file with address information about the company or author sponsoring the advertisement.                      In operation, the user brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[1D]	enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.	<p>Harris discloses enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p> <p>Harris at FIG. 4</p>



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Element	'897 Claim Recitation	Exemplary Citations in Reference
		 <p style="text-align: center;"><b>FIG. 4</b></p> <p>Harris at 4:41-48</p> <ul style="list-style-type: none"> <li>“In this system, the information can represent a cue, e.g. a number, that is associated with a special function. The cue is used during a hot sync to access a publicly available information network, e.g. by direct connection or by the Internet. The cue 431 is sent over the Internet 432 to <b>the server 450</b>, and addresses more detailed information in a memory of the server. The server returns that information as 455, and the client receives the more detailed information.”</li> </ul> <p>To the extent it is found that Harris does not expressly disclose this limitation,</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**2. Claim 30**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
30	<p>The method of claim 25, wherein the step of displaying the displayed image includes displaying a time varying image.</p>	<p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

**3. Claim 33**

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<b>Claim</b>	<b>'897 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
33	The method of claim 25, wherein the step of enabling performance of the transaction includes initiating a verification.	To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

**4. Claim 34**

<b>Claim</b>	<b>'897 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
34	The method of claim 25 wherein the step of enabling performance of the transaction includes initiating an authorization.	To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

**5. Claim 38**

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 U.S. Patent No. 6,666,377 to Harris (“Harris”)

Claim	'897 Claim Recitation	Exemplary Citations in Reference
38	The method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.	<p>Harris discloses the step of enabling performance of the interaction includes initiating a transaction with an account. Harris does not explicitly disclose a transaction with an account.</p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.</li> </ul> <p>In operation, <b>the user</b> brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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**6. Claim 39**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
39	<p>The method of claim 38, wherein the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account.</p>	<p>Harris discloses the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account. Harris does not explicitly disclose the step associated with an account.</p> <p>Harris at 4:15-30</p> <ul style="list-style-type: none"> <li>• “The advertisement 400 includes a bar code 405 therein. The bar code 405 is associated with the advertisement, and includes some additional information about the advertisement. For example, the bar code may include the web site address of the company preparing the advertisement, or appointment information about the advertisement, or a “vcf file” or the like which is an importable file with address information about the company or author sponsoring the advertisement.</li> </ul> <p>In operation, <b>the user</b> brings one of the clients, either the cellular telephone 310 or PDA 315, into range of the bar code 405. The client reads the bar code and decodes it as noted above. The decoded information can represent ASCII information, a compressed file such as a zip file, G code information, or any other compressed or non-compressed information.”</p> <p>To the extent it is found that Harris does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Harris does not anticipate this claim, Harris renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Final Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Harris with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these</p>

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		references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
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### **Exhibit H-18**

Bank of America Corporation (“BofA” or “Defendant”) provides this chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety.

On information and belief, the application that matured into Krouse was filed on June 13, 1997, claiming the priority date of June 13, 1997. Krouse published at least as of August 1, 2000, and is available as prior art at least under 35 U.S.C. § 102(a) and (e).

As shown in the chart below, Krouse anticipates asserted claims 25, 30, 31, 33, 34, 39 of the ’897 Patent. To the extent Krouse is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent Krouse is found not to anticipate any asserted claims or claim elements of the ’897 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Invalidity Contentions, for the reasons identified in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed to have that same scope when considering whether they are invalid.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 25**

Element	'897 Claim Recitation	Exemplary Citations in Reference
[25Pre]	A method of conducting a transaction with an interactive system, the method comprising	<p>Krouse discloses a method of conducting a transaction with an interactive system.</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li> </ul>
[25A]	providing access to a device having a display;	<p>Krouse discloses providing access to a device having a display.</p> <p><i>Id.</i> at [25Pre].</p> <p>Krouse at 6:26–34</p> <ul style="list-style-type: none"> <li>• “Preferably, device <b>30</b> comprises a conventional alphanumeric keypad and/or keyboard for permitting input to the processor <b>40</b>, by the human</li> </ul>



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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>operator, of data and commands (which will be described more fully below) related to the transaction being processed, and an LCD/LED or computer monitor for displaying information transmitted thereto from the processor <b>40</b> and for echoing information data and commands input via the device <b>30</b>.”</p> <p>Krouse at 16:66-17:19:</p> <ul style="list-style-type: none"> <li>• “The generator 224 then causes display 206 to display this information and to prompt via the display 206 for the user/customer at the display 206 to indicate via the user interface 206 whether the displayed information is correct. If the user/customer indicates that the displayed information is correct, the generator 224 then causes the display 206 to prompt the user/customer to provide means to pay the bill whose billing information is displayed on the display 206, otherwise the user/customer is prompted to input to the generator 224 the corrected billing information, which corrected information, once input, is displayed on the display with a request that the user verify correctness of Same. Once the user/customer indicates that the billing information displayed on the display 206 is correct, the generator 224 causes the display 206 to request that the user/customer indicate to the system 200 via the user interface 206 how the user/customer wishes to make payment based upon the displayed billing information. Interface 206 may comprise a conventional point of Sale debit card reading/transaction mechanism (not shown) to permit the user/customer to accomplish this.</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[25B]	displaying a displayed image on the display of the device;	Krouse discloses displaying a displayed image on the display of the device.  <i>Id.</i> at [25Pre-A].  Krouse at 6:26–34 <ul style="list-style-type: none"> <li>• “Preferably, device <b>30</b> comprises a conventional alphanumeric keypad and/or keyboard for permitting input to the processor <b>40</b>, by the human operator, of data and commands (which will be described more fully below) related to the transaction being processed, and an LCD/LED or computer monitor for displaying information transmitted thereto from the processor <b>40</b> and for echoing information data and commands input via the device <b>30</b>.”</li> </ul> Krouse at 12:63–13:4 <ul style="list-style-type: none"> <li>• “When the document <b>400</b> is placed into the scanner <b>208</b>, the scanner <b>208</b> indicates same to the display <b>206</b>, whereupon the human operator (not shown) of the terminal <b>202</b> commands the scanner <b>208</b> to scan the entire side <b>402</b> of the document <b>400</b> containing the visual data <b>405</b> to generate a computer-readable scanned image of side <b>402</b> of the document <b>400</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>402</b> of the document <b>400</b>).”</li> </ul> Krouse at 16:66-17:19:

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<ul style="list-style-type: none"> <li>• “The generator 224 then causes display 206 to display this information and to prompt via the display 206 for the user/customer at the display 206 to indicate via the user interface 206 whether the displayed information is correct. If the user/customer indicates that the displayed information is correct, the generator 224 then causes the display 206 to prompt the user/customer to provide means to pay the bill whose billing information is displayed on the display 206, otherwise the user/customer is prompted to input to the generator 224 the corrected billing information, which corrected information, once input, is displayed on the display with a request that the user verify correctness of Same. Once the user/customer indicates that the billing information displayed on the display 206 is correct, the generator 224 causes the display 206 to request that the user/customer indicate to the system 200 via the user interface 206 how the user/customer wishes to make payment based upon the displayed billing information. Interface 206 may comprise a conventional point of Sale debit card reading/transaction mechanism (not shown) to permit the user/customer to accomplish this.</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
[25C]	presenting the displayed image proximate to an optical sensor; and	<p>Krouse discloses presenting the displayed image proximate to an optical sensor.</p> <p><i>Id.</i> at [25Pre-B].</p> <p>Krouse at 12:63–13:4</p> <ul style="list-style-type: none"> <li>• “When the document <b>400</b> is placed into the scanner <b>208</b>, the scanner <b>208</b> indicates same to the display <b>206</b>, whereupon the human operator (not shown) of the terminal <b>202</b> commands the scanner <b>208</b> to scan the entire side <b>402</b> of the document <b>400</b> containing the visual data <b>405</b> to generate a computer-readable scanned image of side <b>402</b> of the document <b>400</b> (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side <b>402</b> of the document <b>400</b>).”</li> </ul> <p>Krouse at 16:66-17:19:</p> <ul style="list-style-type: none"> <li>• “The generator 224 then causes display 206 to display this information and to prompt via the display 206 for the user/customer at the display 206 to indicate via the user interface 206 whether the displayed information is correct. If the user/customer indicates that the displayed information is correct, the generator 224 then causes the display 206 to prompt the user/customer to provide means to pay the bill whose billing information is displayed on the display 206, otherwise the user/customer is prompted to input to the generator 224 the corrected billing information, which corrected information, once input, is displayed on the display with a request that the user verify correctness of Same. Once the user/customer indicates that the billing information displayed on the display 206 is correct, the generator 224 causes the display 206 to request that the user/customer indicate to the system 200 via the user interface 206 how the user/customer wishes to make payment based upon the displayed</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>billing information. Interface 206 may comprise a conventional point of Sale debit card reading/transaction mechanism (not shown) to permit the user/customer to accomplish this.</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[25D]	<p>enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p>	<p>Krouse discloses enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p> <p><i>Id.</i> at [25Pre-C].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, </li> </ul>

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		<p>representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 3:43–4:12</p> <ul style="list-style-type: none"> <li>• “One preferred embodiment of the system of this aspect of the present invention includes an optical scanner for generating a computer-readable scanned image of the document, and an optical character recognizer for generating, from the scanned image, transaction data indicative of at least a portion of the visual information. This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.</li> </ul>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>One embodiment of the method of the first aspect of the present invention includes generating a computer-readable scanned image of the document, and generating, from the scanned image, transaction data indicative of at least a portion of the visual information contained on the document. A record is generated, from the transaction data, of the electronic financial transaction being processed, which record is for being assented to by the party tendering the document, prior to completion of said transaction. Once the record has been assented to by the party tendering the document, a computer-readable record of the party's assent to the transaction is generated from the assented-to record. An electronic financial transaction request is then generated in response to the transaction data and the computer-readable assented-to record, which request is for being used by an electronic financial transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 7:38–67</p> <ul style="list-style-type: none"> <li>• “One such standardized portion in check <b>110</b> is Magnetic Ink Character Recognizable (MICR) line <b>94</b>, which is positioned at the bottom of the check <b>110</b> and in check <b>110</b>, includes three fields <b>114</b>, <b>116</b>, <b>118</b> of printed digits separated by special control characters. Fields <b>114</b>, <b>116</b> contain the financial institution transaction routing number and account number on which the check <b>110</b> is drawn, and field <b>118</b> contains the check number of the check <b>110</b>. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line <b>94</b>, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System <b>10</b> may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).</li> </ul> <p>Based upon the standardized location, size, style, etc. of the MICR line <b>94</b> in document <b>110</b> and the fields <b>114</b>, <b>116</b>, <b>118</b> contained therein,</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>recognizer <b>32</b> utilizes optical character recognition and image processing techniques to extract from the scanned image data the data generated by the scanner <b>34</b> from scanning the MICR line portion <b>94</b> of the document <b>110</b>, and once thus extracted, to generate numeric transaction data indicative of the visual information (i.e., the numbers printed in fields <b>114, 116, 118</b>) in MICR line <b>94</b>. This numeric data is then transmitted to the processor <b>40</b>, which transmits a copy of the numeric data to the storage system <b>42</b> where it is stored in association with the scanned image data and the payee and payment amount data previously stored therein.”</p> <p>Krouse at 12:63-13:11:</p> <ul style="list-style-type: none"> <li>• “When the document 400 is placed into the scanner 208, the scanner 208 indicates same to the display 206, where upon the human operator (not shown) of the terminal 202 commands the scanner 208 to Scan the entire side 402 of the document 400 containing the visual data 405 to generate a computer-readable scanned image of side 402 of the document 400 (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side 402 of the document 400). This scanned image of side 402 is then transmitted to the image characterization generator 204 in order to generate therefrom recognition characteristics for permitting the System 200 to determine whether document 400 has a format that matches that of another billing transaction document and to execute further processing based upon this determination, as will be described in greater detail below.”</li> </ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in</p>



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Element	'897 Claim Recitation	Exemplary Citations in Reference
		combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

**2. Claim 30**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
30	The method of claim 25, wherein the step of displaying the displayed image includes displaying a time varying image.	Krouse discloses the step of displaying the displayed image includes displaying a time varying image. <i>Id.</i> at [25]. Krouse at 12:63-13:11: <ul style="list-style-type: none"> <li>• “When the document 400 is placed into the scanner 208, the scanner 208 indicates same to the display 206, where upon the human operator (not shown) of the terminal 202 commands the scanner 208 to Scan the entire side 402 of the document 400 containing the visual data 405 to generate a computer-readable scanned image of side 402 of the document 400 (i.e., computer-readable data from which an appropriately provisioned computer may generate a display image of the at least one scanned side 402 of the document 400). This scanned image of side 402 is then transmitted to the image characterization generator 204 in order to generate therefrom recognition characteristics for permitting the System 200 to determine whether document 400 has a format that matches that of another billing transaction document and to execute further processing based upon this determination, as will be described in greater detail below.”</li> </ul>

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		<p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 33**

<b>Claim</b>	<b>'897 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
33	<p>The method of claim 25, wherein the step of enabling performance of the transaction includes initiating a verification.</p>	<p>Krouse discloses the step of enabling performance of the transaction includes initiating a verification.</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the</li> </ul>

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		<p>visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</p> <p>Krouse at 3:49–57</p> <ul style="list-style-type: none"><li>• “This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.”</li></ul> <p>Krouse at 8:1–12</p> <ul style="list-style-type: none"><li>• “A second copy of the numeric data is also transmitted from the processor <b>40</b> to the authorization record generator <b>38</b>, which also retrieves from the storage system <b>42</b> the payee and payment amount data associated with this transaction and transmits same to the generator <b>38</b>. Processor <b>40</b> also supplies to the generator <b>38</b> from the storage system <b>42</b> data indicative of the initiation of the current transaction. Preferably, each of the terminals <b>18, 20, 22</b> of the system <b>10</b> is associated with a unique station/terminal identification code or number which is stored in</li></ul>
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		<p>the terminal's respective storage system <b>42</b>. This terminal identification number is also supplied to the generator <b>38</b> from the system <b>42</b>.”</p> <p>Krouse at 17:3-16:</p> <ul style="list-style-type: none"><li>• “If the user/customer indicates that the displayed information is correct, the generator 224 then causes the display 206 to prompt the user/customer to provide means to pay the bill whose billing information is displayed on the display 206, otherwise the user/customer is prompted to input to the generator 224 the corrected billing information, which corrected information, once input, is displayed on the display with a request that the user verify correctness of Same. Once the user/customer indicates that the billing information displayed on the display 206 is correct, the generator 224 causes the display 206 to request that the user/customer indicate to the system 200 via the user interface 206 how the user/customer wishes to make payment based upon the displayed billing information.”</li></ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**4. Claim 34**

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Claim	'897 Claim Recitation	Exemplary Citations in Reference
34	The method of claim 25 wherein the step of enabling performance of the transaction includes initiating an authorization.	<p>Krouse discloses the step of enabling performance of the transaction includes initiating an authorization.</p> <p><i>Id.</i> at [25].</p> <p>Krouse at Abstract</p> <ul style="list-style-type: none"> <li>• “In accordance with the present invention, financial transaction processing systems and methods are provided. One preferred embodiment of a method according to one aspect of the present invention includes generating an optically scanned image of at least a portion of document containing visual data, in a particular format, representing information related to the financial transaction. Recognition characteristics are generated from the scanned image and are compared to respective sets of reference recognition characteristics generated from respective other transaction documents having different respective formats to determine therefrom whether the particular format of the visual data matches one of the respective formats of the other documents. When such a match is found to exist, location is determined of a field in the scanned image to which optical character recognition may be applied to generate therefrom the information, based upon the respective format found to match the particular format of the visual data. Optical character recognition is then utilized to generate said visual data from said location.”</li> </ul> <p>Krouse at 3:49–57</p> <ul style="list-style-type: none"> <li>• “This embodiment of the system of this aspect of the present invention also includes an authorization record generator for generating, based upon the transaction data, a record of the transaction for being assented to by the party tendering the document prior to completion of the transaction, and for generating from the record once it is assented to by</li> </ul>

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		<p>the party, a computer-readable record of assent of the party to the transaction. A collection system is also included in this embodiment of the system of this aspect of the present invention for generating in response to the transaction data and the computer-readable record, an electronic financial transaction request for being used by an electronic transaction system to execute the electronic financial transaction.”</p> <p>Krouse at 8:1–12</p> <ul style="list-style-type: none"><li>• “A second copy of the numeric data is also transmitted from the processor <b>40</b> to the authorization record generator <b>38</b>, which also retrieves from the storage system <b>42</b> the payee and payment amount data associated with this transaction and transmits same to the generator <b>38</b>. Processor <b>40</b> also supplies to the generator <b>38</b> from the storage system <b>42</b> data indicative of the initiation of the current transaction. Preferably, each of the terminals <b>18, 20, 22</b> of the system <b>10</b> is associated with a unique station/terminal identification code or number which is stored in the terminal's respective storage system <b>42</b>. This terminal identification number is also supplied to the generator <b>38</b> from the system <b>42</b>.”</li></ul> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**5. Claim 38 (Non-asserted)**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
38	The method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.	<p>Krouse discloses the step of enabling performance of the interaction includes initiating a transaction with an account.</p> <p>Krouse at 12:38–45</p> <ul style="list-style-type: none"> <li>• “Processing of a financial transaction using system <b>200</b> begins by placing a bill document (such as bill document <b>400</b> shown in FIG. 8A) to be processed into scanner <b>208</b> so as to permit at least one side <b>402</b> of the document <b>400</b> containing an optical character recognition line (OCR) <b>404</b> which contains numerical data <b>405</b> visually displaying information related to the transaction to be processed (e.g., amount due <b>406</b> and customer account number <b>408</b>).”</li> </ul> <p>Krouse at 17:18–45</p> <ul style="list-style-type: none"> <li>• “The information obtained from reading the customer's debit card and provision of the customer's PIN via the interface <b>206</b> may then be utilized by the generator <b>224</b>, together with the aforesaid billing information, to generate an ACH EFT request to transfer funds from the customer's bank account (indicated via the debit card information) to the bill payee's bank account, to pay the customer's bill as indicated on the billing document <b>400</b>. This request is transmitted from the generator <b>224</b> to the ACH/EFT system via the interface <b>226</b>, and a copy of said request is stored in the archive <b>228</b> in association with the other billing information and scanned image obtained from the document <b>400</b> by the system <b>200</b>. Once the ACH system notifies the generator <b>224</b> that the request has been executed, the generator <b>224</b> provides to the payee system <b>232</b> via the interface <b>230</b> a copy of the notice, the submitted ACH/EFT request, and a statement of the customer's billing account</li> </ul>

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		<p>number in order to permit the payee <b>232</b> to update its records to reflect the customer's payment to reduce the outstanding balance of the customer's billing account. Alternatively, the ACHIEFT request may be forwarded by the generator <b>224</b> to the payee <b>232</b> via the interface <b>230</b> for submission by the payee <b>232</b> directly to the ACH/EFT system. The archive <b>228</b> may also be adapted to permit the payee <b>232</b> to access the other information associated with the payee (e.g., the particular EFT requests generated for effectuating payment of bills generated by that payee and scanned images of such bills) stored in the archive <b>228</b>.”</p> <p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**6. Claim 39**

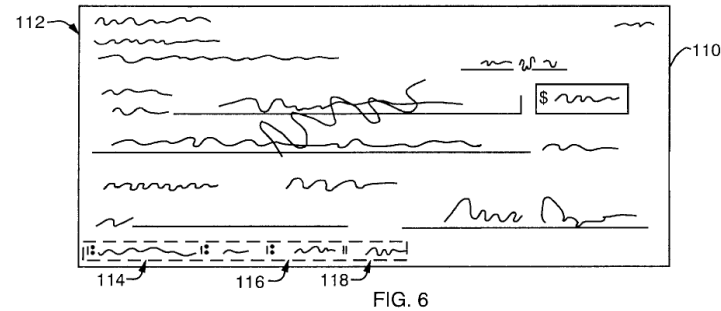
Claim	'897 Claim Recitation	Exemplary Citations in Reference
39	The method of claim 38, wherein the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user	Krouse discloses the account includes at least one of the following: an on-line account, an account linked with the portable device, an account linked to a user of the portable device, a bank account, and a credit card account.  <i>Id.</i> at [38].



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of the portable device, a bank account, and a credit card account.

Krouse at Fig. 6



Krouse at 7:43–53

- “Fields **114**, **116** contain the financial institution transaction routing number and account number on which the check **110** is drawn, and field **118** contains the check number of the check **110**. It should be noted, however, that other than the left most nine digits (and associated separator characters) of the MICR line **94**, the contents of said line may vary, depending upon the financial institution upon which the negotiable instrument is drawn. System **10** may be adapted to recognize and parse information contained in different types of negotiable instrument MICR lines (not shown).”

Krouse at 12:37–45

- “Processing of a financial transaction using system **200** begins by placing a bill document (such as bill document **400** shown in FIG. 8A) to be processed into scanner **208** so as to permit at least one side **402** of the document **400** containing an optical character recognition line (OCR) **404** which contains numerical data **405** visually displaying information related to the transaction to be processed (e.g., amount due **406** and customer account number **408**).”

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		<p>To the extent it is found that Krouse does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that Krouse does not anticipate this claim, Krouse renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine Krouse with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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### Exhibit H-23

Bank of America Corporation (“BofA” or “Defendant”) provides this second supplemental chart subject to all reservations, objections, statements, and disclaimers set forth herein and in BofA’s Final Invalidity Contentions Cover Pleading, as well as any amendment, supplement, or modification thereof, which are incorporated herein by reference in their entirety. A statement of reasons and good cause for each supplement in this chart is identified in the cover pleading.

QBIC was known or used by others in the United States and publicly used or on sale in the United States by November 5, 2000. *See generally* W. Niblack et al., *The QBIC Project: Querying Images By Content Using Color, Texture, and Shape*, SPIE Vol. 1908 (1993), pp. 173–187 (IBM0002390–404); M. Flickner et al., *Query by Image and Video Content: The QBIC System (“QBIC”)*, IEEE Sept. 1995, pp. 23–32 (IBM0000893–902); W. Niblack et al., *Updates to the QBIC System*, SPIE Vol. 3312 (1997), pp. 150–161 (IBM 0002419–430); and *Query By Image Content QBIC Demonstration Program*, IBM Research, Sept. 1998 (IBM000747). QBIC is available as prior art at least under 35 U.S.C. § 102(a), (b), and (g), having been known or used by others in the United States and publicly used or on sale in the United States by at least 1995 and certainly by November 5, 2000, including, for example, at <http://libra.uc.davis.edu> through the Art History Department at U.C. Davis; at [www.thinker.org/imagebase/indox-2 .htm3](http://www.thinker.org/imagebase/indox-2.htm3) through the Fine Arts Museum of San Francisco; through demos at <http://www.qbic.almaden.ibm.com>; and through IBM’s commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information Portal. *See generally* Deposition of IBM Corporate Representative Myron Flickner, *Nantworks, LLC and Nant Holdings IP, LLC v. Bank of America Corporation and Bank of America, N.A.*, 2:20-cv-07872-GW-PVC (C.D.C.A. 2020) (“Flickner 8/29/23 Depo”) at e.g., 32–33, 39–40, 44, 62–63, 66–67, 72–74, 103–107, 110–112, 127, 163–174, 183–189, 191–195, 215, 219–220, 241, 307–309, 311–317, Exs. 3–13; *see also* Deposition of IBM Corporate Representative Myron Flickner, *Network-1 Technologies, Inc., v. Google LLC and Youtube LLC*, 1:14-cv-09558-PGG (S.D.N.Y. 2019) (“Flickner Depo”), including, e.g., at 13, 14, 15–18, 29–30, 34, 36, 37, 43–46, 48, 58, 60, 61–62, 67–69, 72, 74–76, 84–86, 88–89, 98–100, 102, 106, 113, 125, 135, 152–154, 160–161, 170–172, 180–181, 194, 198–201, 203–205, 215–216, 220–221, and Exs. 1–16. As shown in the chart below, QBIC anticipates asserted claims 25, 30, 33, 34, and 39 of the ’897 Patent. The disclosures/exemplary citations for each element incorporate the disclosures/exemplary citations of the proceeding limitations. To the extent QBIC is found not to expressly disclose certain limitations in the asserted claims, such limitations are inherent. To the extent QBIC is found not to anticipate any asserted claims or claim elements of the ’897 Patent, the reference nevertheless renders those claims or claim elements obvious under 35 U.S.C. § 103, either alone or in combination with other art identified herein or in the cover pleading of BofA’s Final Invalidity Contentions, for the reasons identified in the cited references and/or in the cover pleading. These Invalidity Contentions are not an admission by BofA that the accused products, including any current or past versions of the accused products, are covered by, or infringe the asserted claims, but are based instead on the recognition that if the claims are interpreted to be broad enough to encompass the accused products, the claims must also be construed

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to have that same scope when considering whether they are invalid. The following chart incorporates by reference the analysis from Exhibit H-21 for each limitation.

The following chart is based on the Court’s claim construction rulings (Dkt. Nos. 145, 153, 236), and to the extent not contradictory, Plaintiffs’ apparent interpretations of the claims in Plaintiffs’ “Preliminary” Final Infringement Contentions. BofA notes that in many instances, Plaintiffs’ “Preliminary” Final Infringement Contentions ignore and/or contradict the Court’s claim construction rulings. BofA does not accept the assumptions concerning the scope and meaning implicit in Plaintiffs’ Preliminary Final Infringement Contentions, to the extent those assumptions are discernible, and reserves the right to challenge Plaintiffs’ proposed (or implied) constructions. Furthermore, Plaintiffs’ “Preliminary” Final Contentions fail to comply with the level of specificity required by SPR 2.1.2 and 2.1.3, and include improper reservation of rights to supplement with “additional ways in which BoA Accused Products infringe.” Any alleged deficient discovery is of Plaintiffs own making. Most if not all of the deficiencies in Plaintiffs’ Preliminary Final Contentions have been documented by Defendants through multiple letters since at least May 18, 2021 and up to Bank of America’s most recent letter of August 19, 2023. Plaintiffs’ shifting infringement contentions, deficiencies in its infringement contentions, and changing claim scope have prejudiced BofA from being able to reasonably prepare its defenses, including its invalidity contentions. BofA also reserves the right to revise and supplement these charts if and when Plaintiffs are permitted to provide revised or supplemental Infringement Contentions. Citations given in the chart below are merely representative of the respective elements to provide notice to Plaintiffs of BofA’s invalidity theories and are not meant to be exhaustive.

