(19) Japanese Patent Office (JP)

(12) **Kokai Unexamined Patent Application Bulletin (A)**

(11)	**Laid Open Patent Application No.**	6-124340
(43)	**Publication Date**	May 6, 1994
	Number of Claims	5
	Number of Pages	16
	Examination Request	not yet made

(51)	Int. Cl.5	Identification Code		Internal File No.	FI	Tech. Indic.
	G06F 15/62	380		9287-5L		
		415		9287-5L		
	G01C 21/00		N			
	G01S 13/86			7015-5J		Continued on the last page
	13/93		N	7015-5J		

(21)	**Application No.:**	5-138145	(71)	**Applicant:**	000003997 NISSAN MOTOR CO.,LTD. 2 Takaracho, Kanagawa-ku, Yokohama-shi, Kanagawa-ken
(22)	**Application Date:**	June 10, 1993	(72)	**Inventor:**	YAMAMURA, Tomohiro NISSAN MOTOR CO.,LTD. 2 Takaracho, Kanagawa-ku, Yokohama-shi, Kanagawa-ken
(31)	**Number assigned to priority application:**	4-193993	(72)	**Inventor:**	SATOU, Hiroshi NISSAN MOTOR CO.,LTD. 2 Takaracho, Kanagawa-ku, Yokohama-shi, Kanagawa-ken
(32)	**Date of filing of priority application:**	July 21, 1992	(74)	**Agent:**	Patent Attorney, NAKAMURA, Junnosuke (and one more person)
(33)	**Country in which priority application was filed:**	Japan			

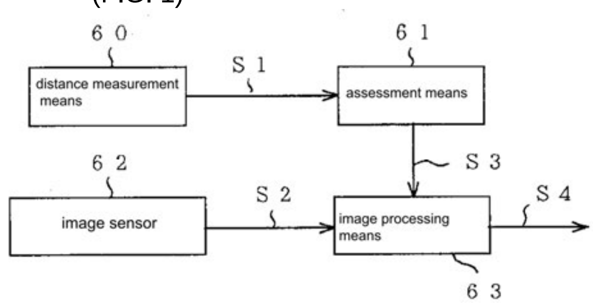
(54) **[Title of the Invention] Vehicle Image Processing Device**

(57) **[Abstract]**

[Problem] To provide a vehicle image processing device that performs suitable image processing and can be practically realized for a vehicle.

[Configuration] A vehicle image processing device that comprises a distance measurement means 66 that detects information about the distance and direction to an object outside the vehicle, an assessment means 67 that decides upon an image processing method based on the measurement results, and an image processing means 69 that, based on the above set image processing method, performs image processing on the image detected by an image sensor 68. The image processing method is, for example, processing that decides upon a region on which to perform image processing, processing that decides upon an object on which to perform image processing, and processing that enlarges/reduces/direction-converts a specified object in an image. With the above configuration, extraction processing is done on image information focusing on an object of scrutiny as the target, so that the range in which data processing is performed is limited, the number of items of data to be handled is greatly reduced, the processing steps become fast, and extraction of the features of the object under scrutiny can be realized at high speed.

(FIG. 1)



[Claims]

[Claim 1] A vehicle image processing device characterized by comprising:

an image sensor that is carried on the vehicle and into which is input image information on the vehicle surroundings;

a distance measurement means that determines information on the distance and direction to a single object or a plurality of objects present outside the vehicle;

an assessment means that assesses and sets an image processing method based on the distance and direction information; and

an image processing means that, based on the image processing method set by the assessment means, performs image processing on the image information determined by the image sensor.

[Claim 2] The vehicle image processing device recited in claim 1, characterized in that the assessment means assesses and sets an image processing method including at least one type of processing among: processing to decide upon the region on which to perform image processing, processing to decide upon the object on which to perform image processing, and processing to enlarge/reduce/direction-convert a specified object in an image.

[Claim 3] The vehicle image processing device recited in claim 1, characterized in that the image sensor enlarges/reduces/direction-converts a specified object in an image according to the enlargement/reduction/direction-conversion processing that is set by the assessment means.

[Claim 4] The vehicle image processing device recited in claim 2 or claim 3, characterized by comprising a measurement means that detects the travel state of one's own vehicle,

wherein the assessment means decides upon the object on which to perform image processing, according to the detection results of the measurement means.

[Claim 5] A vehicle image processing device characterized by comprising:

a reflecting body detection means that detects the distance and direction from one's own vehicle to a reflecting body by emitting electromagnetic waves in the direction of travel of one's own vehicle while sweeping a prescribed angle range, receiving the reflected wave from the reflecting body, and calculating the distance to the reflecting body based on the propagation delay time from emission to reception of the electromagnetic wave at prescribed sweep angles;

an image pickup means that images the scenery to the front in the direction of travel of one's own vehicle;

an image recognition means that processes the image to the front of the vehicle imaged by the image pickup means and detects preceding vehicles that are present ahead;

an image processing region setting means that sets the image processing region in the image recognition means according to the distance and direction detected from the reflecting body detection means; and

a preceding vehicle position output means that outputs the distance or direction, or both, to the reflecting body that is recognized as a preceding vehicle by the image processing recognition means.

[Detailed Description of the Invention]

[0001]

[Field of Industrial Application] This invention relates to a vehicle image processing device that recognizes the environment around the vehicle. Such a vehicle image processing device is used, for example, in a preceding vehicle detection device to be applied in a vehicle automatic travel control device or a warning device for approaching another vehicle, or the like; that is to say, it is used in a device that detects the position of a preceding vehicle that is traveling ahead of one's own vehicle.

[0002]

[Prior Art] Devices for preceding vehicle image processing include, for example those shown in FIG. 14. In FIG. 14, (a) is a vehicle image processing device, which uses one image sensor to take in information in as wide a range as possible around the vehicle, and which recognizes the information. And (b) is a vehicle image processing device that uses two