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**1. Claim 25**

Element	'897 Claim Recitation	Exemplary Citations in Reference
[25Pre]	A method of conducting a transaction with an interactive system, the method comprising	<p>QBIC discloses a method of conducting a transaction with an interactive system.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2390</p> <p style="text-align: center;"><b>ABSTRACT</b></p> <p>In the QBIC (Query By Image Content) project we are studying methods to query large on-line image databases using the images’ content as the basis of the queries. Examples of the content we use include color, texture, and shape of image objects and regions. Potential applications include medical (“Give me other images that contain a tumor</p> <p>QBIC Demo (IBM000747)</p>  <p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>1 Q. And you mentioned that you would extract</p> <p>2 features from the images?</p> <p>3 A. We did.</p> <p>4 Q. How would you do that?</p> <p>5 A. We ran algorithms on the pixels of the</p> <p>6 image and from that we created a feature.</p> <p>7 Q. What sort of features would you extract</p> <p>8 from the images?</p> <p>9 A. A QBIC system did color, shape and</p> <p>10 texture.</p> <p>11 Q. Okay. So let's take color.</p> <p>12 How would you, say, extract a color</p> <p>13 feature from an image?</p> <p>14 A. We typically would compute -- compute a</p> <p>15 color histogram.</p> <p>16 Q. And what's a color histogram?</p> <p>17 A. It's a measure of -- it's an estimate of</p> <p>18 the probability density of a color being in an</p> <p>19 image.</p> <p>20 Q. So you would take an image and extract</p> <p>21 that color histogram from it?</p> <p>22 A. Yup.</p>

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		<p>11 Q. How would one with the Ultimedia Manager 12 use the query by image search functionality of the 13 QBIC system? 14 A. I don't remember the details. And it's 15 basically rank -- giving you a rank list of images 16 based on a query. 17 Q. And where would the images being searched 18 come from? 19 A. The file system on the -- on the 20 computer. 21 Q. So would the user themselves supply the 22 images?</p> <hr/> <p>1 A. They could, yeah. 2 Q. And how many images could the user 3 search? 4 A. I don't remember specific numbers. 5 Whatever the file system supports. 6 Q. Was there any cap on the amount of images 7 that the user could search? 8 A. I don't know. 9 Q. Could the user search an example image 10 based on the extraction of features from that 11 example image? 12 A. I think so.</p>
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right? 1 A. Right.</p> <p>Flickner 3/29/23 Depo at 42</p>



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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>4 Q. So let's just start at a high level. Tell 5 me generally what is QBIC? 6 A. QBIC was a technology -- stands for query 7 by image content. It was a way of extracting 8 features of various types, putting those features in 9 a database and then searching the database to get 10 images that looked visually similar or semantically 11 similar. 12 Q. And when you say "semantically similar," 13 what do you mean? 14 A. You could query based on semantics. You 15 could ask for what does a microphone look like and 16 you get various incantations of visual microphones.</p> <p><i>Id.</i> at 205–206</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>10 Q. All right. I want to -- you've been                      11 testifying about different systems today. We've                      12 heard about Ultimedia Manager. We've heard about                      13 DB2. We've heard about image extender. I want to                      14 ask you about QBIC piece of things, just to make                      15 sure I have the delineation --                      16 A. Okay.                      17 Q. -- straight, okay?                      18 QBIC stood for query by image content;                      19 right?                      20 (Reporter seeks clarification.)                      21 Q. QBIC stands for query by image content?                      22 A. Yes.                      23 Q. Okay. And there are essentially three                      24 logical steps associated with QBIC, one of which is                      25 database population?</p> <p style="text-align: right;">Page 206</p> <p>1 A. Yes.                      2 Q. Another one of which is called feature                      3 calculation?                      4 A. Feature extraction.                      5 Q. Okay. Feature extraction. And then image                      6 query; is that right?                      7 A. Yeah.                      8 Q. Okay. So basically all the steps involved                      9 in QBIC fall into one of those three categories; is                      10 that right?                      11 A. Sounds about right.</p> <p><i>Id.</i> at 197–198</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>17 Q. First sentence says, "Many paper-intensive                      18 enterprises, such as insurance companies and                      19 financial institutions, administer large volumes of                      20 business-related content. The need for an                      21 enterprise solution for managing and accessing                      22 business information spans many industries."                      23 Did I read that correctly?                      24 A. Yes.                      25 Q. Okay. For -- is it -- is it your                      1 experience and understanding that QBIC is something                      2 that would be beneficial for businesses that have                      3 large volumes of business-related content?                      4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC                      8 functionality was good for insurance companies and                      9 financial institutions.                      10 Do you recall that?                      11 A. Yes.                      12 Q. Do you agree with that?                      13 A. Yes.                      14 Q. Okay. QBIC would be good for any company                      15 that has large amounts of business-related                      16 information, including multimedia content; correct?                      17 A. Correct.</p> <p>A person of ordinary skill in the art would have been motivated to improve, modify, or combine QBIC with prior art reference teachings to arrive at the limitations in this claim at least because QBIC was designed for applications that included large amounts of business-related information, including multimedia content, including for financial institutions. <i>See, e.g.</i>, IBM 000789; Flickner Depo Rough Tr. at 191:16-192:8, 293:14-294:8.</p> <p>The QBIC system was implemented in IBM commercial products, including in IBM’s Ultimedia Manager, the DB2 series of products such as the Image Extender in DB2 Universal Database, and the Enterprise Information</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>Portal. All of the features referenced in this chart were incorporated into these commercial implementations before November 6, 2000, as reflected in a combination of scientific papers, IBM’s internal documentation, and the QBIC demo software applications. <i>See, e.g.</i>, Flickner 8/29/23 Depo Tr. at 33:9-24, 71:21-72:10, 164:21-166:2, 166:11-175:24, 178:5-186:17, 186:21-192:4, 192:14-194:1, 195:16-196:4, 194:1-308:1; IBM 000001-617; IBM 000747; IBM 000777-880; IBM 000893-902; IBM 0002315-320; IBM 0002390-404; IBM 0002418-430.</p>
[25A]	<p>providing access to a device having a display;</p>	<p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p> <p>Flickner 8/29/23 Depo at 75–76</p> <p>23 Q. Okay. But the image -- the content of the                  24 image, including the objects in the image, it could                  25 have been anything. So, for example, it could have                  1 been a picture of a building?                  2 A. Yeah.                  3 Q. A print advertisement?                  4 A. Yeah.                  5 Q. Painting?                  6 A. Yeah.                  7 Q. Advertisement on TV?                  8 A. Yep.                  9 Q. I could have taken a picture of an                  10 electronic billboard or display and submit that to                  11 the system?                  12 A. Yep.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[25B]	<p>displaying a displayed image on the display of the device;</p>	<p>Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).</p> <p>Flickner 8/29/23 Depo at 75–76</p> <p>23 Q. Okay. But the image -- the content of the                  24 image, including the objects in the image, it could                  25 have been anything. So, for example, it could have                  1 been a picture of a building?                  2 A. Yeah.                  3 Q. A print advertisement?                  4 A. Yeah.                  5 Q. Painting?                  6 A. Yeah.                  7 Q. Advertisement on TV?                  8 A. Yep.                  9 Q. I could have taken a picture of an                  10 electronic billboard or display and submit that to                  11 the system?                  12 A. Yep.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the</p>

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		reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.
[25C]	presenting the displayed image proximate to an optical sensor; and	Flickner Depo at, e.g., 24, 41-42, 62-63 (user could take a picture or video and submit it to the QBIC system).  Flickner 8/29/23 Depo at 75–76 23 Q. Okay. But the image -- the content of the 24 image, including the objects in the image, it could 25 have been anything. So, for example, it could have 1 been a picture of a building? 2 A. Yeah. 3 Q. A print advertisement? 4 A. Yeah. 5 Q. Painting? 6 A. Yeah. 7 Q. Advertisement on TV? 8 A. Yep. 9 Q. I could have taken a picture of an 10 electronic billboard or display and submit that to 11 the system? 12 A. Yep.  <i>Id.</i> at 53

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		<p>4 Q. So if you look at -- under 2.1 Database 5 Population, it says, "The first step in population 6 is to simply load the images into the system." 7 Is that right? 8 A. Yep. 9 Q. And the next sentence says then you can 0 also add the image to the database, preparing a 1 reduced thumbnail and adding any available text 2 information to the database. 3 A. Yep. 4 Q. Is that correct? 5 A. Yep.</p> <p><i>Id.</i> at 60–61</p>

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		<p>13 Q. Okay. Did you do that type of                      14 segmentation to differentiate foreground objects                      15 from the background in this database population                      16 step?                      17 A. We did research prototypes of it. I don't                      18 know what all went out.                      19 Q. You don't know whether those made it into                      20 a commercial product?                      21 A. I would say they probably didn't.                      22 Q. Okay. Were they in the -- were they used                      23 in the -- in demo applications that you referred to?                      24 A. They might have been.                      25 Q. Okay. And so let's say that objects were</p> <hr/> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done                      2 with those objects? Were they stored, for example,                      3 as a separate image or were they somehow linked to                      4 or associated with the image from which they were                      5 extracted?                      6 A. Typically they were linked.                      7 Q. They were linked to the source image?                      8 A. Yeah.</p> <p><i>Id.</i> at 32–33</p>



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		<p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p><i>Id.</i> at 74–75</p>

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		<p>17 Q. Mr. Flickner, the images that are in the 18 database and used to submit a image query, could 19 those be images of anything? Or the -- 20 A. Yes. 21 Q. There were no restrictions on what the 22 image was of? 23 A. There are practical restrictions on image 24 size. 25 (Reporter seeks clarification.)</p> <hr/> <p style="text-align: right;">Page 75</p> <p>1 A. On image size, but other than that, no. 2 Q. Okay. Other than -- other than practical 3 restrictions on image size, were there any other 4 restrictions? 5 A. Well, there are some -- there are some 6 restrictions related to content. For example, porn 7 wouldn't be allowed. 8 Q. How would that be -- how was that policed? 9 A. It wasn't. 10 Q. Okay. What about in terms of, like, the 11 format of the image, was there -- were there 12 requirements for the format? 13 A. We had a very general library for doing 14 image import, so we could process all JPEGs or TIFs 15 or GIFs, or whatever. 16 Q. So you could process all image formats and 17 video formats? 18 A. Not -- I wouldn't say all but the 19 majority. 20 Q. The ones that were in existence in the 21 technology at the time? 22 A. And were popular as well.</p>
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		<p><i>Id.</i> at 114</p> <p>1 Q. If I took all the components off of the CD                  2 and put it onto my desktop operating system, could I                  3 then add images to that folder?                  4 MR. HANSEN: Objection; calls for speculation.                  5 THE WITNESS: I think so.                  6 BY MR. EDWARDS:                  7 Q. Okay. Do you -- do you -- based on your                  8 knowledge of putting these demos together, do you                  9 see any reason why -- any -- anything that would                  10 prohibit me from doing that?                  11 MR. HANSEN: Same objection.                  12 THE WITNESS: We have to -- at the time there                  13 was a big issue with the copyright of the image.                  14 BY MR. EDWARDS:                  15 Q. Was there a way that you could                  16 electronically prevent me from moving those contents                  17 from the CD over to a desktop and then adding images                  18 to the -- to the folder?                  19 A. No.</p> <p><i>Id.</i> at 202</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 202</p> <p>1 Q. Okay. For the QBIC system, a user can                  2 take an image with a portable camera and submit that                  3 to the QBIC system for image query; is that correct?                  4 A. Correct.                  5 Q. Okay. And that would -- that would                  6 include any commercial products that we looked at,                  7 like Ultimedia and Enterprise Portal, that use QBIC                  8 system. A user could take an image, submit that to                  9 those systems and QBIC would be able to extract                  10 features from that image from an image query and                  11 also for any images that were taken by a portable                  12 camera used to store in the database; is that right?                  13 MR. HANSEN: Objection; lacks foundation.                  14 THE WITNESS: Yes.</p> <p><i>Id.</i> at 300</p> <p>6 Q. Did QBIC have a camera?                  7 A. Yes.                  8 Q. It did?                  9 A. There were internal versions that we                  10 attached cameras to.                  11 Q. I mean, was the camera part of QBIC or                  12 something you attached to QBIC?                  13 A. Something you attached to OBIC.</p> <p><i>Id.</i> at 312</p>

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		<p style="text-align: right;">Page 512</p> <p>1 Q. And with respect to -- I think we talked a                  2 bit -- a little bit about this before, but I want to                  3 make sure my understanding is correct.                  4 On the -- on the demo application on the                  5 CD, if I took those files off and put it on my                  6 computer and ran it, just like Mr. Hansen was                  7 running it today from a computer, there's no                  8 technical restriction that would prevent me from                  9 capturing an image with a portable camera and                  10 importing that into the file with all the other                  11 images; is that --                  12 MR. HANSEN: Objection; lacks foundation.                  13 (Reporter seeks clarification.)                  14 THE WITNESS: It would be possible, yes.                  15 BY MR. EDWARDS:                  16 Q. Okay. The user then could use that                  17 captured image in a query?                  18 MR. HANSEN: Same objection.                  19 THE WITNESS: Yes.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these</p>

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		<p>references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
[25D]	<p>enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p>	<p>QBIC discloses enabling, via the interactive system, identification of features from the displayed image, recognition of a target based on the features, association of the target with target information pertinent to the target, and performance of a transaction based on the target information.</p> <p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2395-96</p> <p>Retrievals on image features are done based on similarity, not exact match, and we have defined one or more similarity functions for each feature or feature set. The easiest similarity functions are distance metric such as cityblock, Euclidean, or weighted Euclidean distance. (Similarity functions typically range from 1 for perfect similarity to 0 for no similarity, whereas a distance function is 0 for perfect similarity and large for low similarity, so we must convert as necessary to obtain consistent measures.) Different similarity measures may be used, and they may vary from application to application.</p> <p>The matching methods and similarity functions for the different feature types are described below:</p> <p><i>Color:</i> For average color, the distance between a query object and database object is weighted Euclidean distance. The weights are user adjustable so that we may, for example, downweight the <i>L</i> component of a <math>(L, a, b)</math> query. Best results, as judged by our subjective evaluation in on-going experiments, are obtained by representing the average color in the MTM color space, and by inversely weighting each component by its standard deviation over the samples in the database.</p> <p>Improved results are obtained when color matching is done not on average color, but on the distribution of colors that occur in an object or image. In this way, a red and blue object matches other red and blue object better than to a purple object. To match color histograms, we use a method similar to the one described in [8]. Let <math>X</math> be the query histogram and <math>Y</math> the histogram of an item in the database, both normalized. We compute the element by element difference histogram <math>Z</math>. Then the similarity between <math>X</math> and <math>Y</math> is given by <math>\ Z\  = Z^T A Z</math>, where <math>A</math> is a symmetric color similarity matrix with</p> $a(i, j) \equiv 1 - d(c_i, c_j) / d_{max}$ <p>where <math>c_i</math> and <math>c_j</math> are the <math>i</math>th and <math>j</math>th colors in the color histograms, and <math>d(c_i, c_j)</math> is the <i>MTM</i> color distance and <math>d_{max}</math> is the maximum distance between any two colors ([8] used <i>Luv</i> distance.) This metric gives the (weighted) length of the difference vector between <math>X</math> and <math>Y</math>, weighted by <math>A</math>, which accounts for the perceptual distance between different pairs of colors. The result is a measure that accounts for both the difference between the amounts in any given color (e.g. a particular shade of red), as well as differences between similar color (e.g. red and orange).</p>

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		<p>The QBIC Project: Querying Images by Content Using Color, Texture, and Shape (IBM 0002390–404) at 2396</p> <p style="text-align: center;"><b>3. Indexing and Database Issues</b></p> <p>Currently, we store computed feature values for objects and images in either flat files or in a Starburst database [19]. Starburst, a research prototype developed at IBM Research, is an extensible relational database with numerous extensions such as triggers and support for long fields (up to 1.5 gigabytes). Our current database schema using Starburst is shown in Figure 3. Because we are still defining and experimenting with the set of features, we most frequently use the flat file format.</p> <p>...</p> <p>Given the above feature extraction functions, each image corresponds to a point in a multi-dimensional feature space; similarity queries correspond to nearest-neighbor or range queries. For example “ Find all images that are similar to a given image, within a user-specified tolerance” (a range query), or “Given an image, find the 5 most similar images” (a nearest neighbor query). Also, we need a multidimensional indexing method that can work for large, disk-based databases. The prevailing multidimensional indexing methods form three classes: (a) <i>R*</i>-trees [20] and the rest of the R-tree family [21, 22]; (b) linear quadtrees [23]; and (c) grid-files [24].</p> <p>QBIC (Query by Image Content) at 1</p>



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		<p>Query by example using <i>color histograms</i></p> <ul style="list-style-type: none"> <li>• Example image:                     <div> </div> </li> <li>• One of the colour histograms for the example image is shown in Fig. 28.1.                     <div> </div> </li> </ul> <p><b>Colour Histogram of Image</b></p> <ul style="list-style-type: none"> <li>• Store a histogram vector for each image in the database.                      compare images using mean squared difference.                      return images sorted by this metric.</li> </ul> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p>



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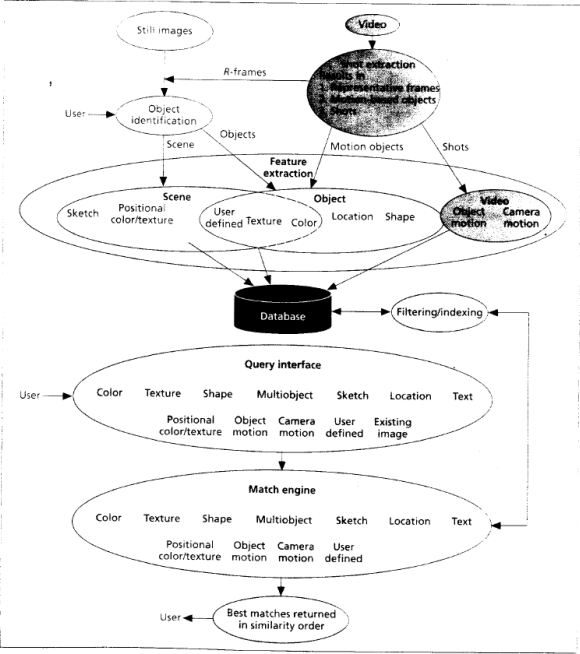
Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>  <p>The diagram illustrates the QBIC system architecture, divided into two main parts: database population (top) and query (bottom).  <b>Database Population (Top):</b> This section shows the process of creating the database. It starts with 'Still images' and 'Video' as inputs. 'Video' is processed through 'Frame extraction' to produce 'Representative frames' and 'Motion objects'. 'Still images' are processed through 'Object identification' (which also receives input from a 'User') to produce 'Objects'. 'Objects' and 'Motion objects' are then processed through 'Feature extraction' to generate 'Scene' and 'Object' features. 'Scene' features include 'Sketch', 'Positional color/texture', and 'User defined'. 'Object' features include 'Texture', 'Color', 'Location', and 'Shape'. 'Video' also contributes 'Shots' and 'Object motion' features. All these features are stored in a central 'Database'. A 'Filtering/indexing' step is also shown connected to the database.  <b>Query (Bottom):</b> This section shows how a user queries the database. A 'User' interacts with a 'Query interface' to input various features: 'Color', 'Texture', 'Shape', 'Multiobject', 'Sketch', 'Location', and 'Text'. The interface also lists 'Positional color/texture', 'Object motion', and 'Camera motion' as available query options. The 'Query interface' sends these inputs to a 'Match engine', which performs the search using the same feature set. The 'Match engine' returns 'Best matches returned in similarity order' to the 'User'.</p>

Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.

“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video

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		<p>shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene—for example, the fox in Figure 3—or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p> <p>Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen.</p> <p>Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p><b>“DATABASE POPULATION</b></p> <p>In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. Internally, each object is represented as a binary mask. There may be an arbitrary number of objects per image. Objects can overlap and can consist of multiple disconnected components like the set of dots on a polka-dot dress. Text, like ‘baby on beach,’ can be associated with an outlined object or with the scene as a whole.</p> <p><b>Object-outlining tools</b></p> <p>Ideally, object identification would be automatic, but this is generally difficult. The alternative—manual identification—is tedious and can inhibit query-by-content applications. As a result, we have devoted considerable effort to</p>

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		<p>developing tools to aid in this step. In recent work, we have successfully used fully automatic unsupervised segmentation methods along with a foreground/background model to identify objects in a restricted class of images. The images, typical of museums and retail catalogs, have a small number of foreground objects on a generally separable background. Figure 4 shows example results. Even in this domain, robust algorithms are required because of the textured and variegated backgrounds.</p> <p>We also provide semiautomatic tools for identifying objects. One is an enhanced flood-fill technique. Flood-fill methods, found in most photo-editing programs, start from a single object pixel and repeatedly add adjacent pixels whose values are within some given threshold of the original pixel. Selecting the threshold, which must change from image to image and object to object, is tedious. We automatically calculate a dynamic threshold by having the user click on background as well as object points. For reasonably uniform objects that are distinct from the background, this operation allows fast object identification without manually adjusting a threshold. The example in Figure 3 shows an object, a fox, identified by using only a few clicks.</p> <p>We designed another outlining tool to help users track object edges. This tool takes a user-drawn curve and automatically aligns it with nearby image edges. Based on the ‘snakes’ concept developed in recent computer vision research, the tool finds the curve that maximizes the image gradient magnitude along the curve.</p> <p>The spline snake formulation we use allows for smooth solutions to the resulting nonlinear minimization problem. The computation is done at interactive speeds so that, as the user draws a curve, it is ‘rubber-banded’ to lie along object boundaries. . . .</p> <p><b>Video data</b></p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using</p>

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		<p>an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p><b>“SAMPLE QUERIES</b></p> <p>For each full-scene image, identified image object, r-frame, and identified video object resulting from the above processing, a set of features is computed to allow content-based queries. The features are computed and stored during database population. We present a brief description of the features and the associated queries. Mathematical details on the features and matching methods can be found in Ashley et al. and Niblack et al.</p> <p>Average color queries let users find images or objects that are similar to a selected color, say from a color wheel, or to the color of an object. The feature used in the query is a 3D vector of Munsell color coordinates. Histogram color queries return items with matching color distributions—say, a fabric pattern with approximately 40 percent red and 20 percent blue. For this case, the underlying feature is a 256-element histogram computed over a quantized version of the color space.</p> <p>Figure 7 shows a histogram query on still images and a color query on video r-frames. Note that in the query specification for the histogram query of Figure 7, the user has selected percentages of two colors (blue and white) by adjusting sliders. Using such a query, an advertising agent could, for example, search for a picture of a beach scene, one predominantly blue (for sky and water) and white (for sand and clouds); or find images with similar color spreads for a uniform ad campaign. The average color query demonstrates a query against a video shot database where the user is searching for red r-frames. Again, the query specification is on the left and the best hits are on the right.</p> <p>Figure 8 shows an example texture query. In this case, the query is specified by selecting from a sampler—a set of prestored example images. The underlying texture features are mathematical representations of coarseness, contrast, and directionality features. Coarseness measures the scale of a texture</p>

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		<p>(pebbles versus boulders), contrast describes its vividness, and directionality describes whether it has a favored direction (like grass) or not (like a smooth object).</p> <p>An object shape query is shown in Figure 8. In this case, the query specification is the drawn shape on the left. Area, circularity, eccentricity, major-axis direction, features derived from the object moments, and a set of tangent angles around the object perimeter are the features used to characterize and match shapes.</p> <p>Figure 9 illustrates query by sketch. In this case, the query specification is a freehand drawing of the dominant lines and edges in the image. The sketch feature is an automatically extracted reduced-resolution ‘edge map.’ Matching is done by using a template-matching technique.</p> <p>A multiobject query asking for images that contain both a red round object and a green textured object is shown in the bottom of Figure 9. The features are standard color and texture. The matching is done by combining the color and texture distances. Combining distances is applied to arbitrary sets of objects and features to implement logical And semantics.</p> <p>....</p> <p><b>ANNOTATION AND DATABASE POPULATION TOOLS.</b> Automatic methods (such as our Positional Color query) that don't rely on object identification, methods that identify objects automatically as in the museum image example, fast and easy-to-use semiautomatic outlining tools, and motion-based segmentation algorithms will enable additional application areas.</p> <p><b>FEATURE EXTRACTION AND MATCHING METHODS.</b> New mathematical representations of video, image, and object attributes that capture ‘interesting’ features for retrieval are needed. Features that describe new image properties such as alternate texture measures or that are based on fractals or wavelet representations, for example, may offer advantages of representation, indexability, and ease of similarity matching.</p> <p><b>INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION.</b></p>

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		<p>Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at pp. 7–8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p> <p>“A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content. You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.</p> <p>A QBIC catalog can hold data for the following image features:</p>

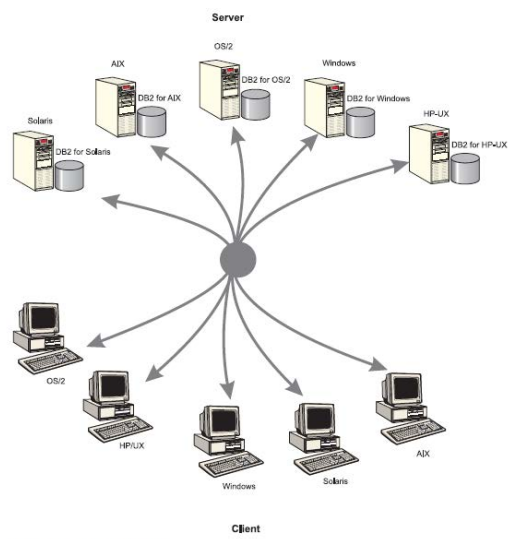
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		<p><b>Average color</b>                      The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b>                      Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b>                      The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b>                      Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by</p>

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		<p>computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>  <p style="text-align: center;"><small>Client</small></p> <p style="text-align: center;"><small>Figure 6. DB2 extender platforms</small></p> <p style="text-align: right;"><i>Id.</i> at p. 12 (Fig. 6).</p> <p>“The DB2 Extenders run in the DB2 client/server environment. This environment consists of a database server and one or more remote database</p>



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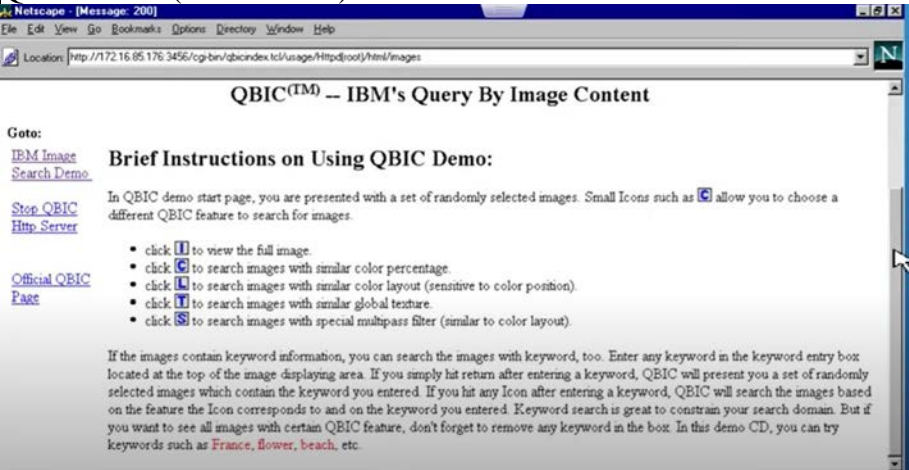

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		<p>clients. The DB2 extender services run on the server. Before you can access them, you have to start them.” <i>Id.</i> at p. 47.</p> <p>Managing Enterprise Information Portal (IBM 000777–880): “Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p> <p>“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” <i>Id.</i> at p. 63.</p>

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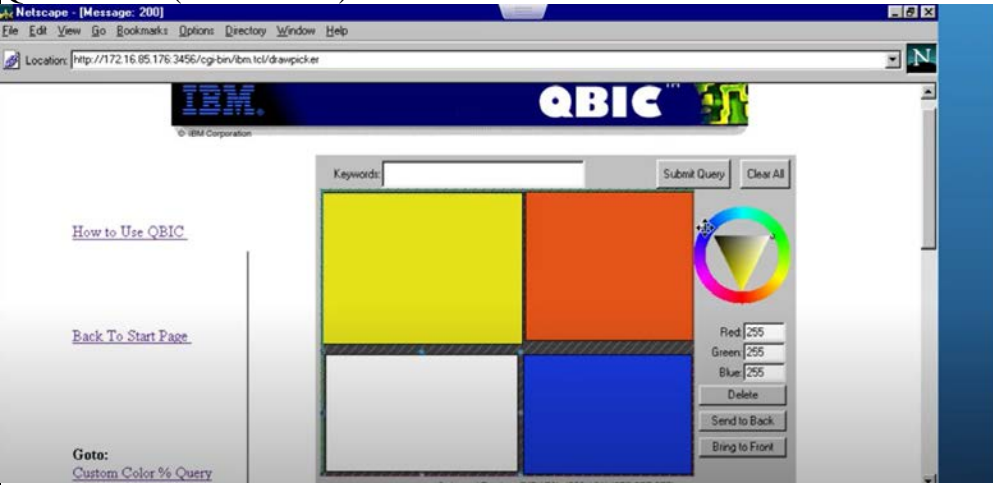
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>QBIC Demo (IBM000747)</p>  <p>QBIC Demo (IBM000747)</p>  <p>QBIC Demo (IBM000747)</p>

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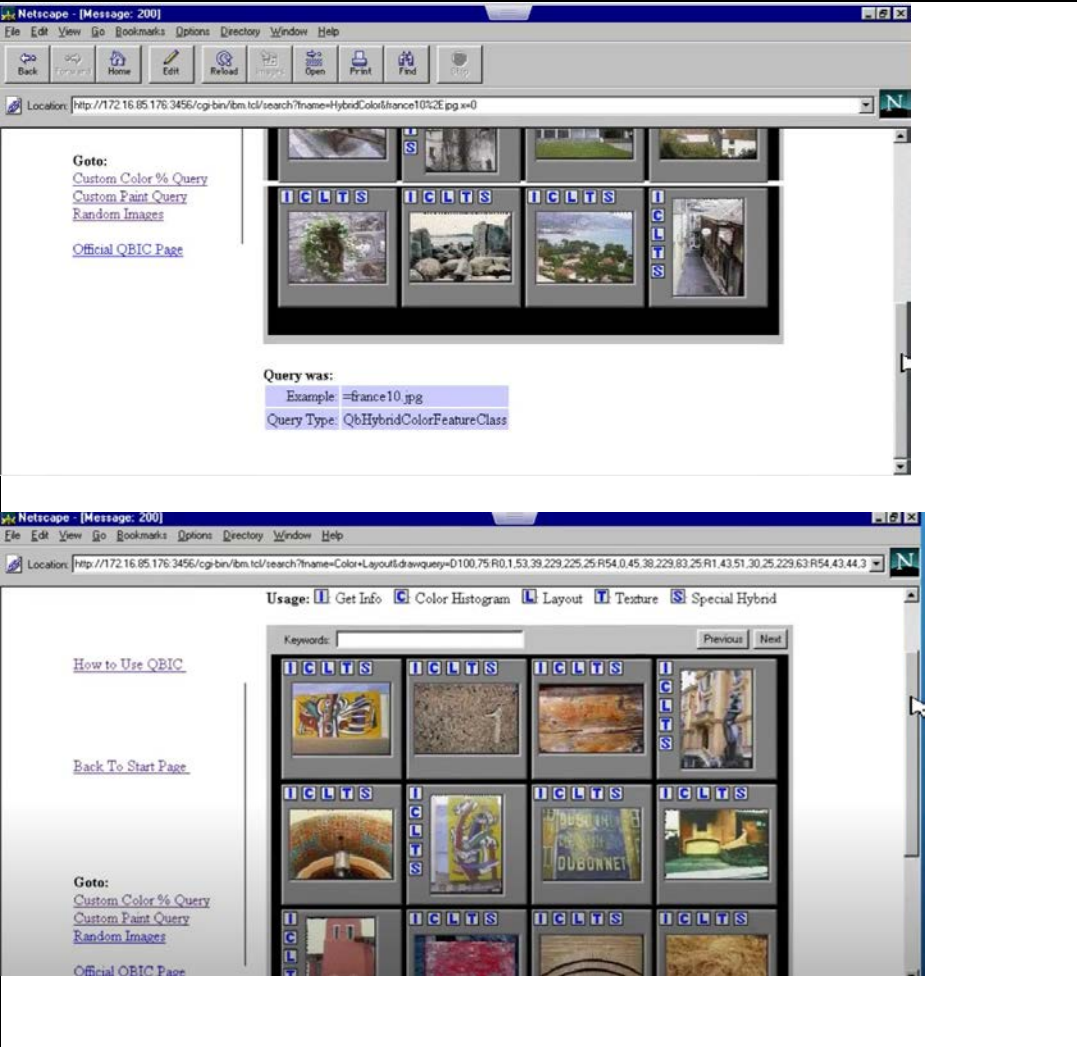
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		 <p>QBIC Demo (IBM000747)</p> 


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		 <p>The image displays two screenshots of a Netscape browser window. The top screenshot shows a search results page with a grid of image thumbnails and a 'Query was:' section containing an example query: '=france10.jpg' and a query type: 'QbHybridColorFeatureClass'. The bottom screenshot shows the 'Usage' page of the QBIC system, featuring a 'Keywords:' field, navigation buttons ('Previous', 'Next'), and a grid of image thumbnails. The browser's address bar in both screenshots points to a URL from 'http://172.16.05.176:3456/cgi-bin/bm.tcl/search/'.</p>

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		 <p>Flickner Depo at 54-55</p>

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		<p>13 Q. Was there also a demo online comparing                      14 trademarks at this time?                      15 A. There was a trademark demo. I don't                      16 remember the time frame.                      17 Q. And how would the trademark demo work?                      18 A. Similar to the stamp demo, just different                      19 database. The features were a little bit different                      20 features. Most trademarks are black-and-white.                      21 Q. What sort of features would be extracted?                      22 A. I don't remember which features we were</p> <p style="text-align: right;">Page 54</p> <hr/> <p>1 using on trademarks.                      2 Q. Could you search for -- could you search                      3 an example trademark into a database of other                      4 trademarks?                      5 A. I believe so.                      6 Q. And would that work in a similar fashion                      7 to this stamps demo?                      8 A. I believe so.                      9 Q. And would that identify the stamp -- or                      10 the trademark that you were searching in any way?                      11 A. What do you mean by identify?                      12 Q. Would the -- would the trademarks                      13 returned ever match the trademark that you                      14 searched, or were they always different trademarks?                      15 A. Well, if your query was in a database, it                      16 would match.                      17 Q. Was there any metadata returned with the                      18 trademarks?                      19 A. I'm sure there was.</p> <p>Flickner Depo at 89-90</p>

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		<p>11 Q. Was that used to the QBIC system publicly                      12 available anywhere?</p> <p>13 A. You mean was the Fine Arts demo                      14 available?</p> <p>15 Q. Yes.</p> <p>16 A. I think it was on our site, but I can't                      17 remember for...</p> <p>18 Q. How did their system work to identify art                      19 prints?</p> <p>20 A. Art what?</p> <p>21 Q. How would one identify an art print using                      22 their system?</p> <p>2 THE DEPONENT: Well, you had a picture --                      3 you could take a picture of a painting and then you                      4 could use that as a query content. And you could,                      5 for example, determine its -- its heritage or its                      6 lineage.</p> <p>7 Q. (By Mr. Dang) So you could identify                      8 image about -- or you could identify information                      9 about the painting using the system?</p> <p>10 A. Right.</p> <p>Flickner Depo at 88</p>

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		<p>7 Q. (By Mr. Dang) Suppose you search for a              8 set of features or you search using a query image              9 in this demonstration, what would the system do?              10 MS. HAYDEN: Objection. Foundation.              11 THE DEPONENT: The system would              12 compute -- in the query image case, the system              13 would compute the features on that -- that image              14 and then compute the distance associated with each              15 one of the images in the database.</p> <p>Flickner Depo at 40-42</p>



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		<p>3 Q. Okay. Could you take as -- as you did in 4 the query by image search system, could you just 5 search a video using this system? 6 A. You could search for a key frame and that 7 could point you to a video. 8 Q. As an input into the system, could you 9 search -- could you input a whole video and then 10 the system would extract the key frames and then -- 11 A. Yes. 12 Q. -- search that using that? 13 A. If I recall correctly, yes. 14 Q. Okay. And the way -- the method by which 15 it did so, as you mentioned, was -- would it 16 extract key frames from the video, extract features 17 from those key frames, and then search those 18 features; is that right? 19 A. Correct. 20 Q. Okay. Other than the use of shots and 21 key frames, is there any difference between the 22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p> <hr/> <p>1 query by image search system? 2 A. There may have been. 3 Q. Can you think of any now? 4 A. No. 5 Q. When you searched for -- or when you 6 searched a video using this system, what would 7 the -- or what would the system return? 8 A. I don't remember if we returned the 9 stills or a small -- small video clip. 10 Q. Say it returned the stills, could you use 11 those stills to point you to a video? 12 A. Yeah. 13 Q. And how would you do that? 14 A. Well, the -- each -- each key frame 15 typically represents a frame in the video. So 16 there's a -- the key frame is -- is one frame of 17 the video so you just seek to that point. 18 Q. So if I'm understanding this right, you 19 could take a query video, the system would extract 20 frames, which would then extract features from it, 21 and then the system would return either shot clips 22 or key frames; is that right?</p>
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		<p>1 A. Right.</p> <p>Flickner Depo at 87.</p> <p>4 Q. What feature extraction methods did the                      5 UC Davis implementation of QBIC rely on?                      6 A. It was similar to the other texture,                      7 shape, color and layout.                      8 Q. Was there any indexing scheme used?                      9 A. There may have been some text indexing                      10 scheme used.</p> <p>Flickner Depo at 78-79</p>

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		<p>6 Q. How would the Db2 universal search a                      7 query image using QBIC technology?                      8 A. You would create a -- create a manager                      9 QB- -- or create a QBIC catalog.                      10 Q. What's a QBIC catalog?                      11 A. It's an instance of a table that has a                      12 bunch of images in it.                      13 Q. And forgive me, what's an instance of a                      14 table?                      15 A. You create a table -- create a database,                      16 and then in the database you create a table and you                      17 have maybe like a file name, and then the actual                      18 image bits into it.                      19 Q. And how would you search for images using                      20 that table?                      21 A. You could search -- you could use                      22 whatever you wanted to for the -- the SQL query</p> <p style="text-align: right;">Page 78</p> <hr/> <p>1 to -- to filter, and then that would give you a                      2 list of results. And then you'd rank all of those                      3 results based on the QBIC distance measures.</p> <p>Flickner Depo at 201-202</p>

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		<p>5 Q. Now, to search a video by content using</p> <p>6 CueVideo, how would the features be extracted from</p> <p>7 the video?</p> <p>8 MS. HAYDEN: Objection. Foundation.</p> <p>9 THE DEPONENT: You typically would</p> <p>10 extract -- you -- you try to find key frames and</p> <p>11 then you populate the image database with key</p> <p>12 frames.</p> <p>13 Q. (By Mr. Dang) And how would you search</p> <p>14 for those key frames in the image data?</p> <p>15 A. You could use a QBIC-like engine.</p> <p>16 Q. And by QBIC-like engine, what do you</p> <p>17 mean?</p> <p>18 A. Some image content-based retrieval</p> <p>19 system.</p> <p>20 Q. And what would the CueVideo system return</p> <p>21 in response to a video query?</p> <p>22 A. Typically, video snippets or videos</p>

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		<p>1 with -- where you already -- you had already seeked</p> <p>2 to the -- the point of the -- of the match.</p> <p>3 Q. Would it return the same video as the</p> <p>4 query video?</p> <p>5 A. It would -- it would return snippets, as</p> <p>6 I recall.</p> <p>7 Q. And snippets of which videos?</p> <p>8 A. Of the video that's -- the -- that the</p> <p>9 database has been created with.</p> <p>10 Q. Were those video snippets indexed in any</p> <p>11 way?</p> <p>12 A. I'm sure they were.</p> <p>Flickner Depo at 22-25</p>

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	<p>1 Q. Okay. And what would you do with the                  2 image after you hit and extracted the color                  3 histogram from it?                  4 A. Nothing.                  5 Q. Would those features be stored in any                  6 database or --                  7 A. Yes.                  8 Q. Okay. And let's do -- what about                  9 texture, could you extract texture features from an                  10 image?                  11 A. We did.                  12 Q. And how would you do that?                  13 A. I don't remember exact features we were                  14 using. There were -- we published some papers on                  15 them.                  16 Q. Okay. Was there any reasoning behind                  17 picking the features that you chose?                  18 A. Yes.                  19 Q. And what was that reasoning?                  20 A. We wanted to make it so that the results                  21 were perceptually good.                  22 Q. What do you mean by perceptually good?</p> <p style="text-align: right;">Page 22</p>		<p>1 want to look for all of the images that have a red                  2 color in it or some sort red color histogram, is                  3 that right?                  4 A. Well, you -- you take specific -- you                  5 search for a red color. You'd compute the                  6 histogram and then basically match the histogram,                  7 which would give you images that had more colors in                  8 the reds. This is not -- it's not a unique thing.                  9 Q. Were you always searching for a                  10 particular feature, or could you just search some                  11 sort of example image?                  12 A. We could search an example image.                  13 Q. And how would that process work?                  14 A. Just extract the features from it.                  15 Q. So let's break that down.                  16 So you would submit an example image to                  17 the -- to the system, right?                  18 A. Uh-huh.                  19 Q. And then how do the -- how -- how does                  20 the system select which features to extract?                  21 A. It would compute them all, typically, or                  22 all that were based from the query.</p> <p style="text-align: right;">Page 24</p>
	<p>1 A. That people would get -- would agree that                  2 this is a better match, that the ordering was                  3 reasonable and...                  4 Q. So by that, do you mean that people would                  5 view the results returned as the closest or close                  6 matches to your -- to your image?                  7 A. It was -- it would satisfy their query.                  8 Q. Okay. So -- so you would have this set                  9 of features in your database.                  10 How would you search for those features?                  11 A. Typically, we -- initially, we did linear                  12 scan where you just actually evaluate the -- the                  13 distance metric against all the features.                  14 Q. So in linear scan, you would compare some                  15 sort of search term against all the features in the                  16 database?                  17 A. Well, it depends on which features you're                  18 using. You didn't have to use all the features.                  19 You could use just color features or just texture                  20 features or just...                  21 Q. So to make sure I'm understanding this                  22 right, you could have a color, say, red, and you</p> <p style="text-align: right;">Page 23</p>		<p>1 Q. Okay. And then what would it do with                  2 those features that it had extracted from that                  3 example?                  4 A. Then it became the reference point to the                  5 search.                  6 Q. And by reference point to the search, what                  7 do you mean?                  8 A. So you have a vector in -- in the                  9 individual space.                  10 (Reporter clarification.)                  11 A. That -- that query represents a point in                  12 that space, and you're looking for other things                  13 near that space or ordered by that space.                  14 Q. And by other things near that space, is                  15 that the other features that are in the -- in the                  16 database?                  17 A. Yes.                  18 Q. Okay. So at bottom then, you would --                  19 you would take the image, the system would extract                  20 features from it, and then those features would be                  21 searched against the reference database -- the                  22 features within the referenced database; is that</p> <p style="text-align: right;">Page 25</p>

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		<p>Flickner Depo at 159</p> <p>10 Q. Would either version of the stamps demo                      11 allow a user to submit an unknown image as the                      12 query and ask the system to find images similar to                      13 that query image?                      14 A. I suspect it did.                      15 Q. Why do you suspect that?                      16 A. Because that's one of the nice things you                      17 can do with QBIC.</p> <p>Flickner Depo at 209-210</p> <p>13 Q. Okay. Let me ask -- let me ask that                      14 question using -- using an example.                      15 Say I had a file that -- that was a                      16 snippet of a Star Wars movie.                      17 Could the CueVideo system take that                      18 snippet of the -- of a Star Wars movie and indicate                      19 to the user what Star Wars movie that snippet is                      20 from?                      21 A. Most likely, yes.                      22 Q. And how do you know that?                      1 A. Based on my knowledge in content-based                      2 imagery -- content-based retrieval, in general,                      3 that would be one of the first things you would try                      4 to implement in a video search system.</p> <p>Flickner Depo at 21</p>

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		<p>1 Q. And you mentioned that you would extract                  2 features from the images?                  3 A. We did.                  4 Q. How would you do that?                  5 A. We ran algorithms on the pixels of the                  6 image and from that we created a feature.                  7 Q. What sort of features would you extract                  8 from the images?                  9 A. A QBIC system did color, shape and                  10 texture.                  11 Q. Okay. So let's take color.                  12 How would you, say, extract a color                  13 feature from an image?                  14 A. We typically would compute -- compute a                  15 color histogram.                  16 Q. And what's a color histogram?                  17 A. It's a measure of -- it's an estimate of                  18 the probability density of a color being in an                  19 image.                  20 Q. So you would take an image and extract                  21 that color histogram from it?                  22 A. Yup.</p> <p>Flickner Depo at 36</p> <p>10 Q. So underlying this paper, you mentioned                  11 you did more work on the shape side of things; is                  12 that right?                  13 A. I did.                  14 Q. And what would that work have entailed?                  15 A. We wanted to query by shape.                  16 Q. Okay. And how would that have worked?                  17 A. We created features related to the shape                  18 of a -- the object of -- as it populated the                  19 database, and then we would query against those                  20 features.</p>



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		Flickner Depo at 38-41	
		<p>1 project at this time?</p> <p>2 A. I don't know that.</p> <p>3 Q. Okay. Would reviewing -- let's see.</p> <p>4 Let's turn to page -- let's turn to page -- this</p> <p>5 one is Bates-stamped, so the page ending in</p> <p>6 Network1_007316.</p> <p>7 Would reviewing this page refresh your</p> <p>8 recollection as to whether --</p> <p>9 A. Yes.</p> <p>10 Q. Okay. Perfect. Feel free.</p> <p>11 MR. DeCLERCK: Just give him a chance to</p> <p>12 finish his question before you respond.</p> <p>13 MR. DANG: Thank you.</p> <p>14 THE DEPONENT: Is there a question</p> <p>15 standing?</p> <p>16 Q. (By Mr. Dang) Sure. Yeah.</p> <p>17 So was there any video search</p> <p>18 functionality included as part of the QBIC system</p> <p>19 at this time?</p> <p>20 A. Evidently, yes.</p> <p>21 Q. Okay. And how did that video search</p> <p>22 functionality work?</p> <p style="text-align: right;">Page 38</p>	<p>1 A. You just populate image database using</p> <p>2 those images.</p> <p>3 Q. Okay. Could you take as -- as you did in</p> <p>4 the query by image search system, could you just</p> <p>5 search a video using this system?</p> <p>6 A. You could search for a key frame and that</p> <p>7 could point you to a video.</p> <p>8 Q. As an input into the system, could you</p> <p>9 search -- could you input a whole video and then</p> <p>10 the system would extract the key frames and then --</p> <p>11 A. Yes.</p> <p>12 Q. -- search that using that?</p> <p>13 A. If I recall correctly, yes.</p> <p>14 Q. Okay. And the way -- the method by which</p> <p>15 it did so, as you mentioned, was -- would it</p> <p>16 extract key frames from the video, extract features</p> <p>17 from those key frames, and then search those</p> <p>18 features; is that right?</p> <p>19 A. Correct.</p> <p>20 Q. Okay. Other than the use of shots and</p> <p>21 key frames, is there any difference between the</p> <p>22 video search functionality disclosed here and the</p> <p style="text-align: right;">Page 40</p>
		<p>1 A. You detect shots in -- transitions in</p> <p>2 video and then treat -- treat those as still images</p> <p>3 in the QBIC system.</p> <p>4 Q. So to break that down, you -- what do you</p> <p>5 mean by detecting shots?</p> <p>6 A. You try to find some key frame in a video</p> <p>7 sequence or multiple key frames in a video</p> <p>8 sequence, to give you a summarization of the video.</p> <p>9 Q. And how would you detect those key</p> <p>10 frames?</p> <p>11 A. There were algorithms to do it. I didn't</p> <p>12 personally work on any of those algorithms.</p> <p>13 Q. Are you otherwise aware of any of those</p> <p>14 algorithms?</p> <p>15 A. Well, they used histogram methodologies.</p> <p>16 I remember that.</p> <p>17 Q. Okay. So you would take -- you would use</p> <p>18 a histogram methodology to extract key frames from</p> <p>19 the video; is that what -- is that right?</p> <p>20 A. That's one way to do it.</p> <p>21 Q. Okay. And then what would you do with</p> <p>22 those key frames?</p> <p style="text-align: right;">Page 39</p>	<p>1 query by image search system?</p> <p>2 A. There may have been.</p> <p>3 Q. Can you think of any now?</p> <p>4 A. No.</p> <p>5 Q. When you searched for -- or when you</p> <p>6 searched a video using this system, what would</p> <p>7 the -- or what would the system return?</p> <p>8 A. I don't remember if we returned the</p> <p>9 stills or a small -- small video clip.</p> <p>10 Q. Say it returned the stills, could you use</p> <p>11 those stills to point you to a video?</p> <p>12 A. Yeah.</p> <p>13 Q. And how would you do that?</p> <p>14 A. Well, the -- each -- each key frame</p> <p>15 typically represents a frame in the video. So</p> <p>16 there's a -- the key frame is -- is one frame of</p> <p>17 the video so you just seek to that point.</p> <p>18 Q. So if I'm understanding this right, you</p> <p>19 could take a query video, the system would extract</p> <p>20 frames, which would then extract features from it,</p> <p>21 and then the system would return either shot clips</p> <p>22 or key frames; is that right?</p> <p style="text-align: right;">Page 41</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p>Flickner Depo at 50</p> <p>7 Q. And so if I clicked on this T, and it</p> <p>8 used the texture features, what would -- what would</p> <p>9 the system do?</p> <p>10 A. It would return the list of stamps based</p> <p>11 on similarity and texture.</p> <p>12 Q. And how would it decide which stamps were</p> <p>13 the most similar to that query image?</p> <p>14 A. It would use those texture features to</p> <p>15 compute it, and then it -- I think it was using L</p> <p>16 to distance.</p> <p>Flickner Depo at 75-76</p> <p>11 Q. What's a Db2 universal extender?</p> <p>12 A. It's the extension of Db2 for other media</p> <p>13 types, for other types of data.</p> <p>14 Q. What do you mean by extension?</p> <p>15 Would it add functionality to the Db2</p> <p>16 database?</p> <p>17 A. Correct.</p> <p>18 Q. Is one of those added functionalities the</p> <p>19 image extender?</p> <p>20 A. Most likely.</p> <p>21 Q. What's an image extender?</p> <p>22 A. It's ability to image queries or</p>

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		<p>1 similarity queries on image data -- on image                  2 datasets.                  3 Q. Did the image extender incorporate QBIC                  4 technology?                  5 A. I believe it did.                  6 Q. Did the image extender allow a user of                  7 the Db2 universal database to search images by                  8 their content?                  9 A. I believe it did.</p> <p>Flickner Depo at 131-132                  14 Q. An action that the QBIC system would                  15 automatically take based on the results it would                  16 return.                  17 A. So you're saying as you return results,                  18 you do some post-filtering on the image or the --                  19 what -- what kind of --                  20 Q. Perhaps not -- not post-filtering.                  21 But, for example, displaying a hyperlink                  22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p> <p>Flickner 8/29/23 Depo at 33-37</p>

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		<p>4 Q. And the second thing you mentioned was you</p> <p>5 were responsible for the architecture interface for</p> <p>6 running analytics. What did that detail?</p> <p>7 A. You wanted -- you're writing programs to</p> <p>8 determine similarity. And to do that you would take</p> <p>9 the image and you'd transform -- you'd extract</p> <p>10 features from the image, then you would put the</p> <p>11 features in the database and you'd query the</p> <p>12 database for the features.</p> <p>13 Q. And when you say you are determining</p> <p>14 similarity, you mean similarity between features</p> <p>15 from one image to another image; is that right?</p> <p>16 A. Correct.</p> <p>17 Q. Okay. And what features were you looking</p> <p>18 at?</p> <p>19 A. We had features in color, in texture, in</p> <p>20 shape. A few other categories.</p> <p>21 Q. Sketch?</p> <p>22 A. Yep.</p> <p>23 Q. What's sketch?</p> <p>24 A. You could draw a sketch -- a rough sketch</p> <p>25 of an image and query. And so you could draw a</p>

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		<p style="text-align: right;">Page 34</p> <p>1 circle for a sun, a line and maybe some trees and                  2 then you could send that sketch in and you'd get                  3 images of a sun in the trees.                  4 Q. And if I refer to images, can I -- let                  5 me -- let me back up.                  6 Earlier you talked about both still images                  7 and video were part of your responsibilities for                  8 these architecture interfaces; correct?                  9 A. Correct.                  10 Q. Okay. If I refer to "images," do you                  11 understand that is including both a still image or,                  12 for example, a frame of a video image?                  13 A. Sure.                  14 Q. Okay. So when I say "image," I'm                  15 including both in my questions from now on out.                  16 A. Okay.                  17 Q. Okay?                  18 A. Okay.                  19 Q. In terms of running analytics, that would                  20 include both extracting these characteristics from a                  21 query image and from an image that you're storing in                  22 a database; correct?                  23 A. Can you rephrase.                  24 Q. Yes. So the comparison that you're doing                  25 between two images; right, is it correct that that</p>	<p style="text-align: right;">Page 36</p> <p>1 clean answer.                  2 When you refer to features, does it                  3 include at least color, texture, shape and sketch?                  4 A. Or a subset thereof.                  5 (Reporter seeks clarification.)                  6 A. Or a subset thereof.                  7 So you could do just color queries, you                  8 could do just shape queries, you could do just --                  9 you didn't need to have all the feature sets in                  10 all -- in every query.                  11 Q. Understood. But would a user have the                  12 option to query at least those four features?                  13 A. Yes.                  14 Q. Okay.                  15 A. For their QBIC system, that's true.                  16 Q. And then I believe the last area you                  17 indicated you were responsible for was architecture                  18 interface for saving images; is that right?                  19 A. Correct.                  20 Q. And what did that entail?                  21 A. It's both saving images and saving                  22 features. That was to define the API, so you would                  23 give it a feature, and it would write the feature in                  24 a database or into a file.                  25 Q. Would that also include saving any</p>
		<p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're                  2 querying image 1 to determine if there are images in                  3 the database that have similar features; is that                  4 right?                  5 A. Correct.                  6 Q. Okay. And the analytics that you're                  7 talking about, where you extract these characters                  8 from the image, that is -- those run on both the                  9 query image and the images that are stored in the                  10 database; is that right?                  11 A. Yeah. We call them features.                  12 Q. Features. Okay.                  13 So when you say "features," you're talking                  14 about the features that we talked about before:                  15 Color, texture, shape, sketch?                  16 A. For example.                  17 Q. Any other ones you can think of?                  18 A. Nothing comes to mind.                  19 Q. But when you refer to features they at                  20 least include those four; is that correct?                  21 A. Yes. Well, at least includes, yeah.                  22 Q. Is that correct? I'm sorry, I didn't --                  23 you trailed off, so I -- that's why I reasked it.                  24 A. Yeah.                  25 Q. Let me reask it and then you can give me a</p>	<p style="text-align: right;">Page 37</p> <p>1 information associated with the images, for example                  2 like any text description about the image?                  3 A. Yeah. Text is just another feature here.                  4 Q. Text is another feature?                  5 A. Yeah.                  6 Q. I understand when the images were saved,                  7 thumbnails were saved of those images; is that                  8 correct?                  9 A. Typically, yeah.                  10 Q. And was that a part of your                  11 responsibilities, to architect the interface for                  12 saving images?                  13 A. Saving . . . hmm. Can you rephrase.                  14 Q. What's -- what was confusing about my                  15 question?                  16 A. I just need you to repeat it.                  17 Q. Oh. One of the areas you mentioned that                  18 you were responsible for was to architect the                  19 interface for saving images.                  20 My question is, as part of that                  21 responsibility, did that include architecting the                  22 features related to saving thumbnails associated                  23 with those images?                  24 A. The thumbnail is an extracted feature.                  25 Q. Okay. So is that a "yes"?</p>

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		<p><i>Id.</i> at 52–53</p> <p>12 Q. Underneath there's a sentence that says,                      13 "There are three logical steps in a QBIC                      14 application: Database population, feature                      15 calculation, and image query."                      16 Do you see that?                      17 A. Yeah.                      18 Q. You agree with that?                      19 A. Yeah.                      20 Q. All right. Well, let's talk about the                      21 first step, database population.                      22 What is database population?                      23 A. It's taking a set of images, extracting                      24 the features and putting them in a database.                      25 Q. Okay. Is part of the database population</p> <hr/> <p style="text-align: right;">Page 53</p> <p>1 step to create or prepare a thumbnail and store that                      2 in the database as well?                      3 A. Could be.                      4 Q. So if you look at -- under 2.1 Database                      5 Population, it says, "The first step in population                      6 is to simply load the images into the system."                      7 Is that right?                      8 A. Yep.                      9 Q. And the next sentence says then you can                      10 also add the image to the database, preparing a                      11 reduced thumbnail and adding any available text                      12 information to the database.                      13 A. Yep.                      14 Q. Is that correct?                      15 A. Yep.</p>

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		<p><i>Id.</i> at 77–78</p> <p>22 Q. Mr. Flickner, we're back from a break.</p> <p>23 Next thing I want to talk about is the next step in</p> <p>24 the process that we talked about earlier in your</p> <p>25 deposition, which is feature calculation.</p> <p>1 A. Okay.</p> <p>2 Q. And feature calculation is where you break</p> <p>3 down the image individual features?</p> <p>4 A. Features. Not necessarily just visual</p> <p>5 features.</p> <p>6 Q. Things like color and shape and texture,</p> <p>7 though, would be visual features; correct?</p> <p>8 A. Yes. Yes.</p> <p>9 Q. And this step of feature calculation can</p> <p>10 be done on both a query image and images that are</p> <p>11 used to populate the database?</p> <p>12 A. Needs to be done on both.</p> <p><i>Id.</i> at 85–99</p> <p>20 Q. So for each of color, texture, shape,</p> <p>21 sketch, there are algorithms that are performing</p> <p>22 some mathematical computation to calculate those</p> <p>23 features; is that right?</p> <p>24 A. Yes.</p> <p>25 Q. Okay. So let's talk about the color</p>

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		<p style="text-align: right;">Page 86</p> <p>1 section. As I understand it, there are two                  2 different color computations that are done. One is                  3 average color, the other is color histogram; is that                  4 right?                  5 A. There certainly are those two.                  6 Q. Say again.                  7 A. There certainly are those two.                  8 Q. Okay. And for average color, let's talk                  9 about that first, it says [as read], "We compute the                  10 average," and it lists four things, "(R, G, B), (Y,                  11 i, q), (L, a, b), and MTM coordinates of each object                  12 and image."                  13 You see that?                  14 A. Yep.                  15 Q. So does that mean that it does -- every                  16 time it -- if it computes average color, it computes                  17 all four of those things? Or are those optional,                  18 meaning that it can compute one as opposed -- or                  19 some combination of those four?                  20 A. Some combination of those four.                  21 Q. Okay. Are there different algorithms for                  22 each of those four or is it the same algorithm?                  23 A. RGB, Yiq and LAB are all linear                  24 transformations.                  25 Q. Okay.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Do you know if those methodologies changed                  2 over time going forward from 1993?                  3 A. Most likely they did.                  4 Q. Do you recall any details for how they may                  5 have changed?                  6 A. No.                  7 Q. Do you know if functionality was added to                  8 compute average color?                  9 A. No.                  10 Q. Do you -- do you recall any other                  11 algorithms or methodologies that were used besides                  12 the four that are listed here?                  13 A. No.                  14 Q. Okay. Second methodology to compute color                  15 is referred to as color histogram here; is that                  16 correct?                  17 A. Yes.                  18 Q. And so at a high level can you explain to                  19 me what a color histogram is?                  20 A. A histogram is a count of each value. And                  21 so, for example, if you have 1, 2, 3 as a value and                  22 you say 1, 2, 3 again, the histogram would say 2                  23 because there are two 1s, two 2s, and two 3s. So                  24 it's a count of the number of values across the                  25 image.</p>
		<p style="text-align: right;">Page 87</p> <p>1 A. I don't remember MTM off the top of my                  2 head.                  3 Q. That's something different from a linear                  4 transformation?                  5 A. It might be a different linear                  6 transformation. I don't recall.                  7 Q. Okay. So for average color, the                  8 algorithms will compute that based on some                  9 combination of those four methodologies?                  10 A. Yes.                  11 Q. Okay. Do you know if those methodologies                  12 evolved over time? So this -- so, for example, this                  13 argu- -- excuse me -- article was written in 1993.                  14 Do you know if the way in which QBIC computed                  15 average color changed over time or did it stay the                  16 same?                  17 MR. STRAUSSMAN: Objection; compound.                  18 MR. EDWARDS: Let me rephrase.                  19 THE WITNESS: I don't recall.                  20 MR. EDWARDS: Let me rephrase.                  21 BY MR. EDWARDS:                  22 Q. So this article was written in 1993, and                  23 it lists four methodologies for computing average                  24 color features.                  25 A. Um-hum.</p>	<p style="text-align: right;">Page 89</p> <p>1 Q. And what do the values 1, 2, 3 represent?                  2 A. Pixels, color.                  3 Q. So is it measuring the probability                  4 density --                  5 A. It's a --                  6 Q. -- of a color being in an image?                  7 A. It's a PDF estimator.                  8 Q. And what does PDF stand for?                  9 A. Probability density function.                  10 Q. Okay. Once the color histogram is                  11 computed, is it normalized after that?                  12 A. Yes, it was normalized.                  13 Q. And why did you normalize the color                  14 histogram?                  15 A. Because different images would have                  16 different color balances.                  17 (Reporter seeks clarification.)                  18 A. Balances, yeah.                  19 Q. Is a -- is a reason why you normalize the                  20 color histogram in -- for stored images -- well,                  21 strike that.                  22 Did you -- did you normalize color                  23 histograms when you extract -- strike that.                  24 When you calculated the color histogram                  25 features from a query image and a stored image, is</p>



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		<p style="text-align: right;">Page 90</p> <p>1 one reason why you normalize it so you're comparing                  2 apples to apples?                  3 A. Yes.                  4 Q. And then going back to average color, just                  5 for the record, what does RGB stand for?                  6 A. Red, green, blue.                  7 Q. And Yiq?                  8 A. Luminance and chrominance. Y is --                  9 (Reporter seeks clarification.)                  10 A. The Y is luminance and the IQ is                  11 chrominance.                  12 Q. And LAB?                  13 A. I think LAB -- the L is luminance. AB are                  14 different chrominance transformations.                  15 Q. And AB, you say chrominance?                  16 A. Chrominance.                  17 Q. C-h-r-o-m-a-n-c-e [sic]?                  18 A. Sounds about right.                  19 Q. Okay. And then the MTM, mathematical                  20 transform to Munsell, is that what that stands for?                  21 A. Yeah. That was a particular color space                  22 that was visually appealing.                  23 Q. Okay. And then for -- so, for example,                  24 for RGB, that's red, green, blue; correct?                  25 A. Correct.</p>	<p style="text-align: right;">Page 92</p> <p>1 you're done.                  2 (Witness reviews document.)                  3 A. Okay.                  4 Q. So for texture, it looks like the                  5 calculations were based on coarseness, contrast and                  6 directionality; is that right?                  7 A. Correct.                  8 Q. Are those three different algorithms that                  9 are used to calculate those, or is it the same                  10 algorithm?                  11 A. It's three different algorithms.                  12 Q. And I think earlier you mentioned that                  13 gray scaling was used in the texture calculation.                  14 For which of those three features is the image                  15 converted to gray scale?                  16 A. Probably all three.                  17 Q. Okay. So coarseness is a measure of the                  18 scale of the textures, such as pebbles versus                  19 boulders?                  20 A. Correct.                  21 Q. Contrast is the vividness of a pattern?                  22 A. Correct.                  23 Q. And then this says that contrast is a                  24 function of the variance of the gray-level                  25 histogram; is that right?</p>
		<p style="text-align: right;">Page 91</p> <p>1 Q. Those are different color features that                  2 are -- that are decomposed or broken down from the                  3 image?                  4 A. Yeah, the value of each pixel.                  5 Q. Okay. And then going back to the color                  6 histogram, so the color histogram's calculated, it's                  7 normalized. After it's normalized, is there                  8 anything else done to it?                  9 A. Sounds like they're computing MTM                  10 coordinates of each cell and then clustering. This                  11 is to help quantize the color space.                  12 Q. Okay. And that would be -- you would do                  13 that both for a query image and a stored image?                  14 A. Yes.                  15 Q. Are there any details about color                  16 histogramming that you recall that are not disclosed                  17 in this paragraph?                  18 A. Not that I recall.                  19 Q. Do you recall if the methodology changed                  20 over time?                  21 A. Most likely it did, but I don't recall                  22 specifics.                  23 Q. Okay. Okay. Let's go on to texture, and                  24 that's at the bottom of 2392 and goes to the top of                  25 2393. Take a look at that and then let me know when</p>	<p style="text-align: right;">Page 93</p> <p>1 A. Correct.                  2 Q. So at least for contrast that's converted                  3 to a gray scale histogram; correct?                  4 A. Correct.                  5 Q. And directionality describes whether or                  6 not the image has a direction, like grass; is that                  7 right?                  8 A. Correct.                  9 (Reporter seeks clarification.)                  10 Q. Do you recall any other details about the                  11 texture feature calculation that is not disclosed in                  12 this paragraph?                  13 A. No.                  14 Q. Do you recall if the texture feature                  15 calculation changed over time after this article?                  16 A. Most likely it did.                  17 Q. Do you recall any specifics?                  18 A. No.                  19 Q. All right. Let's go on to shape. Take a                  20 look at that paragraph and then let me know when                  21 you're done. It's on 2393.                  22 (Witness reviews document.)                  23 Q. And while you're looking at that,                  24 Mr. Flickner, for any of these four features that                  25 we're talking about, did you -- did your work on the</p>

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		<p style="text-align: right;">Page 94</p> <p>1 QBIC project -- were you more involved in one or                  2 more of these features than the other?                  3 A. Yes.                  4 Q. Which one?                  5 A. Shape.                  6 Q. Okay.                  7 (Witness reviews document.)                  8 A. So one thing I can state is originally I                  9 couldn't remember the name of the edge operator --                  10 and the name is Canny, the Canny edge operator --                  11 when we were talking about finding edges.                  12 Q. Okay. So this -- the paragraph on                  13 IBM 2393 refreshed your memory that shape                  14 calculation used Canny edge detection?                  15 A. No, that's sketch.                  16 Q. Oh, I'm sorry.                  17 A. I'm just stating that originally I was                  18 asked a question about standard edge operators. I                  19 couldn't remember the name. The name was Canny.                  20 Q. Canny. And Canny is used in the sketch                  21 calculation?                  22 A. Yeah, it's used in the sketch calculation.                  23 Q. Understood. Okay. Let's go back to                  24 shape.                  25 And for shape, is it a first step -- well,</p>	<p style="text-align: right;">Page 96</p> <p>1 of the object, of the blob.                  2 Q. Can you say the name of the word again?                  3 A. I think it's called perround.                  4 Q. Per round?                  5 A. Yeah.                  6 Q. Those -- are those two words, p-e-r,                  7 r-o-u-n-d?                  8 A. P-e-r -- one word.                  9 Q. Okay. Perround, one word.                  10 A. It's basically the perimeter squared over                  11 area.                  12 (Reporter seeks clarification.)                  13 A. Perimeter squared over area.                  14 (Reporter seeks clarification.)                  15 A. Length of the -- over area.                  16 Q. Okay. So let's step back a little bit.                  17 So it says -- the second paragraph says [as read],                  18 "Our shape features are based on a combination of                  19 heuristic" -- h-e-u-r-i-s-t-i-c -- "shape features                  20 area, circularity, eccentricity, major access                  21 orientation and a set of algebraic moment                  22 invariants," i-n-v-a-r-i-a-n-t-s.                  23 Did I read that correctly?                  24 A. Um-hum.                  25 Q. Okay. For circularity, that is computed</p>
		<p style="text-align: right;">Page 95</p> <p>1 back up, strike that.                  2 To calculate the shape feature in a query                  3 image or a stored database image, is the first step                  4 to convert that image into a binary image?                  5 A. I don't think so.                  6 Q. So if you look at the second paragraph --                  7 and the reason why I ask is -- it's the second                  8 sentence in the second paragraph under "Shape                  9 features." It says [as read], "All shapes are                  10 assumed to be non-occluded planar shapes allowing                  11 for each shape to be represented as a binary image."                  12 See that?                  13 A. Yeah.                  14 Q. And then the next sentence says [as read],                  15 "The area is computed as the number of pixels set in                  16 the binary image."                  17 A. Right.                  18 Q. So that's why I ask is it the first step                  19 in calculating shape to convert the image to binary?                  20 A. Yes.                  21 Q. And then once you convert it to binary                  22 image, then what do you do next in order to                  23 calculate the shape?                  24 A. You're computing something called                  25 perround, which is perimeter squared over the area,</p>	<p style="text-align: right;">Page 97</p> <p>1 as perimeter squared over area; correct?                  2 A. Right.                  3 Q. All right. Area is the number of pixels                  4 in the binary image?                  5 A. In the binary blob.                  6 Q. In the binary what?                  7 A. Blob.                  8 Q. Blob. And when you say "blob," what does                  9 that refer to?                  10 A. The outline of the object that you're                  11 doing a shape query on.                  12 Q. And so are each of these, area,                  13 circularity, eccentricity, major axis orientation                  14 and algebraic moment invariants, are those each                  15 different algorithms or is it all the same                  16 algorithm?                  17 A. It's different algorithms.                  18 Q. Okay. And since you worked on the shape                  19 feature the most, do you recall any other details                  20 that are not disclosed in this paragraph?                  21 A. Well, this evolved and we ended up doing                  22 an implementation of something that's not in here.                  23 Q. Okay. And what was that implementation?                  24 A. Something called turning angle per round,                  25 turning angle, which is -- it looks at the tangent</p>

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		<p style="text-align: right;">Page 98</p> <p>1 angle as you go through the edge of the shape. So</p> <p>2 you're computing the turning angle. You're</p> <p>3 computing this angle that represents a shape in a</p> <p>4 very interesting way.</p> <p>5 They don't seem to be very good for</p> <p>6 human -- so if you asked a human whether these two</p> <p>7 shapes are similar, they would say "yes," but under</p> <p>8 that feature set.</p> <p>9 Q. And you call that something per round?</p> <p>10 What was the name of it? Started with a T.</p> <p>11 Turrent?</p> <p>12 A. Turning angle.</p> <p>13 Q. Oh, turning angle.</p> <p>14 A. Yeah.</p> <p>15 Q. Well, it said -- your answer -- you did</p> <p>16 say turning angle, but you said something called</p> <p>17 something per round, and it started with a T. I</p> <p>18 thought you said turrent, but maybe I misunderstood.</p> <p>19 MR. STRAUSSMAN: Tangent?</p> <p>20 THE WITNESS: Tangent angle, yeah.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Okay. So something called tangent per</p> <p>23 round, is that what you would call it, this --</p> <p>24 A. No.</p> <p>25 Q. -- this implementation?</p>	
		<p style="text-align: right;">Page 99</p> <p>1 A. It's called turning angle.</p> <p>2 Q. Okay. So the name of the new</p> <p>3 implementation you're talking about for shape</p> <p>4 calculation is called turning angle?</p> <p>5 A. It used turning angle as a major feature.</p> <p>6 Q. Okay. Was there any other name it went</p> <p>7 by?</p> <p>8 A. I don't recall.</p> <p>9 Q. All right. And that was -- that</p> <p>10 methodology was implemented to calculate shape on a</p> <p>11 query image and an image stored in the database post</p> <p>12 this article?</p> <p>13 A. Yes.</p> <p>14 Q. Was that the -- did that -- did that</p> <p>15 implementation, the turning angle, did that replace</p> <p>16 the methodology in this article or was it</p> <p>17 supplementing the metho- --</p> <p>18 A. Supplementing.</p> <p>19 Q. Okay. Other than turning angle, were</p> <p>20 there any other methodologies used after this</p> <p>21 article?</p> <p>22 A. Not that I recall.</p> <p>23 Q. Okay. Okay. Let's go sketch features, if</p> <p>24 you take a look at that and then let me know when</p> <p>25 you're done reading it.</p>	

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Element	'897 Claim Recitation	Exemplary Citations in Reference				
		<p><i>Id.</i> at 119–128</p> <table border="0"> <tr> <td style="vertical-align: top; width: 50%;"> <p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. 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So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p> </td> <td style="vertical-align: top;"> <p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p> </td> </tr> </table>	<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. 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<p style="text-align: right;">Page 118</p> <p>1 Do you see that?</p> <p>2 A. Yeah.</p> <p>3 Q. And then it describes different icons: I,</p> <p>4 C, L, T and S.</p> <p>5 Do you see that?</p> <p>6 A. Um-hum.</p> <p>7 Q. Are those icons similar to the QBIC demo</p> <p>8 that you hosted on the IBM's website?</p> <p>9 A. I don't recall the specific details. Most</p> <p>10 likely, yes.</p> <p>11 Q. Okay. So it says, "Click I to view the</p> <p>12 full image."</p> <p>13 Do you see that?</p> <p>14 A. Um-hum.</p> <p>15 Q. Was there a similar capability on the demo</p> <p>16 that was hosted on IBM's website?</p> <p>17 A. I don't recall.</p> <p>18 Q. So do you know what happens if you clicked</p> <p>19 I?</p> <p>20 A. Yeah, you -- pops the window up and you</p> <p>21 see the full image.</p> <p>22 Q. Okay.</p> <p>23 (Reporter seeks clarification.)</p> <p>24 A. It pops the window up.</p> <p>25 Q. And how do you know that?</p>	<p style="text-align: right;">Page 120</p> <p>1 sand.</p> <p>2 Q. Does that correspond to the four features</p> <p>3 we looked at earlier, so for -- well, strike that.</p> <p>4 For color earlier we looked at two</p> <p>5 different flavors. We looked at average color and</p> <p>6 we looked at color histogram. So you said --</p> <p>7 A. Right.</p> <p>8 Q. -- C was color histogram.</p> <p>9 Does L correspond to average color or</p> <p>10 something different?</p> <p>11 A. Well, L has space embedded into it. So</p> <p>12 where the color appears in the image matters.</p> <p>13 Q. Okay.</p> <p>14 A. So C would be the whole image, what was</p> <p>15 the color percentage, and L would be I want a</p> <p>16 certain percentage in this region and a certain</p> <p>17 percentage in this region.</p> <p>18 Q. Okay. So what -- if you recall, so to</p> <p>19 calculate a color layout feature, do you recall the</p> <p>20 details of how that was done?</p> <p>21 MR. HANSEN: Objection; foundation.</p> <p>22 THE WITNESS: I don't recall.</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Do you recall if that used -- for the</p> <p>25 color component, do you recall if that used</p>					
<p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such</p> <p>2 a . . .</p> <p>3 MR. STRAUSSMAN: You got to speak up.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. That's how you implemented what?</p> <p>6 A. You implement what the instructions say.</p> <p>7 Q. Okay. Is that a similar implementation</p> <p>8 for the other demos that you worked on?</p> <p>9 A. Most likely, yes.</p> <p>10 Q. Okay. So you click on I and then I would</p> <p>11 take you to a link that showed the full image?</p> <p>12 A. Um-hum.</p> <p>13 Q. Okay. And it says, "Click C to search</p> <p>14 images with similar color percentage."</p> <p>15 Do you see that?</p> <p>16 A. Yep.</p> <p>17 Q. Is that the color histogram?</p> <p>18 A. Most likely.</p> <p>19 Q. Okay. And it says, "Click L to search</p> <p>20 images with similar color layout."</p> <p>21 What does "color layout" mean?</p> <p>22 A. So now you're asking for color in</p> <p>23 different positions of the image.</p> <p>24 Q. Okay.</p> <p>25 A. So you might want a blue sky with white</p>	<p style="text-align: right;">Page 121</p> <p>1 something akin to average color?</p> <p>2 A. Average color or histogram --</p> <p>3 (Reporter seeks clarification.)</p> <p>4 MR. HANSEN: Objection; foundation.</p> <p>5 THE WITNESS: Average color or histogram color.</p> <p>6 So histogram as a space a position in the image.</p> <p>7 BY MR. EDWARDS:</p> <p>8 Q. Right. And color layout, is that</p> <p>9 something that you recall being developed by the</p> <p>10 QBIC team as a feature that can be extracted?</p> <p>11 A. Right.</p> <p>12 Q. Okay. And so it is color in a specific</p> <p>13 position?</p> <p>14 A. Yes.</p> <p>15 Q. Do you recall any of the algorithms that</p> <p>16 were used to calculate that?</p> <p>17 A. I think we were using color histogram.</p> <p>18 Q. Color histogram. Okay. And then how</p> <p>19 would you calculate the position aspect of it?</p> <p>20 MR. HANSEN: Objection; lacks foundation.</p> <p>21 THE WITNESS: We had -- the sketch tools would</p> <p>22 let you select a region and paint a color. And then</p> <p>23 you'd paint a crude map and then you would go search</p> <p>24 for color images that have the blue sky and the</p> <p>25 white sand. That's a different query than if you</p>					

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		<p style="text-align: right;">Page 122</p> <p>1 had white on top and blue on the bottom. Then                  2 you're looking for blue water, white sand.                  3 BY MR. EDWARDS:                  4 Q. Do you recall what the methodologies                  5 used -- that were used to calculate the orientation                  6 of those colors in the image?                  7 MR. HANSEN: Objection; lacks foundation.                  8 THE WITNESS: There's no orientation per se.                  9 It's just position.                  10 BY MR. EDWARDS:                  11 Q. Well, then position. Do you recall what                  12 the methodologies are to calculate the position?                  13 MR. HANSEN: Same objection.                  14 THE WITNESS: Position is something the user                  15 inputs.                  16 BY MR. EDWARDS:                  17 Q. Something you use what?                  18 A. The user had to input.                  19 Q. Okay. And then let's move on to the next                  20 one, T. It says, "Click T to search images with                  21 similar global texture."                  22 A. Yeah.                  23 Q. Do you recall, in your work on the QBIC                  24 project, a feature called global texture that could                  25 be extracted from the image?</p>	<p style="text-align: right;">Page 124</p> <p>1 Q. Okay. And how do you spell Gabor?                  2 A. G-a-b-o-r.                  3 Q. So switch over and look at the second page                  4 of this Exhibit 6.                  5 So -- well, first back -- go back to -- go                  6 back to the first page. If you see on the left-hand                  7 side it says, "Goto: IBM Image Search Demo," and a                  8 little finger there is clicking it.                  9 You see it's in red?                  10 A. Yeah.                  11 Q. Okay. So that's clicking on that link.                  12 And then the second page is going to the IBM image                  13 search demo.                  14 A. Okay.                  15 Q. Okay? On the second page it is showing                  16 thumbnails with the different icons that we just                  17 walked through, I, C, L, T, S, on each of those                  18 icons.                  19 Do you see that?                  20 A. Yep.                  21 Q. Do you recognize this as a similar layout                  22 to the QBIC demos you hosted in the '90s?                  23 A. I don't.                  24 Q. You don't?                  25 A. No.</p>
		<p style="text-align: right;">Page 123</p> <p>1 A. A feature called . . .                  2 Q. Say again?                  3 A. I missed one of your words. A feature                  4 called what?                  5 Q. I said do you recall in your work on the                  6 QBIC project a feature called global texture that                  7 was extracted from the image?                  8 A. Yes.                  9 Q. Okay. Is that -- is that akin to texture                  10 that we looked at earlier?                  11 A. Yes.                  12 Q. Okay. And the last one is S. It's,                  13 "Search images with special multipass filter."                  14 Do you recall, in your work on the QBIC                  15 project, being able to calculate a feature called                  16 multipass filter?                  17 A. Probably Gabor functions.                  18 Q. Say again?                  19 A. Gabor functions.                  20 Q. One more time and louder.                  21 A. Gabor functions.                  22 Q. Gabor functions. Okay. What are Gabor                  23 functions?                  24 A. Gabor functions are a way of producing                  25 multiple resolution closed contours.</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. This was not -- so the link to the IBM                  2 website that was the AIX operating system in                  3 Exhibit 3, that did not have a similar thumbnail                  4 layout like this?                  5 A. A thumbnail, yes. I don't recall it had                  6 the buttons, the I, C, L, T, S.                  7 Q. You don't recall it had all the buttons or                  8 some of the buttons?                  9 A. All the buttons.                  10 Q. Okay. So you don't recall that it had any                  11 buttons?                  12 A. I don't -- yeah. I don't recall.                  13 Q. It could have, it couldn't have, you just                  14 don't remember?                  15 A. I just don't remember, yeah.                  16 Q. Okay. But the one that you hosted on                  17 IBM's website, it did have thumbnails in a similar                  18 format here?                  19 A. Yeah, it had thumbnails.                  20 Q. And these thumbnails represent the images                  21 that are stored in the database?                  22 A. Yes.                  23 Q. Okay. Here, the 470 images would be                  24 reflected at least -- one, two, three, four, five,                  25 six, seven -- eight of them right here in this</p>

*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 8,520,897 based on the Query by Image and Video Content (“QBIC”) System

Element	'897 Claim Recitation	Exemplary Citations in Reference				
		<table border="1"> <tr> <td> <p style="text-align: right;">Page 126</p> <p>1 screenshot?</p> <p>2 A. Right.</p> <p>3 Q. Right? And then the one that you hosted</p> <p>4 on the -- on the website that you said those --</p> <p>5 there would be on order of thousands of thumbnails;</p> <p>6 correct?</p> <p>7 A. Tens of thousands.</p> <p>8 Q. Tens of thousands. Okay. Let's put that</p> <p>9 aside.</p> <p>10 MR. EDWARDS: Mark another screenshot as</p> <p>11 Exhibit 7.</p> <p>12 (Deposition Exhibit 7 was marked.)</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. So for Exhibit 7, again, I'll represent to</p> <p>15 you this is another screenshot from the QBIC demo</p> <p>16 produced as IBM 747. And in this screenshot the</p> <p>17 icon C is being clicked on the first page.</p> <p>18 Do you see that?</p> <p>19 A. Yep.</p> <p>20 Q. And that's highlighted in red.</p> <p>21 Do you see that?</p> <p>22 A. Yep.</p> <p>23 Q. Okay. 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<p><i>Id.</i> at 135 – 136</p>						

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		<p>14 Q. Okay. Let's put that aside.</p> <p>15 Okay. Now I want to talk about the last</p> <p>16 step in the process that we've talked about -- that</p> <p>17 we -- that we started on at the beginning of your</p> <p>18 deposition. And the last step is database query.</p> <p>19 Okay?</p> <p>20 Generally what is the database query</p> <p>21 process for the QBIC system?</p> <p>22 A. You extract feature vectors and then you</p> <p>23 rank --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. You extract feature vectors and then you</p> <p>1 rank the feature vectors and you give an order, list</p> <p>2 of the top N images that have -- match the small --</p> <p>3 the closest distance.</p> <p>4 Q. You give an order list of the top --</p> <p>5 A. K or N. However many you request. It</p> <p>6 orders the entire database, but it only returns the</p> <p>7 top, the best matches.</p> <p>8 Q. Okay. Just so I understand, the database</p> <p>9 query, you extract feature vectors and then you rank</p> <p>10 the feature vectors and give an ordered list of the</p> <p>11 top results that match based on a distance</p> <p>12 measurement?</p> <p>13 A. So you take the queried image, you extract</p> <p>14 the feature vectors and now you're going to ask the</p> <p>15 database how many images do you have that are close</p> <p>16 in feature space to this query.</p> <p>17 And it'll return the top best -- the best</p> <p>18 hits.</p> <p><i>Id.</i> at 139–165</p>



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		<p>5 Q. And for the image that you use as a base                      6 for the query, the things we all talked about in                      7 terms of feature extraction for average color, color                      8 histogram, shape, texture, sketch, all of those                      9 things, the same algorithms would be used in order                      10 to extract those features from the image query?                      11 A. They're different algorithms. You would                      12 use an algorithm.                      13 Q. I'm sorry. Say that again?                      14 A. The algorithms are different between the                      15 shape features and the color features and sketch                      16 features.                      17 Q. Yeah. Understood. What I'm trying --                      18 what I'm trying to understand is, the process that                      19 we talked about before, when you populate the                      20 database and you extract the features from the                      21 images that are stored in the database.                      22 You know, we went through all those                      23 different algorithms that are used for shape, color,                      24 both average color and histogram, texture and                      25 sketch.</p>



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		<p>1 A. Um-hum.</p> <p>2 Q. Do you remember that?</p> <p>3 A. Yep.</p> <p>4 Q. Okay. That same process -- that exact</p> <p>5 same process for each of those features is used to</p> <p>6 extract those features from an image query?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And those similar -- so the</p> <p>9 algorithm, for example, for average color, that</p> <p>10 algorithm that's used to extract features for a</p> <p>11 database image is the same algorithm that's used to</p> <p>12 extract image for an image query?</p> <p>13 A. Yes.</p> <p>14 Q. Same for color histogram; correct? Same</p> <p>15 algorithm's used for both?</p> <p>16 A. It should be, yeah.</p> <p>17 Q. Same for shape and texture as well;</p> <p>18 correct?</p> <p>19 A. Right.</p>

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		<p style="text-align: right;">Page 142</p> <p>1 QBIC system would uncompress it?                  2 A. Yep.                  3 Q. And then it would extract whatever feature                  4 you want from that uncompressed image?                  5 A. Correct.                  6 Q. And then those extracted features from the                  7 uncompressed JPEG image are used in the matching                  8 process?                  9 A. Correct.                  10 Q. Okay. And you were using -- you were                  11 doing this for JPEG image -- or the QBIC system was                  12 doing this for JPEG images in the -- in the '90s?                  13 A. Yes.                  14 Q. Okay. So once the system -- now, we're                  15 only talking about image-based queries, image using                  16 as input for the queries.                  17 Once you submit an image for the query, if                  18 it's a -- you do your preprocessing that need to be                  19 done. Features are extracted. So now we've got                  20 just the extracted features, whatever those are.                  21 What happens with those extracted features                  22 next?                  23 A. They're put in the database and then                  24 potentially there are indexes built that help you do                  25 fast search against those features.</p>	<p style="text-align: right;">Page 144</p> <p>1 that does a comparison for say texture?                  2 A. You say the matching algorithm?                  3 Q. Correct.                  4 A. Yes, they could be different.                  5 Q. Well, let's talk about them. We can get                  6 into detail here.                  7 Well, before we -- before we get there, so                  8 how does the QBIC system display the results of                  9 matches to the user?                  10 A. Typically just thumbnails in a window in                  11 multiple ordered hits.                  12 Q. Okay. And it displays them in the order                  13 by which they're most similar. So the, you know,                  14 best match to the next best match to the next best                  15 match, so on and so forth?                  16 A. Correct.                  17 Q. Okay. And you said the system determines                  18 similarity based on some distance measure between                  19 the extracted features in the image query versus the                  20 stored image?                  21 A. The features of the stored image.                  22 Q. But it's a -- it's some sort of distance                  23 measure?                  24 A. Yes.                  25 Q. Okay. So let's go back to Exhibit 2.</p>
		<p style="text-align: right;">Page 143</p> <p>1 Q. I'm not talking about a stored image, I'm                  2 talking about for a query, so I'm taking an image                  3 and submitting it to a system as a query.                  4 A. Query by example.                  5 Q. Query by example. Okay. Once those                  6 features extracted for that image, what happens next                  7 in the process?                  8 A. You take the feature vector and you                  9 present it to the database and say return the best                  10 matches to this feature vector.                  11 Q. Okay. So the system would compare -- the                  12 QBIC system would compare the features that are                  13 calculated from the input image to stored calculated                  14 features of the images in the database and come up                  15 with a match?                  16 A. Yes.                  17 Q. Okay. And those matches would be sorted                  18 or arranged in order of most similar?                  19 A. Yes.                  20 Q. And would algorithms do these comparisons?                  21 A. Yes.                  22 Q. Would it be a different algorithm for each                  23 of the features? So, for example, would there be an                  24 algorithm that does the comparison for color                  25 histogram and then there's a different algorithm</p>	<p style="text-align: right;">Page 145</p> <p>1 So if you turn to page IBM 2393 and                  2 rolling over to IBM 2395, that's a discussion on the                  3 image query. And so what I want to do -- I have a                  4 couple high-level questions, but then I want to walk                  5 through each one. Color starts on 2394, then                  6 texture and then shape and sketch are on 2395.                  7 So in terms of the -- in terms of the                  8 distance measure, Mr. Flickner, if -- I know you                  9 said that the results are termed based on those that                  10 are most similar but it could come up with something                  11 that's an exact match; is that right?                  12 A. It's possible.                  13 Q. Like the distance measure, the result                  14 would be zero if it was an exact match; right?                  15 A. Typically you'd get that only if you had                  16 the query image the same as a result image.                  17 Q. Right. But that's a possibility?                  18 A. Yeah.                  19 Q. Okay. So let's take a look at color --                  20 it's on -- starting at the top of 2394. You know,                  21 take your time and read that and then I want to ask                  22 you some questions about it.                  23 (Witness reviews document.)                  24 A. Okay.                  25 Q. Okay. So let's first start with average</p>

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		<p style="text-align: right;">Page 146</p> <p>1 color. Average color determines similarity between</p> <p>2 the query image and the database image using</p> <p>3 weighted Euclidean distance; is that right?</p> <p>4 A. Yep.</p> <p>5 Q. And Euclidean is E-u-c-l-i-d-e-a-n.</p> <p>6 And can you just tell us at a high level</p> <p>7 what -- if you can -- what Euclidean distance is?</p> <p>8 A. So if you have multiple features or</p> <p>9 multiple scaler features, you have to ask the</p> <p>10 question I'm trying to build a distance from that</p> <p>11 vector to a query vector.</p> <p>12 And as you build that -- the distance, you</p> <p>13 have -- you may want to weight different elements of</p> <p>14 the vector differently. And we found out that using</p> <p>15 variance normalization, where weights of the</p> <p>16 variance of the feature, gave good aesthetic</p> <p>17 results.</p> <p>18 (Reporter seeks clarification.)</p> <p>19 A. Aesthetic results.</p> <p>20 Q. And I apologize, I couldn't hear what you</p> <p>21 said. You said, "And we found out that using</p> <p>22 variance" . . .</p> <p>23 A. So you normalize each feature with its</p> <p>24 variance.</p> <p>25 Q. Normalize each feature with . . .</p>	<p style="text-align: right;">Page 148</p> <p>1 (Reporter seeks clarification.)</p> <p>2 Q. Well, let me ask my -- let me get my</p> <p>3 question out first.</p> <p>4 So we talked about the features for</p> <p>5 average color before are RGB, Yiq, LAB and MTM.</p> <p>6 A. Correct.</p> <p>7 Q. And so, for example, for the RGB, you're</p> <p>8 saying that you would take the R and you would</p> <p>9 divide it by the variants of red and green, for</p> <p>10 example --</p> <p>11 A. Just variants of red.</p> <p>12 Q. Okay. And so you could do the same for</p> <p>13 the others, for Yiq or LAB?</p> <p>14 A. Exactly.</p> <p>15 Q. Okay. You do that for both the image</p> <p>16 input query and the stored image; correct?</p> <p>17 A. Correct.</p> <p>18 Q. And then you're calculating the distance</p> <p>19 between them, so determining how similar they are</p> <p>20 based on the distance?</p> <p>21 A. Yeah, or vector distance.</p> <p>22 Q. Understood.</p> <p>23 A. Two vectors of differences --</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. Two vectors with a distance calculation on</p>
		<p style="text-align: right;">Page 147</p> <p>1 A. With its variance.</p> <p>2 Q. With its variance.</p> <p>3 A. And then compute the average.</p> <p>4 Q. Okay.</p> <p>5 A. Or, I'm sorry, compute the weighted sum.</p> <p>6 So red divided by the variants of red, plus green</p> <p>7 divided by the variants of green --</p> <p>8 (Reporter seeks clarification.)</p> <p>9 A. Red divided by the variants of red, green</p> <p>10 divided by the variants of green, L divided by the</p> <p>11 variants of L, that's how you combine the various</p> <p>12 features.</p> <p>13 Q. Understand. And L represents what?</p> <p>14 A. Luminance.</p> <p>15 Q. Okay. And this is -- you're talking</p> <p>16 specifically with respect to average color?</p> <p>17 A. Well, the variance normalization is well</p> <p>18 known in terms of multidimensional feature merging.</p> <p>19 Q. But for average color, you wouldn't use</p> <p>20 luminance, right, as a -- as a variant?</p> <p>21 A. Luminance would just -- you wouldn't use</p> <p>22 just luminance. You could use luminance . . .</p> <p>23 Q. Well, so the color features we talked</p> <p>24 about before would be RGB, Yiq, LAB --</p> <p>25 A. Y is luminance.</p>	<p style="text-align: right;">Page 149</p> <p>1 them. So simply just -- in our product.</p> <p>2 Q. You're going to have to repeat that and be</p> <p>3 just a little bit louder, Mr. Flickner. Sorry.</p> <p>4 A. That's all right. Let me get my thoughts</p> <p>5 together.</p> <p>6 So we have multiple dimensional features.</p> <p>7 It's not unusual to take each dimension and</p> <p>8 normalize it by the variance because that gives</p> <p>9 you -- what that does is if you have tight variances</p> <p>10 you divide it by, you get bigger numbers. So you</p> <p>11 have more information close by.</p> <p>12 Q. What was the word you said before "close</p> <p>13 by"?</p> <p>14 A. I don't remember.</p> <p>15 THE REPORTER: Information?</p> <p>16 THE WITNESS: Information close by?</p> <p>17 BY MR. EDWARDS:</p> <p>18 Q. Okay. Okay. So now let's talk about</p> <p>19 color histograms.</p> <p>20 A. Okay.</p> <p>21 Q. Okay? Well, stop. Let's go back to</p> <p>22 average color. So is there -- you described the</p> <p>23 weighted Euclidean distance that's calculated</p> <p>24 between the query image and the database image for</p> <p>25 average color.</p>

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		<p style="text-align: right;">Page 150</p> <p>1 Is there any other detail that you recall                  2 that's not disclosed in the paragraph at IBM 2394?                  3 A. Not that I recall.                  4 Q. Okay. Do you recall whether this distance                  5 methodology changed after this article or it stayed                  6 the same?                  7 A. It changed.                  8 Q. Are you certain or do you know?                  9 A. I'm not certain, but I'm pretty certain.                  10 Q. And how did it change?                  11 A. Different features were shaped like an                  12 inch in color. The algorithm evolved. It wasn't                  13 static.                  14 Q. And how did it evolve?                  15 A. I don't recall all the details.                  16 Q. Do you recall whether it supplemented the                  17 weighted Euclidean distance or replaced it?                  18 A. I don't recall.                  19 Q. Is it fair to say there was always some                  20 distance measurement to determine similarity for                  21 average color in the QBIC system?                  22 A. There's some measurement, yeah.                  23 Q. Okay. Let's talk about color histogram.                  24 So in order to determine the similarity                  25 between a query image and a database image, the QBIC</p>	<p style="text-align: right;">Page 152</p> <p>1 the query image and the database image was                  2 determined by weighted Euclidean distance; is that                  3 right?                  4 MR. HANSEN: Same objection.                  5 THE WITNESS: Correct.                  6 BY MR. EDWARDS:                  7 Q. And how did -- how was that weighted                  8 Euclidean distance determined?                  9 A. It was inverse variance.                  10 (Reporter seeks clarification.)                  11 A. Variance.                  12 Q. And it was inverse variance for components                  13 like coarseness, contrast and directionality?                  14 A. Correct.                  15 Q. Okay. And do you recall if that                  16 methodology changed or stayed the same after this                  17 article for the QBIC system?                  18 A. Most likely it evolved.                  19 Q. Do you know for sure?                  20 A. No.                  21 Q. Do you recall any details?                  22 A. No.                  23 Q. All right. Let's talk about shape next.                  24 The similarity between the query image and                  25 the database image also used weighted Euclidean</p>
		<p style="text-align: right;">Page 151</p> <p>1 system would use an algorithm that determines                  2 distance between normalized histograms?                  3 A. Correct.                  4 Q. Do you recall any details of how that                  5 worked?                  6 A. Not off the top of my head.                  7 Q. Do you recall whether that methodology                  8 evolved for matching color histograms after this                  9 article?                  10 A. Not that I recall.                  11 Q. Okay. All right. Let's talk about                  12 texture next. And I don't know if you've read that,                  13 but that's at the bottom of 2394 and it goes to just                  14 barely at the top of 2395.                  15 (Witness reviews document.)                  16 A. Okay.                  17 Q. So for texture, the similarity is                  18 determined by the distance or the weighted Euclidean                  19 distance between the query object and -- the query                  20 object image and the database object image; is that                  21 right?                  22 MR. HANSEN: Objection; vague and ambiguous.                  23 THE WITNESS: Can you repeat.                  24 BY MR. EDWARDS:                  25 Q. Yeah. For texture, the similarity between</p>	<p style="text-align: right;">Page 153</p> <p>1 distance for shape; correct?                  2 A. Correct.                  3 Q. And do you recall how that worked?                  4 A. There's computing moments. And we used                  5 the shape measure, which I mentioned earlier,                  6 curvature and turning angle.                  7 (Reporter seeks clarification.)                  8 A. Curvature and turning angle.                  9 Q. And the curvature and turning angle would                  10 be compared between the image query and the database                  11 image; correct?                  12 A. Correct.                  13 Q. And do you recall if that methodology                  14 changed after this article came out in '93?                  15 A. Yes, it did.                  16 Q. How so?                  17 A. Well, in the IEEE computer paper, we                  18 described a different way of doing shape measures.                  19 And they included the moment calculations.                  20 Q. And you use the moment calculations to                  21 determine a distance between the image query and                  22 the -- and the database image?                  23 A. Yes.                  24 Q. Sorry?                  25 A. Yeah. Yes.</p>

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		<p style="text-align: right;">Page 154</p> <p>1 Q. And what are moment calculations?</p> <p>2 A. Given a binary blob, certain high-level</p> <p>3 moments and then you create -- compute the</p> <p>4 eigenvectors of certain matrices that are created --</p> <p>5 (Reporter seeks clarification.)</p> <p>6 A. Eigenvectors, e-i-g-e -- i-n -- to compute</p> <p>7 the eigenvectors of certain matrices. And that</p> <p>8 would give you translation and rotation and</p> <p>9 variance.</p> <p>10 Q. And so after the Exhibit 3 1995 IEEE</p> <p>11 article, did that methodology change to compute the</p> <p>12 distance for shape?</p> <p>13 A. I don't recall.</p> <p>14 Q. So the methodology for shape that you just</p> <p>15 described using moment calculations, that is</p> <p>16 different from what is described in the 1993 article</p> <p>17 for weighted Euclidean distance?</p> <p>18 A. We still might have used weighted</p> <p>19 Euclidean distance when the underlying features are</p> <p>20 different.</p> <p>21 Q. Understood.</p> <p>22 And the underlying features are different</p> <p>23 in the sense that in the 1995 article you're using</p> <p>24 what features?</p> <p>25 A. I'd have to review the article again.</p>	<p style="text-align: right;">Page 156</p> <p>1 Q. -- it talks about algebraic moment</p> <p>2 invariants.</p> <p>3 (Witness reviews document.)</p> <p>4 A. Is there any other papers that we have</p> <p>5 here?</p> <p>6 Q. Nope.</p> <p>7 A. Everything else is screenshots?</p> <p>8 MR. STRAUSSMAN: I don't think you introduced</p> <p>9 any other papers.</p> <p>10 THE WITNESS: I saw it earlier today.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. Why don't we do it this way. In terms of</p> <p>13 the feature calculations that were -- for shape on</p> <p>14 page IBM 900 of Exhibit 3 versus page --</p> <p>15 A. So if you look at 2393.</p> <p>16 Q. What page are you directing me to?</p> <p>17 A. 2393.</p> <p>18 Q. Okay.</p> <p>19 A. So it talks about the moment invariants as</p> <p>20 well.</p> <p>21 Q. Okay.</p> <p>22 A. These are those matrices that you compute</p> <p>23 eigenvectors of.</p> <p>24 (Reporter seeks clarification.)</p> <p>25 A. Matrices that you compute eigenvectors of.</p>
		<p style="text-align: right;">Page 155</p> <p>1 (Witness reviews document.)</p> <p>2 Q. I think the page you may be looking for is</p> <p>3 IBM 900 on the left side.</p> <p>4 (Witness reviews document.)</p> <p>5 A. What else do we have here?</p> <p>6 Q. So if you'll look at -- if you'll -- if</p> <p>7 you'll compare page IBM 900 from Exhibit 3 to page</p> <p>8 IBM 2393 from Exhibit 2, those are the descriptions</p> <p>9 in both articles about the features that are</p> <p>10 calculated.</p> <p>11 A. I'm trying to remember what --</p> <p>12 MR. STRAUSSMAN: Can you direct him a little</p> <p>13 closer?</p> <p>14 BY MR. EDWARDS:</p> <p>15 Q. Can I show you? Do you mind?</p> <p>16 I believe this is what you're looking for.</p> <p>17 So if you look right here (indicating).</p> <p>18 (Witness reviews document.)</p> <p>19 A. That's the same as this one (indicating).</p> <p>20 We had another -- there's another discussion about</p> <p>21 moments.</p> <p>22 Q. So if you look at -- under "Shape</p> <p>23 features" at 2393, right there, where you're looking</p> <p>24 at --</p> <p>25 A. Yeah.</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. Okay. And this is referring to the moment</p> <p>2 invariants in the 1993 SPIE article?</p> <p>3 A. Correct.</p> <p>4 Q. Right. And then if you go to the IEEE</p> <p>5 article that you primarily co-authored, on page 900,</p> <p>6 it refers to shape queries using area, circularity,</p> <p>7 eccentricity, major-axis direction and features</p> <p>8 derived from the object moments.</p> <p>9 A. Right.</p> <p>10 Q. Is that the same thing as algebraic moment</p> <p>11 invariants?</p> <p>12 A. Right.</p> <p>13 Q. So it looks like the methodologies are the</p> <p>14 same for the features that are extracted between the</p> <p>15 papers; is that right?</p> <p>16 A. I thought one paper had algebraic moments</p> <p>17 and one had turning angle. Maybe they both had</p> <p>18 turning angle.</p> <p>19 (Reporter seeks clarification.)</p> <p>20 A. Turning angle. Algebraic moments.</p> <p>21 Turning angles.</p> <p>22 Q. The 1993 paper refers to algebraic moment</p> <p>23 invariants. The IEEE paper, on IBM 900, refers to</p> <p>24 features derived from object moments.</p> <p>25 Are those the same thing?</p>

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		<p style="text-align: right;">Page 158</p> <p>1 A. At a high level, yes.</p> <p>2 Q. Okay. And so turning angles, which you've</p> <p>3 previously testified on, do you think that</p> <p>4 calculating shape features based on turning angles</p> <p>5 came after these papers?</p> <p>6 A. No. They're mentioned in these papers.</p> <p>7 Q. Okay. So they're included in these</p> <p>8 papers?</p> <p>9 A. Yes.</p> <p>10 Q. And so any distance measurement using</p> <p>11 weighted Euclidean distance would have taken into</p> <p>12 account turning angles?</p> <p>13 A. As a feature, yeah. Yes.</p> <p>14 Q. For both -- for both papers?</p> <p>15 A. For both papers.</p> <p>16 Q. Okay. Let's talk about sketch, which</p> <p>17 is -- if you'll just stick with 2395, which is</p> <p>18 Exhibit 2.</p> <p>19 MR. STRAUSSMAN: Can you direct him?</p> <p>20 THE WITNESS: I found it.</p> <p>21 MR. STRAUSSMAN: Okay.</p> <p>22 (Witness reviews document.)</p> <p>23 BY MR. EDWARDS:</p> <p>24 Q. Let me know when you're finished reading</p> <p>25 that paragraph on sketch.</p>	<p style="text-align: right;">Page 160</p> <p>1 histogram, as an example, and I get a return, the</p> <p>2 best matches based on order of similarity?</p> <p>3 A. Um-hum.</p> <p>4 Q. Does iterated query refinement mean that I</p> <p>5 can further refine that query to search for things</p> <p>6 like shape, like a -- you know, some shape in the --</p> <p>7 in the query image, like a logo or an icon, and that</p> <p>8 will further refine the results to give me things</p> <p>9 that have that similar shape inside the results of</p> <p>10 the color histogram?</p> <p>11 A. Yes.</p> <p>12 Q. And then I can -- I can keep doing that, I</p> <p>13 can further even refine that result by using a</p> <p>14 keyword, for example?</p> <p>15 A. Yes. Or you could do it all at once.</p> <p>16 Q. Okay. So the results of the query -- so</p> <p>17 we talked about before that the results of the</p> <p>18 queries display thumbnails of the database images</p> <p>19 based on similarity of which they match; correct?</p> <p>20 A. Correct.</p> <p>21 Q. And then those thumbnails can provide</p> <p>22 links to the original image or, if it was an</p> <p>23 r-frame, it could be -- you could provide a link to</p> <p>24 the video; correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 159</p> <p>1 A. Okay.</p> <p>2 Q. For sketch, the similarity between the</p> <p>3 query image and the database image uses an algorithm</p> <p>4 that performs logical binary correlation of the</p> <p>5 binary image?</p> <p>6 A. Yes.</p> <p>7 Q. Are there any other details you recall for</p> <p>8 the sketch comparison beyond what's disclosed in</p> <p>9 this paragraph on IBM 2395?</p> <p>10 A. Not that I recall.</p> <p>11 Q. Do you recall the methodology for</p> <p>12 determining similarity of the input image and the</p> <p>13 database image for sketch changing after this</p> <p>14 article?</p> <p>15 A. Not that I recall.</p> <p>16 Q. So if you go to the next page,</p> <p>17 Mr. Flickner, which is 2396, the Section 4.2 talks</p> <p>18 about performing queries.</p> <p>19 A. Um-hum.</p> <p>20 Q. And in the last sentence it refers to</p> <p>21 something called iterated query refinement.</p> <p>22 A. Yes.</p> <p>23 Q. And what does that refer to?</p> <p>24 A. It's a way you can refine the query.</p> <p>25 Q. So if I submit an image query for color</p>	<p style="text-align: right;">Page 161</p> <p>1 Q. And does the thumbnail also provide links</p> <p>2 to information about the image that was associated</p> <p>3 with the image in the database?</p> <p>4 A. Yes.</p> <p>5 Q. And, again, that can be that -- whatever</p> <p>6 information that the user inputted or was associated</p> <p>7 with the image from the source?</p> <p>8 A. Yes.</p> <p>9 Q. Could the results also display a matching</p> <p>10 score so the user could see how well the particular</p> <p>11 result matched to the -- to the query image?</p> <p>12 A. It could.</p> <p>13 Q. Okay.</p> <p>14 MR. EDWARDS: I'm going to hand you the next</p> <p>15 exhibit, Mr. Flickner.</p> <p>16 (Deposition Exhibit 10 was marked.)</p> <p>17 MR. EDWARDS: Handing you what's been marked as</p> <p>18 Exhibit 10.</p> <p>19 For the record, it's IBM Bates Nos. 002418</p> <p>20 to 2430.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. The title of this article is "Updates to</p> <p>23 the QBIC system."</p> <p>24 Do you see that?</p> <p>25 A. Yes.</p>



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		<p style="text-align: right;">Page 162</p> <p>1 Q. Do you recognize this article?                  2 A. Yes.                  3 Q. You are listed as a co-author of this                  4 article; is that correct?                  5 A. Yes.                  6 Q. And it is a paper that is published in the                  7 SPIE; correct?                  8 A. Correct.                  9 Q. In 1997; correct?                  10 A. Yes. It was 1997 or 1998.                  11 Q. No later than 1998; correct?                  12 A. Correct.                  13 Q. So just want to kind of orient you to the                  14 first page, which is IBM 2419.                  15 A. It's '98 because '97 is a different paper.                  16 Q. Well, if you turn the page, look at the                  17 footer on the right-hand side.                  18 Are you familiar that SPIE usually                  19 includes footers with the volume and the date at the                  20 bottom?                  21 A. Yeah.                  22 Q. And if you look at the footer kind of                  23 towards the right it says -786X-97-\$10 [sic]?                  24 A. Yeah.                  25 Q. What does that indicate to you?</p>	<p style="text-align: right;">Page 164</p> <p>1 Q. And you agree with that statement?                  2 A. Yep.                  3 Q. Okay. So let's -- I'm going to have you                  4 jump around, so I apologize in advance. Let's go to                  5 the -- kind of the back, IBM 2428.                  6 A. Okay.                  7 Q. Is that example of the stamps demo that                  8 was available on IBM's website?                  9 A. Yes.                  10 Q. All right. And if you look at the top in                  11 the location URL it has the almaden.ibm website                  12 address; correct?                  13 A. Correct.                  14 Q. All right. Let's flip forward to 2429.                  15 And is 2429 a screenshot of a trademark                  16 demo that was also available in the Almaden --                  17 excuse me -- almaden.ibm website?                  18 A. Yes.                  19 Q. Okay. And that demo looks like the                  20 trademark query is based on shape; is that right?                  21 A. It uses shape as one similarity feature.                  22 Q. Right. So the trademarks are converted to                  23 a binary image, like we talked before -- talked                  24 about before, and then they're -- the matching                  25 process is done based on those binary images?</p>	
		<p style="text-align: right;">Page 163</p> <p>1 A. Probably the submission was in '97 and the                  2 conference was in '98.                  3 Q. Submission was in '97. So the paper was                  4 published in '97 and then the conference you                  5 presented it at was in 1998?                  6 A. That's possible.                  7 Q. Do you recall presenting this paper at a                  8 conference in 1998?                  9 A. No, I don't.                  10 Q. So the first page refers to the Photonics                  11 West 1999 -- excuse me. Photonics West 1998                  12 Electronic Imaging Conference in San Jose.                  13 Do you recall attending that conference?                  14 A. It's likely I did, but I don't recall.                  15 Q. Okay. But you would agree with me this                  16 paper was made available at least as early as 1998;                  17 correct?                  18 A. Yes.                  19 Q. Okay. So the first page, IBM 2419. Under                  20 "Introduction," at the time of this paper it says,                  21 last line on the first paragraph, "Several online                  22 demos of QBIC are available at                  23 <a href="http://wwwqbic.almaden.ibm.com">http://wwwqbic.almaden.ibm.com</a>."                  24 Do you see that?                  25 A. Yep.</p>	<p style="text-align: right;">Page 165</p> <p>1 A. I think that's correct.                  2 Q. Okay. And here we're showing the query                  3 image is a -- is a heart -- a heart pattern with                  4 Love's next to it. It's in the top part of the                  5 screenshot.                  6 A. Yep.                  7 Q. And the results are shown below that under                  8 "Shapes judged to be most similar"; is that right?                  9 A. Correct.                  10 Q. Okay. And the results also show                  11 underneath each one the trademark number followed by                  12 matching score after the colon.                  13 Do you see that?                  14 A. Yes.                  15 Q. And this is -- is this an example of what                  16 you told me before, that matching scores could be                  17 presented to the user?                  18 A. Yes.                  19 Q. And so is it the lower the score, the                  20 closer the match; is that correct?                  21 A. Typically, yes.                  22 Q. Okay. So 39 would be the -- so the first                  23 image at the top left is a 39, the one next to it is                  24 a 46, so the 39 would be a closer match than the 46;                  25 correct?</p>	

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Element	'897 Claim Recitation	Exemplary Citations in Reference		
		<p><i>Id.</i> at 174–182</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; border-right: 1px solid black; padding-right: 10px;"> <p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin-top: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"?                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p> </td> <td style="width: 50%; vertical-align: top; padding-left: 10px;"> <p style="text-align: right; margin-bottom: 0;">Page 176</p> <p>1 put in the database.                  2 Q. Data that you want to put in the database.                  3 And what's the scope of the data that you could put                  4 in the database?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: It's quite wide.                  7 BY MR. EDWARDS:                  8 Q. Does that include an image?                  9 A. Yes. But it says here that the image is                  10 not put in the database. It's put external to the                  11 database and the pointer, the handle, goes to -- the                  12 handle goes to the database and use the extender to                  13 put the object in the file system.                  14 Q. 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Yeah.                  24 Q. -- that points to a file in the database                  25 that includes all the metadata that could include</p> </td> </tr> </table>	<p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. 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<p style="text-align: right; margin-bottom: 0;">Page 174</p> <p>1 "Extender data structures."                  2 Do you see that?                  3 A. Yeah.                  4 Q. And the second line under that says, "The                  5 Image Extender also creates and uses QBIC catalogs                  6 to access images by content."                  7 A. Yes.                  8 Q. Do you see that? Are you familiar with                  9 the image extender?                  10 A. Yes.                  11 Q. What is an image extender?                  12 A. It was an add-on we put to DB2 to give it                  13 the QBIC text search capabilities.                  14 Q. Okay. So let's go to 39. It talks about                  15 "Handles" at the top of page 39.                  16 Do you see that?                  17 A. Yeah.                  18 Q. And it says, "When you store an image,                  19 audio, or video object in a user table, the object                  20 is not actually store in the table. Instead, an                  21 extender creates a character string called a handle                  22 to represent the object, and stores the handle in                  23 the table."                  24 Did I read that correctly?                  25 A. Yep.</p> <p style="text-align: right; margin-top: 0;">Page 175</p> <p>1 Q. Do you understand what it means when it                  2 refers to "object"?                  3 A. Yes.                  4 Q. What does "object" mean?                  5 MR. HANSEN: Objection; lacks foundation.                  6 THE WITNESS: "Object" in this context is an                  7 entity you're going to insert into the database.                  8 BY MR. EDWARDS:                  9 Q. It's an entity you're going to insert in                  10 the database?                  11 A. Yeah.                  12 Q. And what are the possibilities for that                  13 entity?                  14 MR. HANSEN: Objection; lacks foundation, calls                  15 for speculation.                  16 MR. EDWARDS: Counsel, he said he recognized                  17 the document.                  18 MR. HANSEN: You're asking him substance about                  19 what the contents of the document are. He                  20 recognized this document.                  21 MR. EDWARDS: I mean, you're fine to make the                  22 objection, it's just lack -- it's ill-founded.                  23 BY MR. EDWARDS:                  24 Q. Go ahead. So "object" can include what?                  25 A. "Object" includes data that you want to</p>	<p style="text-align: right; margin-bottom: 0;">Page 176</p> <p>1 put in the database.                  2 Q. 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And if you go down to "QBIC Catalogs."                  21 Do you see that?                  22 A. Yeah.                  23 Q. It says, "A QBIC catalog is a set of files                  24 that hold data about the visual features of images."                  25 A. Yep.</p> <p style="text-align: right; margin-top: 0;">Page 177</p> <p>1 Q. Correct?                  2 A. Correct.                  3 Q. And, "The Image Extender uses this data to                  4 search for images by content."                  5 Is that right?                  6 A. Correct.                  7 MR. HANSEN: Objection; lacks foundation.                  8 BY MR. EDWARDS:                  9 Q. How is the -- how is the catalog different                  10 from the table?                  11 MR. HANSEN: Objection; lacks foundation.                  12 BY MR. EDWARDS:                  13 Q. That we talked about that has the handle                  14 that points to the image?                  15 MR. 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		<p style="text-align: right;">Page 178</p> <p>1 the image as well?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: It points to the file that's the</p> <p>4 QBIC catalog.</p> <p>5 BY MR. EDWARDS:</p> <p>6 Q. Can you walk us through that one more</p> <p>7 time? And just be a little bit louder, sorry.</p> <p>8 MR. HANSEN: Same objection.</p> <p>9 THE WITNESS: So the QBIC catalog is a set of</p> <p>10 files that hold data about visual features in the</p> <p>11 image.</p> <p>12 (Reporter seeks clarification.)</p> <p>13 THE WITNESS: Visual features. The image</p> <p>14 extender lets you search against that database,</p> <p>15 against that object.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. The image extender lets you search against</p> <p>18 that catalog, the name of that catalog?</p> <p>19 A. The catalog, yeah.</p> <p>20 Q. Okay. And it does so by using a pointer</p> <p>21 from the handle in the table?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. And then if we turn to the next page on</p>	<p style="text-align: right;">Page 180</p> <p>1 BY MR. EDWARDS:</p> <p>2 Q. So take a look at the bottom of IBM</p> <p>3 page 40 to the top of 41.</p> <p>4 So it says, "When you search for an image</p> <p>5 by content, your query identifies one or more</p> <p>6 features for the search (such as average color), a</p> <p>7 source for each feature (such as an example image),</p> <p>8 and a target set of cataloged images. The Image</p> <p>9 Extender computes the feature value of the source</p> <p>10 and compares it to the cataloged feature values for</p> <p>11 the target images. It then computes a score that</p> <p>12 indicates how similar the feature values of the</p> <p>13 target images are to the source. You can have the</p> <p>14 Image Extender return the images whose features are</p> <p>15 most similar to the source. The Image Extender will</p> <p>16 return the handle of each image and the image</p> <p>17 score."</p> <p>18 Did I read that correctly?</p> <p>19 A. Yes.</p> <p>20 Q. So if you were to use the image extender</p> <p>21 in the DB2 universal database when you search for an</p> <p>22 image by content using a query image, it will</p> <p>23 extract the features for whatever you want, compare</p> <p>24 that to the features of images in a database, return</p> <p>25 your results, which includes the score for the</p>
		<p style="text-align: right;">Page 179</p> <p>1 data structures. It says, "A QBIC catalog can hold</p> <p>2 data for the following image features: Average</p> <p>3 color, Histogram color, Positional color and</p> <p>4 Texture."</p> <p>5 Is that right?</p> <p>6 A. Yep.</p> <p>7 Q. Okay. We spoke about average color,</p> <p>8 histogram color and texture; correct?</p> <p>9 A. Right.</p> <p>10 Q. What is positional color?</p> <p>11 A. We talked about it briefly. It's color in</p> <p>12 particular locations in the image.</p> <p>13 Q. Ah. Understood.</p> <p>14 That is -- that is similar to L in the</p> <p>15 demo that we looked at, which is called color</p> <p>16 layout.</p> <p>17 A. Okay, yes.</p> <p>18 Q. Is that correct?</p> <p>19 A. I don't remember if it's called L. Sounds</p> <p>20 right.</p> <p>21 Q. If you look at --</p> <p>22 MR. EDWARDS: If you can show -- give him</p> <p>23 Exhibit 6.</p> <p>24 THE WITNESS: Oh, this L. Yes.</p> <p>25 MR. EDWARDS: Thank you.</p>	<p style="text-align: right;">Page 181</p> <p>1 match?</p> <p>2 A. Correct.</p> <p>3 MR. HANSEN: Objection; lacks foundation, calls</p> <p>4 for speculation.</p> <p>5 MR. EDWARDS: You can put that enormous exhibit</p> <p>6 aside.</p> <p>7 THE WITNESS: Test 1, 2, 3.</p> <p>8 BY MR. EDWARDS:</p> <p>9 Q. Go back to Exhibit 3, please. If you</p> <p>10 could turn to the page Bates-labeled IBM 894 with</p> <p>11 the architecture picture.</p> <p>12 A. Okay.</p> <p>13 Q. So I just -- I just want to kind of walk</p> <p>14 the -- through this architecture, Mr. Flickner. But</p> <p>15 as a high level, I just want to understand, is</p> <p>16 this -- is this a high-level architecture that would</p> <p>17 generally be used for any implementation of QBIC?</p> <p>18 A. Yes.</p> <p>19 Q. All right. So first step is you submit</p> <p>20 still images or r-frames for feature extraction; is</p> <p>21 that correct?</p> <p>22 A. Correct.</p> <p>23 Q. Okay. Features are extracted, such as</p> <p>24 color, texture, shape, sketch and text; correct?</p> <p>25 A. Location, yep.</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 182</p> <p>1 Q. And location. Including the ones that I                  2 listed; correct?                  3 A. Yep.                  4 Q. Okay. After feature extraction is done,                  5 the images and those features for the database                  6 images are stored in the database; correct?                  7 A. Correct.                  8 Q. And then once those are stored, a user can                  9 query using some sort of a user interface; is that                  10 right?                  11 A. Correct.                  12 Q. And the user can query based on color,                  13 texture, shape, multi-object, sketch, location or                  14 text; is that right?                  15 A. Correct.                  16 Q. Okay. Those features are then decomposed                  17 and extracted from the query image and then a                  18 matching engine is used to compare those similarly                  19 extracted features from the stored images; is that                  20 correct?                  21 A. Correct.                  22 Q. And then the best matches are returned in                  23 similarity of order back to the user; is that right?                  24 A. Correct.                  25 Q. Okay. Thank you for that.</p> <p><i>Id.</i> at 190–191                  22 Q. So [as read], "Once the image catalogs are                  23 created, you can use the Image Query component to                  24 find image and business information. Business                  25 information, such as character and numeric data, are</p>

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		<p>1 stored in the database tables using normal table 2 population methods. Image Query is provided in 3 Ultimedia Manager and Client Search Feature. Image 4 Query allows searches by three methods." Excuse me. 5 "One, image content, such as color, shape, 6 texture, or layout; two, data description, such as 7 business data stored in the database (character or 8 numeric) or descriptive text (category); and, three, 9 combinations of image content and data description." 10 Did I read that right? 11 A. Yep. 12 Q. And is that all QBIC functionality? 13 A. Yep. 14 Q. And with respect to image content, if you 15 continue to go on at the bottom of that paragraph 16 and at the top it says [as read], "You can drag and 17 drop visual samples into an image query and select a 18 color from the color wheel or sketch a shape." 19 A. Correct. 20 Q. So the dragging and dropping image samples 21 into an image query, that is a -- an image query 22 search that we talked about before? 23 A. Right. 24 Q. If you go to "Image Formats," are those 25 typical image formats that a QBIC system would use?</p> <hr/> <p style="text-align: right;">Page 191</p> <p>1 A. Yep. 2 Q. But it would understand formats beyond 3 those? 4 A. Yes. 5 Q. Would r-frames be represented as these 6 types of formats or certain of these types of 7 formats? 8 A. R-frames can be represented in these 9 formats, yes. 10 Q. Okay. 11 A. R-frame is just saying there's an image. 12 It's just a particular frame in a video.</p>
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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 198 – 199</p> <p>15 Q. Okay. And then if we can go to IBM 849.</p> <p>16 There?</p> <p>17 A. Yeah.</p> <p>18 Q. Top of the page says, "Adding image search</p> <p>19 to your Content Manager."</p> <p>20 Do you see that?</p> <p>21 A. Yeah. Yeah.</p> <p>22 Q. And the first paragraph starts -- talks</p> <p>23 about QBIC.</p> <p>24 Do you see that?</p> <p>25 A. Yeah.</p> <hr/> <p style="text-align: right;">Page 199</p> <p>1 Q. It says, "The image search server uses</p> <p>2 IBM's QBIC (query by image content) technology to</p> <p>3 help you search for objects by certain visual</p> <p>4 properties, such as color and texture."</p> <p>5 Did I read that correctly?</p> <p>6 A. Yes.</p> <p>7 Q. It says [as read], "The image search</p> <p>8 server analyzes images and stores the image</p> <p>9 information in a database. Then users can run image</p> <p>10 queries, which use the visual properties of image,</p> <p>11 to match colors, textures, and their positions</p> <p>12 without describing them -- describing them in</p> <p>13 words."</p> <p>14 Did I read that correctly?</p> <p>15 A. Yes.</p> <p>16 Q. And that's consistent with the features</p> <p>17 and functionalities that we have talked about in the</p> <p>18 1993 SPIE and 1995 IEEE article; correct?</p> <p>19 A. Correct.</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p><i>Id.</i> at 312 – 313</p> <p>21 Q. For every implementation of QBIC, if an                      22 input image has an object and the object has colors,                      23 the color histogram feature would match those stored                      24 image that include objects with similar colors;                      25 correct?</p> <hr/> <p style="text-align: right;">Page 313</p> <p>1 A. Correct.</p> <p><i>Id.</i> at 317–322</p> <p>22 Q. Okay. So for every commercial                      23 implementation of QBIC as of the IEEE 1995 article                      24 in Exhibit 3, those implementation calculated                      25 features of a query image and stored image; is that</p>

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		<p style="text-align: right;">Page 318</p> <p>1 correct?</p> <p>2 MR. HANSEN: Objection; lacks foundation.</p> <p>3 THE WITNESS: Correct.</p> <p>4 BY MR. EDWARDS:</p> <p>5 Q. And those calculations of features</p> <p>6 included color, shape and/or texture in all</p> <p>7 implementations that we looked at today, correct?</p> <p>8 MR. HANSEN: Same objections.</p> <p>9 THE WITNESS: I don't remember if all versions</p> <p>10 supported all features.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. If the 1995 article references calculating</p> <p>13 color, shape and texture, you would agree with me</p> <p>14 that the commercial embodiments implementing QBIC at</p> <p>15 the time would have been able to calculate color,</p> <p>16 shape and texture as part of feature extraction;</p> <p>17 correct?</p> <p>18 MR. HANSEN: Objection; lacks foundation.</p> <p>19 THE WITNESS: I don't remember exactly which</p> <p>20 products incorporated any subsets of the features.</p> <p>21 BY MR. EDWARDS:</p> <p>22 Q. Do you recall that all the products used</p> <p>23 color?</p> <p>24 MR. HANSEN: Objection; lacks foundation.</p> <p>25 THE WITNESS: I'm pretty sure they all did use</p>	<p style="text-align: right;">Page 320</p> <p>1 [as read] "Image Query allows searches by three</p> <p>2 methods: Image content, such as color, shape and</p> <p>3 texture."</p> <p>4 You see that?</p> <p>5 A. Yeah.</p> <p>6 Q. So Ultimedia Manager 1.1 was able to</p> <p>7 perform an image query using color, shape and</p> <p>8 texture, correct?</p> <p>9 MR. HANSEN: Objection; lacks foundation.</p> <p>10 THE WITNESS: And layout.</p> <p>11 BY MR. EDWARDS:</p> <p>12 Q. And layout. But also color, shape and</p> <p>13 texture, correct?</p> <p>14 A. Yes.</p> <p>15 MR. HANSEN: Same objection.</p> <p>16 BY MR. EDWARDS:</p> <p>17 Q. And then if you go to the last sentence it</p> <p>18 goes on -- and the bottom of the left column on that</p> <p>19 same page, going to the top of the right column, it</p> <p>20 says, "You can drag and drop visual samples into an</p> <p>21 image query."</p> <p>22 You see that?</p> <p>23 A. Yeah.</p> <p>24 Q. And that would include images, correct?</p> <p>25 A. Correct.</p>
		<p style="text-align: right;">Page 319</p> <p>1 color.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. And color histograms specifically?</p> <p>4 MR. HANSEN: Same objection.</p> <p>5 (Reporter seeks clarification.)</p> <p>6 BY MR. EDWARDS:</p> <p>7 Q. Histograms specifically.</p> <p>8 (Reporter seeks clarification.)</p> <p>9 THE WITNESS: Most likely, yes.</p> <p>10 BY MR. EDWARDS:</p> <p>11 Q. Well, pick up Exhibit 12, please.</p> <p>12 And go to IBM 2264.</p> <p>13 A. Okay.</p> <p>14 Q. So the Ultimedia Manager 1.1 was able to</p> <p>15 perform an image query using color, shape and</p> <p>16 texture; correct?</p> <p>17 MR. HANSEN: Objection; lacks foundation.</p> <p>18 (Witness reviews document.)</p> <p>19 BY MR. EDWARDS:</p> <p>20 Q. Let me orient you a little more. If you</p> <p>21 go to the bottom of IBM 2264, where it says "Image</p> <p>22 Query,"</p> <p>23 You see that?</p> <p>24 A. Yeah.</p> <p>25 Q. Where the bullet points start, it says,</p>	<p style="text-align: right;">Page 321</p> <p>1 MR. HANSEN: Objection; lacks foundation.</p> <p>2 BY MR. EDWARDS:</p> <p>3 Q. Okay?</p> <p>4 A. Correct.</p> <p>5 Q. Mr. Flickner, every commercial</p> <p>6 implementation of QBIC as of the Exhibit 3, IEEE</p> <p>7 1995 article, returned results of the matching</p> <p>8 process to the user in the form of a stored image</p> <p>9 and information associated with that image; is that</p> <p>10 fair?</p> <p>11 MR. HANSEN: Objection; lacks foundation.</p> <p>12 THE WITNESS: Yes.</p> <p>13 BY MR. EDWARDS:</p> <p>14 Q. Okay. And a thumbnail is an image;</p> <p>15 correct?</p> <p>16 A. Thumbnail is an image.</p> <p>17 Q. And for every commercial embodiment of</p> <p>18 QBIC as of the 1995 IEEE article in Exhibit 3, those</p> <p>19 implementations calculated a distance metric as a</p> <p>20 measure of similarity for each feature between an</p> <p>21 input image and a stored image; correct?</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 THE WITNESS: Correct.</p> <p>24 BY MR. EDWARDS:</p> <p>25 Q. Okay. And a distance measure value</p>

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Element	'897 Claim Recitation	Exemplary Citations in Reference
		<p style="text-align: right;">Page 322</p> <p>1 indicates how confident the system is that the                  2 features of the stored image match the features of                  3 the input image; correct?                  4 A. Correct.</p> <p><i>Id.</i> at 53–56</p> <p>16 Q. And when it refers to "text information,"                  17 what is it referring to?                  18 A. Anything that could be extracted in the                  19 context of how the image was annotated.                  20 Q. And when you say "annotated," annotated by                  21 the user who was populating the database?                  22 A. Could be.                  23 Q. What else could it be?                  24 A. It could be the supplier of the data.                  25 Q. Okay. So you may have some annotations</p>

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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>



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		<p><i>Id.</i> at 60 – 62</p> <div style="border: 1px solid black; padding: 5px;"> <p>25 Q. Okay. And so let's say that objects were</p> <p style="text-align: right;">Page 61</p> <p>1 identified within a particular image, what were done</p> <p>2 with those objects? Were they stored, for example,</p> <p>3 as a separate image or were they somehow linked to</p> <p>4 or associated with the image from which they were</p> <p>5 extracted?</p> <p>6 A. Typically they were linked.</p> <p>7 Q. They were linked to the source image?</p> <p>8 A. Yeah.</p> <p>9 Q. Okay. And this was done in the database?</p> <p>10 A. Could be done in the database.</p> <p>11 Q. How was it done?</p> <p>12 A. It was probably done in a text database or</p> <p>13 some sort of key index pair database. So database</p> <p>14 has a lot of different meanings.</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>14 Q. Yeah, that was a bad question.</p> <p>15 Once the objects are identified within a</p> <p>16 particular source image that's stored in the</p> <p>17 database, how are the objects linked to the source</p> <p>18 image in the key --</p> <p>19 A. The key would have been, like, the image</p> <p>20 name and the value would have been the definition of</p> <p>21 the -- of the objects.</p> </div> <p><i>Id.</i> at 103</p>

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		<p>3 Q. Okay. And then once -- for each -- strike                      4 that.                      5 For each of these four feature                      6 calculations, color, whether it's average or                      7 histogram, texture, shape, sketch, once those                      8 features are extracted, those are stored in the                      9 database; is that right?                      10 A. Correct.                      11 Q. And those are linked to the image from                      12 which they are extracted?                      13 A. Yes.                      14 Q. And those -- is it -- is it true that in                      15 the database that the stored image is linked with a                      16 thumbnail is linked with the description that is --                      17 that is entered by the user or comes from the image                      18 source and also is linked to these features that are                      19 extracted, all those things are linked together?                      20 A. Yeah.</p> <p><i>Id.</i> at 129 – 131</p>

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		<p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes.</p> <p>2 Q. Okay. And so when a user clicks the I,</p> <p>3 you can see the I is highlighted in red?</p> <p>4 A. Yeah.</p> <p>5 Q. Was there a -- was there a similar</p> <p>6 functionality on the one on the website, where you</p> <p>7 clicked something and it lit up to tell the user</p> <p>8 that they were actually clicking the button?</p> <p>9 A. Yeah.</p> <p>10 Q. Okay. And then you go to the second page,</p> <p>11 and that is the full image of the thumbnail; is that</p> <p>12 correct?</p> <p>13 A. It's not of the thumbnail, it's the</p> <p>14 full-size image.</p> <p>15 Q. Well, yeah, it's the -- it's the</p> <p>16 full-sized image representation of the thumbnail on</p> <p>17 the first page; right?</p> <p>18 A. I would phrase it as the thumbnail is a</p> <p>19 representation of the full-sized image.</p> <p>20 Q. Understood. The first page is a</p> <p>21 thumbnail. You click on "Info" and then it returns</p> <p>22 to you the full-sized image?</p> <p>23 A. Yeah.</p> <p>24 Q. And that's reflected on the second page?</p> <p>25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that?</p> <p>2 A. That would be the file name of the image.</p> <p>3 Q. Okay. And so if you go back to the first</p> <p>4 page, when the pointer is pointed to I and it clicks</p> <p>5 on that, that is actually directing -- is going to</p> <p>6 direct the user to a separate link, correct, where</p> <p>7 the full-sized image is?</p> <p>8 A. Yes.</p> <p>9 Q. And the address of that link's on the</p> <p>10 second page at the top that says "Location";</p> <p>11 correct?</p> <p>12 A. Yeah, the URL.</p> <p>13 Q. Right. And so that would be similar to</p> <p>14 how the demo is on the website, it would go to a</p> <p>15 specific URL that's linked to where that image is</p> <p>16 stored?</p> <p>17 A. Yes.</p> <p>18 Q. Right? And that's how it would work on</p> <p>19 any implementation, any commercial implementation;</p> <p>20 correct?</p> <p>21 A. Yeah.</p> <p>22 MR. HANSEN: Objection; lacks foundation.</p> <p>23 MR. EDWARDS: So we've been going for about an</p> <p>24 hour. How do you -- how are you feeling?</p> <p>25 THE WITNESS: I'm all right.</p>	

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		<p><i>Id.</i> at 161</p> <p>1 Q. And does the thumbnail also provide links                  2 to information about the image that was associated                  3 with the image in the database?                  4 A. Yes.                  5 Q. And, again, that can be that -- whatever                  6 information that the user inputted or was associated                  7 with the image from the source?                  8 A. Yes.                  9 Q. Could the results also display a matching                  10 score so the user could see how well the particular                  11 result matched to the -- to the query image?                  12 A. It could.</p> <p><i>Id.</i> at 321</p> <p>5 Q. Mr. Flickner, every commercial                  6 implementation of QBIC as of the Exhibit 3, IEEE                  7 1995 article, returned results of the matching                  8 process to the user in the form of a stored image                  9 and information associated with that image; is that                  10 fair?                  11 MR. HANSEN: Objection; lacks foundation.                  12 THE WITNESS: Yes.                  13 BY MR. EDWARDS:                  14 Q. Okay. And a thumbnail is an image;                  15 correct?                  16 A. Thumbnail is an image.</p> <p><i>Id.</i> at 118–119</p>

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		<p>18 Q. So do you know what happens if you clicked                      19 I?                      20 A. Yeah, you -- pops the window up and you                      21 see the full image.                      22 Q. Okay.                      23 (Reporter seeks clarification.)                      24 A. It pops the window up.                      25 Q. And how do you know that?</p> <hr/> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such                      2 a . . .                      3 MR. STRAUSSMAN: You got to speak up.                      4 BY MR. EDWARDS:                      5 Q. That's how you implemented what?                      6 A. You implement what the instructions say.                      7 Q. Okay. Is that a similar implementation                      8 for the other demos that you worked on?                      9 A. Most likely, yes.                      10 Q. Okay. So you click on I and then I would                      11 take you to a link that showed the full image?</p> <p><i>Id.</i> at 129 – 131</p>

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		<p>9 Q. Okay? And if you want to compare, or you</p> <p>10 can take my word for it, the image in the top left</p> <p>11 corner, the querying image, is the same one that was</p> <p>12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I</p> <p>15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full</p> <p>22 resolution.</p> <p>23 Q. Okay. And was there a similar</p> <p>24 functionality on the demo app on the -- on the</p> <p>25 website in the '90s?</p>

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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	



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		<p><i>Id.</i> at 197–198</p> <p>17 Q. First sentence says, "Many paper-intensive                      18 enterprises, such as insurance companies and                      19 financial institutions, administer large volumes of                      20 business-related content. The need for an                      21 enterprise solution for managing and accessing                      22 business information spans many industries."                      23 Did I read that correctly?                      24 A. Yes.                      25 Q. Okay. For -- is it -- is it your                      1 experience and understanding that QBIC is something                      2 that would be beneficial for businesses that have                      3 large volumes of business-related content?                      4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC                      8 functionality was good for insurance companies and                      9 financial institutions.                      10 Do you recall that?                      11 A. Yes.                      12 Q. Do you agree with that?                      13 A. Yes.                      14 Q. Okay. QBIC would be good for any company                      15 that has large amounts of business-related                      16 information, including multimedia content; correct?                      17 A. Correct.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been</p>

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		<p>motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, a person of ordinary skill in the art would have been motivated to improve, modify, or combine QBIC with prior art reference teachings to arrive at this limitation at least because QBIC was designed for applications that included large amounts of business-related information, including multi-media content, including for financial institutions. <i>See, e.g.,</i> IBM 000789; Flickner Depo Rough Tr. at 191:16-192:8, 293:14-294:8.</p>

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**2. Claim 30**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
30	<p>The method of claim 25, wherein the step of displaying the displayed image includes displaying a time varying image.</p>	<p>QBIC discloses the method of claim 25, wherein the step of displaying the displayed image includes displaying a time varying image.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “We have developed the QBIC (Query by Image Content) system to explore content-based retrieval methods. QBIC allows queries on large image and video databases based on • example images, • user-constructed sketches and drawings, • selected color and texture patterns, • camera and object motion, and • other graphical information.” <i>Id.</i> at pp. 1–3.</p> <p>“To achieve this functionality, QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content-colors, textures, shapes, and camera and object motion-and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p> <p>“For both population and query, the QBIC data model has • still images or scenes (full images) that contain objects (subsets of an image), and • video shots that consist of sets of contiguous frames and contain motion objects. For still images, the QBIC data model distinguishes between ‘scenes’ (or images) and ‘objects.’ A scene is an image or single representative frame of video. An object is a part of a scene-for example, the fox in Figure 3-or a moving entity in a video. For still image database population, features are extracted from images and objects and stored in a database as shown in the top left part of Figure 2.</p>

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		<p>Videos are broken into clips called shots. Representative frames, or r-frames, are generated for each extracted shot. R-frames are treated as still images, and features are extracted and stored in the database. Further processing of shots generates motion objects—for example, a car moving across the screen. Queries are allowed on objects (‘Find images with a red, round object’), scenes (‘Find images that have approximately 30-percent red and IS-percent blue colors’), shots (‘Find all shots panning from left to right’), or any combination (‘Find images that have 30 percent red and contain a blue textured object’).” <i>Id.</i> at p. 3.</p> <p>“In still image database population, the images are reduced to a standard-sized icon called a thumbnail and annotated with any available text information. Object identification is an optional but key part of this step. It lets users manually, semiautomatically, or fully automatically identify interesting regions—which we call objects—in the images. . . .</p> <p>For video data, database population has three major components: • shot detection, • representative frame creation for each shot, and • derivation of a layered representation of coherently moving structures/ objects. . . .</p> <p>Once the shot boundaries have been detected, each shot is represented using an r-frame. R-frames are used for several purposes. First, during database population, r-frames are treated as still images in which objects can be identified by using the previously described methods.” <i>Id.</i> at pp. 3–6.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“Your applications can even search for images by content. Imagine an application that uses visual examples to search for images. With such an application, users could select an example image and have the application find other images that have colors or textures similar to those in the example. With DB2 extenders’ Query by Image Content (QBIC) capability, you can create applications that search for images in this visual way.” <i>Id.</i> at p. 4.</p>
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		<p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p>
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### Flickner Depo at 214-215

1 videos were indexed by shot boundaries?

2 A. Correct -- well, the images of shot  
3 boundaries were indexed.

4 Q. What do you mean by the images of shot  
5 boundaries were indexed?

6 A. Each -- each shot -- the shot -- the shot  
7 boundary detection is trying to extract key frames  
8 or break the video into small subsec --  
9 subsections -- hang on. Let me think here a  
10 second.

11 So the shot boundary here is different  
12 than key framing. So I'll -- I'll retract what I  
13 said earlier. This -- while similar, they're not  
14 the same.

15 Q. What are the differences?

16 A. Shot boundaries are typically detected at  
17 fade to black, and key frames are supposed to be a  
18 representative still image of the video segment.

19 Q. How would a shot boundary index allow one  
20 to query a video by content?

21 A. It gives you semantical information as  
22 related to what the -- that -- that -- that is a --

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1 a reasonable amount of return video. It's -- it's  
2 breaking it into small snippets.

3 Q. Does it extract features from the key  
4 frames?

5 A. If there are key frames extracted, it --  
6 it will reference key frames.

7 Q. But how do you know that there are -- are  
8 other features extracted from the video --

9 A. I'm sorry. It does -- it does represent  
10 key frames as well, because it says it's -- it's  
11 getting both the -- the boundaries as well as  
12 indi- -- indicative key frame.

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		<p>Flickner 3/29/23 Depo at 32–33</p> <p>22 Q. The question was, any of the commercial 23 repositories that you went to source images, do you 24 know if any of them captured the still images or 25 video images that you purchased?</p> <hr/> <p>1 A. Some of them did, yeah. P</p> <p><i>Id.</i> at 34 – 35</p>
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		<p>10 Q. Okay. If I refer to "images," do you 11 understand that is including both a still image or, 12 for example, a frame of a video image? 13 A. Sure. 14 Q. Okay. So when I say "image," I'm 15 including both in my questions from now on out. 16 A. Okay. 17 Q. Okay? 18 A. Okay. 19 Q. In terms of running analytics, that would 20 include both extracting these characteristics from a 21 query image and from an image that you're storing in 22 a database; correct? 23 A. Can you rephrase. 24 Q. Yes. So the comparison that you're doing 25 between two images; right, is it correct that that</p> <hr/> <p style="text-align: right;">Page 35</p> <p>1 comparison is for purposes of a query? You're 2 querying image 1 to determine if there are images in 3 the database that have similar features; is that 4 right? 5 A. Correct. 6 Q. Okay. And the analytics that you're 7 talking about, where you extract these characters 8 from the image, that is -- those run on both the 9 query image and the images that are stored in the 10 database; is that right? 11 A. Yeah. We call them features. 12 Q. Features. Okay. 13 So when you say "features," you're talking 14 about the features that we talked about before: 15 Color, texture, shape, sketch? 16 A. For example.</p>	
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*Id.* at 68 – 72



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		<p>2 Q. Do you see that, "Videos are broken into"? 3 A. "Clips called shots." 4 Q. Yes. Well, it says, "Videos are broken 5 into clips called shots. Representative frames, or 6 r-frames, are generated for each extracted shot. 7 R-frames are treated as still images, and features 8 are extracted and stored in the database." 9 Did I read that correctly? 10 A. Um-hum. 11 Q. Okay. So for purposes of database 12 population and queries for video, r-frames were 13 used, and those were treated as still images? 14 A. Right. 15 Q. So what would happen if I queried using an 16 r-frame image? What results would I get back? 17 Could I get back both still images and r-frames, or 18 would it just return r-frame images back? 19 A. You could get both back. 20 Q. Say it again, louder. 21 A. You could get both back. 22 Q. Okay. And in what form would those 23 results be displayed to me? For images would they 24 be displayed as a thumbnail? 25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those 2 be displayed to you? 3 A. It could be as a thumbnail or as a short 4 video clip or as a single representative frame. 5 Q. Okay. So they could be -- so for a video, 6 there's a video that matched the image query of an 7 r-frame, the results I could get back could include 8 three things. It could be a still image, it could 9 be a thumbnail, or it could be an r-frame 10 representation? 11 A. R-frame, I think, is representative frame. 12 So it was a key frame in that video sequence, 13 summary frame. 14 Q. Once I ran a query on an r-frame; right? 15 Well, let's stop there. 16 If I run a query on still images, 17 typically the results I would get back are 18 thumbnails that are most similar to the 19 characteristics which I queried from the query 20 image; right? 21 A. You could get thumbnails back. You could 22 also get the full-sized image back. 23 Q. Okay. 24 A. Thumbnail is a tool for helping you return 25 lots of results and quickly scan it.</p>	
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		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I  2 have to click on the thumbnail in order to bring up  3 the full-sized image?  4 A. You could.  5 Q. Otherwise I could automatically receive  6 the full-sized image as part of the result?  7 A. You could.  8 Q. Okay. So walk through that process if I'm  9 using an r-frame of a video. If I do a -- if I run  10 a query on an r-frame of a video as a -- an image  11 query, how could I get the results back?  12 MR. HANSEN: Objection; vague and ambiguous.  13 BY MR. EDWARDS:  14 Q. In what form would I get the results back?  15 MR. HANSEN: Same objection.  16 THE WITNESS: You could get back the still  17 r-frame, representative frame, you could get back  18 the thumbnail, or you could get back the entire  19 video clip that that r-frame represents, a few  20 frames.  21 BY MR. EDWARDS:  22 Q. If I received a thumbnail or the r-frame,  23 would there be some sort of link I could click on to  24 get the underlying full video?  25 MR. HANSEN: Objection; vague and ambiguous,</p> <p style="text-align: right;">Page 71</p> <p>1 calls for speculation.  2 THE WITNESS: As I recall -- I'm not sure  3 definitely, but, yes, this is -- you could do that.  4 BY MR. EDWARDS:  5 Q. So let's go to page IBM 898.  6 So if you'll take -- just read that  7 paragraph that starts with the header  8 "Representative Frame Generation."  9 MR. STRAUSSMAN: And if you need to read  10 anything else to put it in context, feel free to do  11 so.  12 THE WITNESS: Okay.  13 (Witness reviews document.)  14 THE WITNESS: So what was your question, again?  15 BY MR. EDWARDS:  16 Q. If you go to the sentence that says,  17 "First" -- it's the second sentence in that  18 paragraph. It says, "First, during database  19 population, r-frames are treated as still images."  20 See that?  21 A. Yeah.  22 Q. And that's what you told me earlier;  23 correct?  24 A. Yeah.  25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic  2 units initially returned in a video query."  3 Meaning the r-frames?  4 A. Correct.  5 Q. "For example, in a query for shots that  6 are dominantly red, a set of r-frames will be  7 displayed. To see the actual video shot, the user  8 clicks on the displayed r-frame icon."  9 A. Yep.  10 Q. And that was one of the ways you were  11 describing that the results of a r-frame query would  12 be returned to the user?  13 A. Right.  14 Q. Do you know if that was the preferred way  15 that was used in demos in commercial applications?  16 MR. HANSEN: Objection; vague and ambiguous,  17 lacks foundation.  18 MR. STRAUSSMAN: You can answer.  19 THE WITNESS: I don't know.  20 BY MR. EDWARDS:  21 Q. But, Mr. Flickner, this -- generally this  22 article represents the status of the QBIC technology  23 as of the date of this publication, which is  24 September 1995; is that right?  25 A. Actually a little before September 1995</p> <p style="text-align: right;">Page 73</p> <p>1 because --  2 Q. Okay.  3 A. -- there's an editorial process.  4 Q. Say that last part?  5 A. There's an editorial process. You submit  6 it, they edit and make changes and eventually it  7 appears.  8 Q. Right. So what you're saying is there's  9 some lag between the time that you wrote the article  10 and the time it was published?  11 A. Yeah.  12 Q. So this article -- but this article  13 represents the state of the QBIC technology at least  14 as of September 1995?  15 A. Yeah. Yes.  16 Q. And then let's go to IBM 900.  17 And take your time to orient yourself on  18 that page, but what I really want to ask you about  19 is the last paragraph on the left-hand column going  20 up to the top of the right-hand column.  21 A. Yep.  22 Q. So it says this paper describes [as read],  23 "a prototype system that uses image and video  24 content as the basis for retrievals."  25 Is that right?</p>
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*Id.* at 75–76

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		<p>23 Q. Okay. But the image -- the content of the 24 image, including the objects in the image, it could 25 have been anything. So, for example, it could have 1 been a picture of a building? 2 A. Yeah. 3 Q. A print advertisement? 4 A. Yeah. 5 Q. Painting? 6 A. Yeah. 7 Q. Advertisement on TV? 8 A. Yep. 9 Q. I could have taken a picture of an 10 electronic billboard or display and submit that to 11 the system? 12 A. Yep.</p> <p><i>See also</i> Flickner Depo at 38-41, 201, 209-210.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.</p>
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**3. Claim 33**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
33	The method of claim 25, wherein the step of enabling performance of the transaction includes initiating a verification.	<p>QBIC discloses the method of claim 25, wherein the step of enabling performance of the transaction includes initiating a verification.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p>

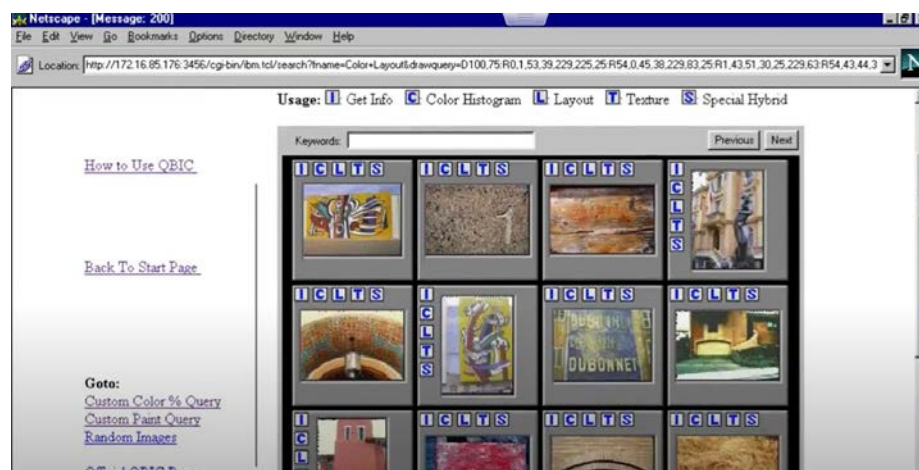
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“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” *Id.* at p. 3.

“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” *Id.* at p. 63.

#### QBIC Demo (IBM000747)



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		<p>Flickner Depo at 131-133</p> <p>14 Q. An action that the QBIC system would 15 automatically take based on the results it would 16 return.</p> <p>17 A. So you're saying as you return results, 18 you do some post-filtering on the image or the -- 19 what -- what kind of --</p> <p>20 Q. Perhaps not -- not post-filtering. 21 But, for example, displaying a hyperlink 22 along with the results for a specific result.</p> <p>1 A. Yeah, you could do that.</p> <p>2 Q. But did the QBIC system do that?</p> <p>3 A. I don't remember.</p> <p>4 Q. What about advertisements?</p> <p>5 A. There was no support I know of for 6 advertisement.</p> <p>7 Q. Did any version of the QBIC system do 8 anything with the results other than display them 9 to the user?</p> <p>10 A. It lets you use them as a refinement 11 query.</p> <p>12 Q. And what do you mean by -- what do you 13 mean by use it as a --</p> <p>14 A. You could click on one of the results and 15 it would cause another query using that input 16 image.</p>
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		<p>17 Q. I see.</p> <p>18 The user would need to --</p> <p>19 A. Yeah.</p> <p>20 Q. -- create another query based on the</p> <p>21 results?</p> <p>22 A. You -- you could probably hyperlink</p> <hr/> <p style="text-align: right;">Page 132</p> <p>1 browse so you -- you could search that image, you</p> <p>2 click on that image, you change the metrics on</p> <p>3 where you're sorting, and you get a -- basically,</p> <p>4 get a re-sort.</p> <p>Flickner 8/29/23 Depo at 53–56</p> <p>16 Q. And when it refers to "text information,"</p> <p>17 what is it referring to?</p> <p>18 A. Anything that could be extracted in the</p> <p>19 context of how the image was annotated.</p> <p>20 Q. And when you say "annotated," annotated by</p> <p>21 the user who was populating the database?</p> <p>22 A. Could be.</p> <p>23 Q. What else could it be?</p> <p>24 A. It could be the supplier of the data.</p> <p>25 Q. Okay. So you may have some annotations</p>
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		<p style="text-align: right;">Page 54</p> <p>1 about an image that the supplier of the data                  2 supplied and then also the user populating the                  3 database could also enter text descriptions?                  4 A. Right.                  5 Q. Okay. And were there limitations to the                  6 text descriptions or -- in terms of character                  7 limits?                  8 A. Probably were -- there . . .                  9 Q. But essentially, other than the character                  10 limits, could a -- could a user essentially put                  11 anything in the text description?                  12 A. You're saying any text in the text                  13 description?                  14 Q. Correct.                  15 A. Sure.                  16 Q. So, for example, if it were for a product,                  17 you could put price?                  18 A. Yep.                  19 Q. If -- you could put the name of the                  20 product?                  21 A. Yeah.                  22 Q. You could put where you could purchase the                  23 product?                  24 A. Yep.                  25 Q. You -- could you put a URL where you could</p>	<p style="text-align: right;">Page 56</p> <p>1 would do this?                  2 A. Or an annotator, yeah.                  3 Q. Okay. And how would they do that?                  4 A. They could do it manually or they could                  5 use tools to help identify objects.                  6 Q. And manually how would that work?                  7 A. You look at the image and specify what                  8 objects are in the image.                  9 Q. And how would they specify it?                  10 A. Typing in a text phrase.                  11 Q. Okay. So if it was an image of a dog,                  12 they could type in "dog," for example?                  13 A. Yeah, exactly.                  14 Q. What if there were multiple objects in the                  15 image, was there a way for the user to outline or                  16 demarcate those objects?                  17 A. Yes.                  18 Q. How would they do that?                  19 A. They could just put "German Shepherd" and                  20 "Retriever" to determine the type of dogs. So they                  21 could do it using annotations of text --                  22 Q. Was there a way --                  23 A. -- or they could use extracting tools                  24 where you could outline the object more accurately.                  25 Q. So you could outline the edges of the</p>
		<p style="text-align: right;">Page 55</p> <p>1 link to go find the product?                  2 A. 1993, URLs were just starting to come on                  3 board, if I recall right. URLs weren't particularly                  4 popular yet.                  5 Q. Not in 1993, but the QBIC project lasted                  6 throughout the '90s; correct?                  7 A. Yeah.                  8 Q. So say a user closer to 2000, they could                  9 insert a URL in that description?                  10 A. Yeah. Yeah.                  11 Q. So in addition to uploading the images,                  12 associated thumbnail, text descriptions, did object                  13 identification also occur at this database                  14 population step?                  15 A. It could.                  16 Q. And what is object identification?                  17 A. It's to be taking a region of an image and                  18 putting a label on it.                  19 Q. Say the last part?                  20 A. Putting a label on it.                  21 Q. Taking a region of an image and putting a                  22 label on it?                  23 A. Yeah.                  24 Q. Okay. And how would you -- and back up.                  25 The user who was populating the database</p>	<p style="text-align: right;">Page 57</p> <p>1 shape of the object?                  2 A. Right.                  3 Q. And you could do that with a manual -- the                  4 user could do that with a manual tool?                  5 A. Yeah.                  6 Q. Were there automatic tools that did --                  7 that did things like look for objects? So, for                  8 example, were there automatic tools that QBIC used,                  9 like edge detection or segmentation, that extracted                  10 object --                  11 A. You could --                  12 Q. -- shapes?                  13 A. You could use edge detection.                  14 Q. Okay. Did QBIC use edge detection?                  15 A. Yes, in certain aspects.                  16 Q. In what aspects?                  17 A. So on the annotation tool, if you compute                  18 gradients, you can make a better prediction of                  19 helping the person annotate.                  20 So it's very tedious to go through and                  21 annotate everything. Whereas if you have a tool,                  22 it'll tell you where it thinks the boundaries are.                  23 And you could speed up annotation quite a bit doing                  24 that.                  25 Q. So this tool that you're referring to, a</p>

*Id.* at 68–72



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		<p>22 Q. Okay. And in what form would those 23 results be displayed to me? For images would they 24 be displayed as a thumbnail? 25 A. It could be.</p> <hr/> <p style="text-align: right;">Page 69</p> <p>1 Q. And what about r-frames, how would those 2 be displayed to you? 3 A. It could be as a thumbnail or as a short 4 video clip or as a single representative frame. 5 Q. Okay. So they could be -- so for a video, 6 there's a video that matched the image query of an 7 r-frame, the results I could get back could include 8 three things. It could be a still image, it could 9 be a thumbnail, or it could be an r-frame 10 representation? 11 A. R-frame, I think, is representative frame. 12 So it was a key frame in that video sequence, 13 summary frame. 14 Q. Once I ran a query on an r-frame; right? 15 Well, let's stop there. 16 If I run a query on still images, 17 typically the results I would get back are 18 thumbnails that are most similar to the 19 characteristics which I queried from the query 20 image; right? 21 A. You could get thumbnails back. You could 22 also get the full-sized image back. 23 Q. Okay. 24 A. Thumbnail is a tool for helping you return 25 lots of results and quickly scan it.</p>	
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		<p style="text-align: right;">Page 70</p> <p>1 Q. So I would receive the thumbnail. Would I          2 have to click on the thumbnail in order to bring up          3 the full-sized image?          4 A. You could.          5 Q. Otherwise I could automatically receive          6 the full-sized image as part of the result?          7 A. You could.          8 Q. Okay. So walk through that process if I'm          9 using an r-frame of a video. If I do a -- if I run          10 a query on an r-frame of a video as a -- an image          11 query, how could I get the results back?          12 MR. HANSEN: Objection; vague and ambiguous.          13 BY MR. EDWARDS:          14 Q. In what form would I get the results back?          15 MR. HANSEN: Same objection.          16 THE WITNESS: You could get back the still          17 r-frame, representative frame, you could get back          18 the thumbnail, or you could get back the entire          19 video clip that that r-frame represents, a few          20 frames.          21 BY MR. EDWARDS:          22 Q. If I received a thumbnail or the r-frame,          23 would there be some sort of link I could click on to          24 get the underlying full video?          25 MR. HANSEN: Objection; vague and ambiguous,</p>	<p style="text-align: right;">Page 72</p> <p>1 it says, "Secondly, during query, they are the basic          2 units initially returned in a video query."          3 Meaning the r-frames?          4 A. Correct.          5 Q. "For example, in a query for shots that          6 are dominantly red, a set of r-frames will be          7 displayed. To see the actual video shot, the user          8 clicks on the displayed r-frame icon."          9 A. Yep.          10 Q. And that was one of the ways you were          11 describing that the results of a r-frame query would          12 be returned to the user?          13 A. Right.          14 Q. Do you know if that was the preferred way          15 that was used in demos in commercial applications?          16 MR. HANSEN: Objection; vague and ambiguous,          17 lacks foundation.          18 MR. STRAUSSMAN: You can answer.          19 THE WITNESS: I don't know.          20 BY MR. EDWARDS:          21 Q. But, Mr. Flickner, this -- generally this          22 article represents the status of the QBIC technology          23 as of the date of this publication, which is          24 September 1995; is that right?          25 A. Actually a little before September 1995</p>
		<p style="text-align: right;">Page 71</p> <p>1 calls for speculation.          2 THE WITNESS: As I recall -- I'm not sure          3 definitely, but, yes, this is -- you could do that.          4 BY MR. EDWARDS:          5 Q. So let's go to page IBM 898.          6 So if you'll take -- just read that          7 paragraph that starts with the header          8 "Representative Frame Generation."          9 MR. STRAUSSMAN: And if you need to read          10 anything else to put it in context, feel free to do          11 so.          12 THE WITNESS: Okay.          13 (Witness reviews document.)          14 THE WITNESS: So what was your question, again?          15 BY MR. EDWARDS:          16 Q. If you go to the sentence that says,          17 "First" -- it's the second sentence in that          18 paragraph. It says, "First, during database          19 population, r-frames are treated as still images."          20 See that?          21 A. Yeah.          22 Q. And that's what you told me earlier;          23 correct?          24 A. Yeah.          25 Q. And then if you go to the next sentence,</p>	<p style="text-align: right;">Page 73</p> <p>1 because --          2 Q. Okay.          3 A. -- there's an editorial process.          4 Q. Say that last part?          5 A. There's an editorial process. You submit          6 it, they edit and make changes and eventually it          7 appears.          8 Q. Right. So what you're saying is there's          9 some lag between the time that you wrote the article          10 and the time it was published?          11 A. Yeah.          12 Q. So this article -- but this article          13 represents the state of the QBIC technology at least          14 as of September 1995?          15 A. Yeah. Yes.          16 Q. And then let's go to IBM 900.          17 And take your time to orient yourself on          18 that page, but what I really want to ask you about          19 is the last paragraph on the left-hand column going          20 up to the top of the right-hand column.          21 A. Yep.          22 Q. So it says this paper describes [as read],          23 "a prototype system that uses image and video          24 content as the basis for retrievals."          25 Is that right?</p>

*Id.* at 118–119

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		<p>18 Q. So do you know what happens if you clicked 19 I? 20 A. Yeah, you -- pops the window up and you 21 see the full image. 22 Q. Okay. 23 (Reporter seeks clarification.) 24 A. It pops the window up. 25 Q. And how do you know that?</p> <hr/> <p style="text-align: right;">Page 119</p> <p>1 A. That's how we want to implement such 2 a . . . 3 MR. STRAUSSMAN: You got to speak up. 4 BY MR. EDWARDS: 5 Q. That's how you implemented what? 6 A. You implement what the instructions say. 7 Q. Okay. Is that a similar implementation 8 for the other demos that you worked on? 9 A. Most likely, yes. 10 Q. Okay. So you click on I and then I would 11 take you to a link that showed the full image?</p> <p><i>Id.</i> at 129 – 131</p>	
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		<p>9 Q. Okay? And if you want to compare, or you 10 can take my word for it, the image in the top left 11 corner, the querying image, is the same one that was 12 on Exhibit 7.</p> <p>13 A. Yes.</p> <p>14 Q. Okay. And here the user's clicking the I 15 icon, which stands for "Get Info."</p> <p>16 Do you see that?</p> <p>17 A. Um-hum.</p> <p>18 Q. On the first page?</p> <p>19 A. Yeah.</p> <p>20 Q. And the second page is doing what?</p> <p>21 A. Is presenting the image at full 22 resolution.</p> <p>23 Q. Okay. And was there a similar 24 functionality on the demo app on the -- on the 25 website in the '90s?</p>
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		<p style="text-align: right;">Page 130</p> <p>1 A. Yes. 2 Q. Okay. And so when a user clicks the I, 3 you can see the I is highlighted in red? 4 A. Yeah. 5 Q. Was there a -- was there a similar 6 functionality on the one on the website, where you 7 clicked something and it lit up to tell the user 8 that they were actually clicking the button? 9 A. Yeah. 10 Q. Okay. And then you go to the second page, 11 and that is the full image of the thumbnail; is that 12 correct? 13 A. It's not of the thumbnail, it's the 14 full-size image. 15 Q. Well, yeah, it's the -- it's the 16 full-sized image representation of the thumbnail on 17 the first page; right? 18 A. I would phrase it as the thumbnail is a 19 representation of the full-sized image. 20 Q. Understood. The first page is a 21 thumbnail. You click on "Info" and then it returns 22 to you the full-sized image? 23 A. Yeah. 24 Q. And that's reflected on the second page? 25 A. Yeah.</p>	
		<p style="text-align: right;">Page 131</p> <p>1 Q. Image france50.jpg, what is that? 2 A. That would be the file name of the image. 3 Q. Okay. And so if you go back to the first 4 page, when the pointer is pointed to I and it clicks 5 on that, that is actually directing -- is going to 6 direct the user to a separate link, correct, where 7 the full-sized image is? 8 A. Yes. 9 Q. And the address of that link's on the 10 second page at the top that says "Location"; 11 correct? 12 A. Yeah, the URL. 13 Q. Right. And so that would be similar to 14 how the demo is on the website, it would go to a 15 specific URL that's linked to where that image is 16 stored? 17 A. Yes. 18 Q. Right? And that's how it would work on 19 any implementation, any commercial implementation; 20 correct? 21 A. Yeah. 22 MR. HANSEN: Objection; lacks foundation. 23 MR. EDWARDS: So we've been going for about an 24 hour. How do you -- how are you feeling? 25 THE WITNESS: I'm all right.</p>	

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		<p><i>Id.</i> at 159–160</p> <p>20 Q. And in the last sentence it refers to 21 something called iterated query refinement. 22 A. Yes. 23 Q. And what does that refer to? 24 A. It's a way you can refine the query. 25 Q. So if I submit an image query for color</p> <hr/> <p>1 histogram, as an example, and I get a return, the 2 best matches based on order of similarity? 3 A. Um-hum. 4 Q. Does iterated query refinement mean that I 5 can further refine that query to search for things 6 like shape, like a -- you know, some shape in the -- 7 in the query image, like a logo or an icon, and that 8 will further refine the results to give me things 9 that have that similar shape inside the results of 10 the color histogram? 11 A. Yes. 12 Q. And then I can -- I can keep doing that, I 13 can further even refine that result by using a 14 keyword, for example? 15 A. Yes. Or you could do it all at once.</p> <p><i>Id.</i> at 160–161</p>
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		<p>16 Q. Okay. So the results of the query -- so 17 we talked about before that the results of the 18 queries display thumbnails of the database images 19 based on similarity of which they match; correct? 20 A. Correct. 21 Q. And then those thumbnails can provide 22 links to the original image or, if it was an 23 r-frame, it could be -- you could provide a link to 24 the video; correct? 25 A. Correct.</p> <hr/> <p>1 Q. And does the thumbnail also provide links 2 to information about the image that was associated 3 with the image in the database? 4 A. Yes. 5 Q. And, again, that can be that -- whatever 6 information that the user inputted or was associated 7 with the image from the source? 8 A. Yes. 9 Q. Could the results also display a matching 10 score so the user could see how well the particular 11 result matched to the -- to the query image? 12 A. It could.</p> <p><i>Id.</i> at 197–198</p> <p>17 Q. First sentence says, "Many paper-intensive 18 enterprises, such as insurance companies and 19 financial institutions, administer large volumes of 20 business-related content. The need for an 21 enterprise solution for managing and accessing 22 business information spans many industries." 23 Did I read that correctly? 24 A. Yes. 25 Q. Okay. For -- is it -- is it your</p>
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		<p>1 experience and understanding that QBIC is something 2 that would be beneficial for businesses that have 3 large volumes of business-related content? 4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC 8 functionality was good for insurance companies and 9 financial institutions. 10 Do you recall that? 11 A. Yes. 12 Q. Do you agree with that? 13 A. Yes. 14 Q. Okay. QBIC would be good for any company 15 that has large amounts of business-related 16 information, including multimedia content; correct? 17 A. Correct.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, a person of ordinary skill in the art would have been motivated to improve, modify, or combine QBIC with prior art reference teachings to arrive at this limitation at least because QBIC was designed for applications that included large amounts of business-related information, including multi-media content, including for financial</p>
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		institutions. <i>See, e.g.</i> , IBM 000789; Flickner Depo Rough Tr. at 191:16-192:8, 293:14-294:8.
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**4. Claim 34**

Claim	'897 Claim Recitation	Exemplary Citations in Reference
34	The method of claim 25 wherein the step of enabling performance of the transaction includes initiating an authorization.	<p>QBIC discloses the method of claim 25 wherein the step of enabling performance of the transaction includes initiating an authorization.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):                      “DB2 (DB2) Universal Database (UDB) is a powerful, object-relational database manager. It stores and protects traditional numeric and character data, as well as large, complex objects (LOBs). DB2 extenders help you exploit DB2 ’s object-relational features. The extenders define distinct data types and special functions for image, audio, video, and text objects. ... Because of that, the extenders give your applications a single point of access to any or all of these types of data, along with traditional numeric and character data.” <i>Id.</i> at p. 3.</p> <p>“A trigger defines a set of actions that are activated by a change to a table. Triggers can be used to perform actions such as validating input data, automatically generating a value for a newly inserted row, reading from other tables for cross-referencing purposes, or writing to other tables for auditing purposes. Triggers are often used for integrity checking or to enforce business rules.” <i>Id.</i> at 16–17.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p>

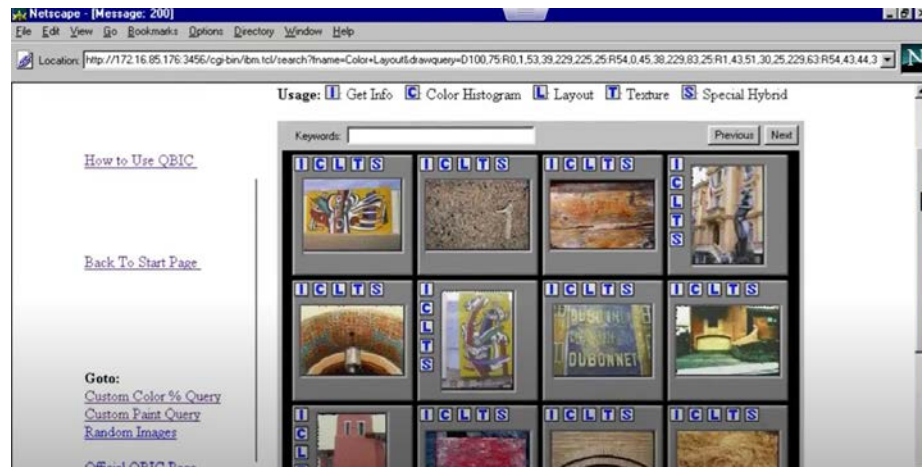
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“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” *Id.* at p. 3.

“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” *Id.* at p. 63.

#### QBIC Demo (IBM000747)



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		<p>Flickner Depo at 131-133</p> <p>Flickner 8/31/23 Depo at 197–198</p> <p>17 Q. First sentence says, "Many paper-intensive 18 enterprises, such as insurance companies and 19 financial institutions, administer large volumes of 20 business-related content. The need for an 21 enterprise solution for managing and accessing 22 business information spans many industries." 23 Did I read that correctly? 24 A. Yes. 25 Q. Okay. For -- is it -- is it your 1 experience and understanding that QBIC is something 2 that would be beneficial for businesses that have 3 large volumes of business-related content? 4 A. Yes.</p> <p><i>Id.</i> at 307</p> <p>7 Q. We saw a document that indicated QBIC 8 functionality was good for insurance companies and 9 financial institutions. 10 Do you recall that? 11 A. Yes. 12 Q. Do you agree with that? 13 A. Yes. 14 Q. Okay. QBIC would be good for any company 15 that has large amounts of business-related 16 information, including multimedia content; correct? 17 A. Correct.</p> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Invalidity Contentions. A person of ordinary skill in the art would have been</p>
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		<p>motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, a person of ordinary skill in the art would have been motivated to improve, modify, or combine QBIC with prior art reference teachings to arrive at this limitation at least because QBIC was designed for applications that included large amounts of business-related information, including multi-media content, including for financial institutions. <i>See, e.g.</i>, IBM 000789; Flickner Depo Rough Tr. at 191:16-192:8, 293:14-294:8.</p>
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**5. Claim 38**

<b>Claim</b>	<b>'897 Claim Recitation</b>	<b>Exemplary Citations in Reference</b>
38	The method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.	To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s Preliminary Invalidation Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results.

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**6. Claim 39**

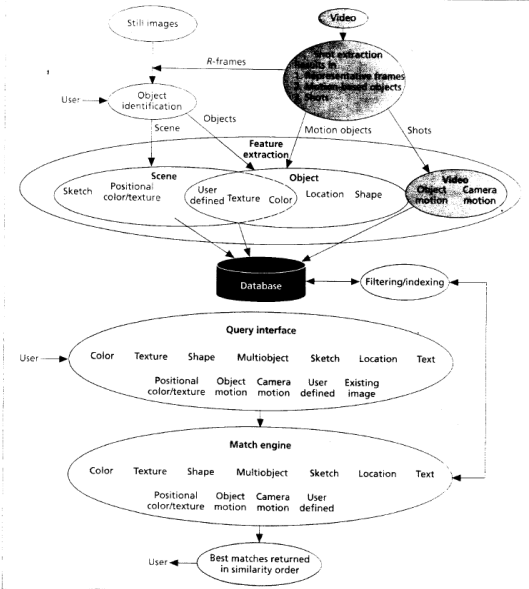
Claim	'897 Claim Recitation	Exemplary Citations in Reference
39	<p>The method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.</p>	<p>QBIC discloses the method of claim 25, wherein the step of enabling performance of the interaction includes initiating a transaction with an account.</p> <p>Query by Image and Video Content: The QBIC System (IBM 0000893–902):                      “QBIC has two main components: database population (the process of creating an image database) and database query. During the population, images and videos are processed to extract features describing their content—colors, textures, shapes, and camera and object motion—and the features are stored in a database. During the query, the user composes a query graphically. Features are generated from the graphical query and then input to a matching engine that finds images or videos from the database with similar features. Figure 2 shows the system architecture.” <i>Id.</i> at p. 3.</p>  <p>The diagram illustrates the QBIC system architecture, divided into two main parts: database population (top) and query (bottom).  <b>Database Population (Top):</b> A user provides 'Still images' and 'Video'. 'Still images' are processed into 'R-frames', which are then used for 'Object identification'. 'Video' is processed into 'R-frames in representation frames' and 'Motion objects'. Both 'Object identification' and 'Motion objects' feed into 'Feature extraction', which identifies 'Scene', 'Object', and 'Shots'. 'Feature extraction' also identifies 'Positional color/texture', 'User defined Texture Color', 'Location Shape', and 'Object Camera motion'. These features are stored in the 'Database'.  <b>Query (Bottom):</b> A user interacts with a 'Query interface' to define a query using 'Color', 'Texture', 'Shape', 'Multiobject', 'Sketch', 'Location', and 'Text'. The 'Query interface' also includes 'Positional color/texture', 'Object motion', 'Camera motion', 'User defined', and 'Existing image'. The query is processed by a 'Match engine' which uses the same feature categories as the population stage. The 'Match engine' outputs 'Best matches returned in similarity order' to the user. A 'Filtering/indexing' step is also shown between the database and the match engine.</p>

Figure 2. QBIC database population (top) and query (bottom) architecture.

*Id.* at Fig. 2.

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		<p>“INTEGRATION WITH TEXT AND PARAMETRIC ANNOTATION. Query by visual content complements and extends existing query methods. Systems must be able to integrate queries combining date, subject matter, price, and availability with content properties such as color, texture, and shape.” <i>Id.</i> at p. 8.</p> <p>Image, Audio, and Video Extenders Administration and Programming (IBM 000001–617):</p> <p>“To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source. You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.” <i>Id.</i> at pp. 20–21.</p> <p>Managing Enterprise Information Portal (IBM 000777–880):</p> <p>“Many paper-intensive enterprises, such as insurance companies and financial institutions, administer large volumes of business-related content. The need for an enterprise solution for managing and accessing business information spans many industries. A content server is a software system that stores multimedia, business forms, documents, and related data, along with metadata that allows employees to process and work with the content.” <i>Id.</i> at p. 3.</p>
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“The image search server uses IBM’s QBIC (query by image content) technology to help you search for objects by certain visual properties, such as color and texture. The image search server analyzes images and stores the image information in a database. Then users can run image queries, which use the visual properties of images, to match colors, textures, and their positions without describing them in words. You can combine content-based queries with text and keyword searches for more powerful retrieval of image and multimedia data.” *Id.* at p. 63.

Flickner 8/31/23 Depo at 197–198

17 Q. First sentence says, "Many paper-intensive  
18 enterprises, such as insurance companies and  
19 financial institutions, administer large volumes of  
20 business-related content. The need for an  
21 enterprise solution for managing and accessing  
22 business information spans many industries."

23 Did I read that correctly?

24 A. Yes.

25 Q. Okay. For -- is it -- is it your

1 experience and understanding that QBIC is something  
2 that would be beneficial for businesses that have  
3 large volumes of business-related content?

4 A. Yes.

*Id.* at 307

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		<p>7 Q. We saw a document that indicated QBIC 8 functionality was good for insurance companies and 9 financial institutions. 10 Do you recall that? 11 A. Yes. 12 Q. Do you agree with that? 13 A. Yes. 14 Q. Okay. QBIC would be good for any company 15 that has large amounts of business-related 16 information, including multimedia content; correct? 17 A. Correct.</p> <p>IBM000001 at 39 – 41</p>
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**Data structures**

**Handles**

When you store an image, audio, or video object in a user table, the object is not actually stored in the table. Instead, an extender creates a character string called a **handle** to represent the object, and stores the handle in the table. The extender stores the object in an administrative support table, or stores a file identifier in an administrative support table if you keep the content of the object in a file. It also stores the object’s attributes and handle in administrative support tables. In this way, the extender can link the handle stored in a user table with the object information stored in the administrative support tables. Figure 8 illustrates the information stored for two images in a user table.

User Table

ID	Name	Picture
		Handle 1
		Handle 2

Administrative Support Tables

Common Attributes				
Handle	Importer	Updater		
Handle 1				
Handle 2				

Unique Attributes				
Handle	Width	Height	Numcolors	
Handle 1				
Handle 2				

Figure 8. Handles

**QBIC catalogs**

A QBIC catalog is a set of files that hold data about the visual features of images. The Image Extender uses this data to search for images by content.

You create a QBIC catalog for each column of images in a user table that you want to make available for searching by content. When you create a QBIC catalog you identify the features for which you want the Image Extender to analyze, store, and later query data. You can also add or drop features from a QBIC catalog after the catalog is created.

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		<p><b>Data structures</b></p> <p>A QBIC catalog can hold data for the following image features:</p> <p><b>Average color</b> The sum of the color values for all pixels in an image divided by the number of pixels in the image. (A pixel is the smallest element of an image that can be assigned color and intensity.) For example, if 50% of an image consists of blue pixels and the other 50% red pixels, the image has an average color value of purple. Average color is used to search for images that have a predominant color. If an image has a predominant color, the average color will be similar to the predominant color.</p> <p><b>Histogram color</b> Measures the distribution of colors in an image against a spectrum of 64 colors. For each of the 64 colors, histogram color identifies the percentage of pixels in an image that have that color. For example, the histogram color of an image might be 40% white pixels, 50% blue, and 10% red; none of the pixels in the image have any of the remaining colors in the histogram spectrum. Histogram color is used to search for images that have a variety of colors.</p> <p><b>Positional color</b> The average color value for the pixels in a specified area in an image. For example, the upper right-hand corner of an image might show a bright yellow sun; the positional color of this area of the image is bright yellow. Positional color is used to search for images that have a predominant color in a particular area.</p> <p><b>Texture</b> Measures the coarseness, contrast, and directionality of an image. Coarseness indicates the size of repeating items in an image (for example, pebbles versus boulders). Contrast identifies the brightness variations in an image (light versus dark). Directionality indicates whether a direction predominates in an image (as in the vertical direction of a picket fence) or does not predominate (as in an image of sand). Texture is used to search for images that have a particular pattern.</p> <p>To make an image available for searching by content, you catalog the image. When you catalog an image, the Image Extender analyzes the image, by computing the feature values for the image, and stores the values in a QBIC catalog.</p> <p>When you search for an image by content, your query identifies one or more features for the search (such as average color), a source for each feature (such as an example image), and a target set of cataloged images. The Image Extender computes the feature value of the source and compares it to the</p> <p>20 IBM® DB2® Universal Database: Image, Audio, and Video Extenders</p> <p>IBM 000040</p>
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		<p style="text-align: right;"><b>Data structures</b></p> <p>cataloged feature values for the target images. It then computes a score that indicates how similar the feature values of the target images are to the source.</p> <p>You can have the Image Extender return the images whose features are most similar to the source. The Image Extender will return the handle of each image and the image score. You can also have the Image Extender return only the score of a single image.</p> <p><b>Video indexes</b></p> <p>A <b>video index</b> is a file that the Video Extender uses to find a specific shot or frame in a video clip.</p> <p>The Video Extender can detect scene changes in a video. A <b>scene change</b> is a point in a video clip where there is a significant difference between two successive frames. This happens, for example, when a camera changes its point of view while recording a video. The frames between two scene changes constitute a <b>shot</b>.</p> <p>You can use the Video Extender’s scene detection capabilities to find a shot, or even an individual frame, in a video clip. To do this, the extender needs indexing information for the shot or frame. This indexing information is stored in an <b>index file</b>.</p> <p><b>Shot catalogs</b></p> <p>A <b>shot catalog</b> is used to store data about shots in a video clip. The shot catalog can be stored in a database or in a file.</p> <p>A shot catalog stored in a file contains the following shot-related data:</p> <ul style="list-style-type: none"><li>• Shot catalog file name</li><li>• Values that control how the Video Extender detects a shot, for example, the minimum number of frames in a shot</li><li>• Values that control how many frames and which frames will be stored as representative frames for a shot</li><li>• Shot number</li><li>• Starting frame number</li><li>• Ending frame number</li><li>• Representative frame number</li><li>• Name of a file that contains the contents of the representative frame</li></ul> <p>You can access the data in the shot catalog file or access a view of the shot catalog stored in a database. The view contains columns for the following shot-related data:</p> <ul style="list-style-type: none"><li>• Shot handle</li><li>• Video table name</li></ul> <p style="text-align: right;">Chapter 2. DB2 extender concepts 21 IBM 000041</p> <p>IBM0002263 at 226</p>
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		<div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"><b>Description</b></div> <p>Ultimedia Manager 1.1 opens new dimensions in visual queries, helping you manage your image database more efficiently. With its easy-to-use interface, even entry-level users can perform sophisticated searches. You can search by image content, data description, or a combination of both. Once the images are found, you can view the images in full resolution, use the images in another application, or read the associated textual comments.</p> <p>You can use Ultimedia Manager 1.1 either as a stand-alone product or in a LAN environment. As a stand-alone product, Ultimedia Manager 1.1 employs full image classification and image query capabilities. Within the LAN environment, the Ultimedia Manager image catalogs can be sorted on a DB2 for OS/2 or DB2 for AIX database server. The image catalogs can be accessed by Windows or OS/2 clients using the Client Search Feature or the Visualizer Ultimedia Query.</p> <p>Ultimedia Manager runs as an OS/2 application to a DB2 for OS/2 or DB2 for AIX database server in a LAN, or as a stand-alone application with a local DB2 for OS/2 database. The Client Search Feature runs on DOS or Windows, and accesses files in dBASE flat file format. A database manager is not required to access catalogs in dBASE file format.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"><b>Image Classification</b></div> <p>With the Image Classifier, you can create visual indexes based on color, shape, category, and layout elements, which are areas of the image containing the patterns you want to use for searches. You can store these elements in catalogs in DB2 for OS/2 databases. The catalogs can be used locally or, through the use of utility programs, be transferred to DB2 for OS/2 or AIX servers. In addition, you can convert the catalog data into dBASE flat file format for access by Windows client applications.</p> <p>The Image Classifier and Analyzer allows automatic or interactive classification of images for later image queries, flexibility in storage of catalog information, and access to multiple users. You can organize large image catalogs so that later searches for images can be performed easily. You can classify automatically using a batch program, or interactively by specifying areas of interest in an image and indicating the visual cue (color, shape, or texture) to be saved for later queries.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"><b>Image Query</b></div> <p>Once the image catalogs are created, you can use the Image Query component to find image and business information. Business information, such as character and numeric data, are stored in the database tables using normal table population methods. Image Query is provided in Ultimedia Manager and Client Search Feature.</p> <p>Image Query allows searches by three methods:</p> <ul style="list-style-type: none"> <li>• Image content, such as color, shape, texture, or layout</li> <li>• Data description, such as business data stored in the database (character or numeric) or descriptive text (category)</li> <li>• Combinations of image content and data description.</li> </ul> <p><b>Image Content:</b> To search by image content, specify the attributes (color, shape, texture, or layout). You can drag</p> <p>and drop visual samples into an image query, select a color from the color wheel, or sketch a shape.</p> <p><b>Data Description:</b> To search by data description, enter character and numeric data values in the database tables using the simple fill-in-the-blanks query panel. You can enter data such as name, number, date, or a range of dates. You can integrate character or numeric data as part of the image query, enabling a more effective search for better results. The simple fill-in-the-blanks method for specifying desired conditions is so easy even non-programmers can use database table information as part of their searches.</p> <p><b>Combinations:</b> Image queries using either image content or data description, or combinations of both, allow you to search through thousands of images more quickly and effectively than the traditional text and keyword search methods.</p> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"><b>Image Formats</b></div> <p>Ultimedia Manager 1.1 understands these image formats:</p> <ul style="list-style-type: none"> <li>• Audio Visual Connection (AVC) images</li> <li>• OS/2 bitmap</li> <li>• Windows 3.x bitmap</li> <li>• PCK</li> <li>• Intel and Motorola TIFF</li> <li>• TARGA TGA</li> <li>• TIFF (FAX)</li> <li>• GIF</li> <li>• Kodak Photo-CD</li> </ul> <div style="text-align: center; border-bottom: 1px solid black; margin-bottom: 10px;"><b>Product Positioning</b></div> <p>The advanced image search technology in Ultimedia Manager, query by image content, was developed in conjunction with the IBM Almeden Research Center. It provides function not available with conventional, text-only image management systems.</p> <p>Ultimedia Manager fulfills image search and retrieval needs of business users and creative professionals through use of online image libraries or collections. It is intended for users who have large image libraries and need fast, flexible access to their image data, users who may also want to add character or numeric data to their image queries, and users who feel limited by text-based systems.</p> <p>Ultimedia Manager 1.1 works with the DB2 Family of products and the Visualizer Ultimedia Query product. Catalogs created by Ultimedia Manager can be stored in DB2 for OS/2 database tables. Image catalogs also can be stored in DB2 for OS/2 or DB2 for AIX database servers in client/server environments.</p> <p>OS/2 and Windows clients in a LAN environment using the Client Search Feature and the Visualizer Ultimedia Query can access catalogs created with Ultimedia Manager 1.1. Visualizer Ultimedia Query provides users with the capability to:</p> <ul style="list-style-type: none"> <li>• Add multimedia columns (such as image, video, audio, and formatted text) to DB2 for OS/2 database tables</li> <li>• Query and display images</li> <li>• View or listen to video and audio information</li> <li>• Display formatted text</li> </ul> <p>Users of Ultimedia Manager 1.1 and Client Search Feature are focused on image management and query applications. Visualizer Ultimedia Query users are</p> <p style="font-size: small; margin-top: 20px;">205-042 -2-</p> <p style="text-align: right; margin-top: 20px;">IBM 0002264</p>
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*Nantworks, LLC v. Bank of America Corporation*  
 Central District of California, No. 2:20-cv-7872

Invalidity Chart for U.S. Patent 8,520,897 based on the Query by Image and Video Content (“QBIC”) System

		<p>workflow builder. Your users can then use the defined workflow process to perform their tasks, using a client that you develop or the Enterprise Information Portal thin client samples.</p> <p><b>Content Manager text search server and client</b>          You can use this feature to automatically index, search, and retrieve documents stored in Content Manager. Users can locate documents by searching for words or phrases</p> <p><b>Restriction:</b> The Content Manager text search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <p><b>Content Manager image search server and client</b>          This feature uses IBM QBIC<sup>®</sup> (query by image content) technology with which you can search for objects by certain visual properties, such as color and texture.</p> <p><b>Restriction:</b> The Content Manager image search server and client is an optional Content Manager feature that you can configure and run with Content Manager servers only. If you do not use Content Manager servers, do not install this feature.</p> <hr/> <p><b>What's new in Version 7.1</b></p> <p>Enterprise Information Portal Version 7.1 provides unprecedented access to disparate content servers. The new features and components include:</p> <ul style="list-style-type: none"> <li>• Improved installation procedures</li> <li>• Additional connectors for relational databases              Enterprise Information Portal provides relational database connectors for DB2 UDB, DB2 DataJoiner, DB2 Data Warehouse Manager Information Catalog Manager, and other databases through JDBC or ODBC drivers.</li> <li>• Advanced information mining and search capabilities              Information Mining offers advanced text searching using a flexible query that you can restrict to documents of certain categories.</li> <li>• Workflow capabilities              By using Enterprise Information Portal workflow feature, you can define and run the workflow process of a work group, department, or enterprise.</li> <li>• Federated level access control              You can control access to Enterprise Information Portal information mining and workflow processes through the use of privilege sets and access control lists. Additional access control to data can be managed by the access control features of each content server.</li> <li>• Additional support for Content Manager:             <ul style="list-style-type: none"> <li>- List, add, retrieve, update, and delete of content class</li> <li>- Asynchronous retrieval of object content</li> </ul> </li> </ul> <p>To the extent it is found that QBIC does not expressly disclose this limitation, the limitation is inherent. And to the extent it is found that QBIC does not anticipate this claim, QBIC renders it obvious, either alone, in combination with the knowledge of a person of ordinary skill in the art, and/or in combination with other prior art references identified herein or in the cover pleading of BofA’s</p>	
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		<p>Invalidity Contentions. A person of ordinary skill in the art would have been motivated to combine QBIC with any of the other prior art references identified in the cover pleading or herein with a reasonable expectation of success for the reasons identified in the cover pleading, including because each of these references contains familiar elements within the similar fields of endeavor to address similar known problems, according to known methods which would yield predictable results. For example, a person of ordinary skill in the art would have been motivated to improve, modify, or combine QBIC with prior art reference teachings to arrive at this limitation at least because QBIC was designed for applications that included large amounts of business-related information, including multi-media content, including for financial institutions. <i>See, e.g.</i>, IBM 000789; Flickner Depo Tr. at 191:16-192:8, 293:14-294:8.</p>
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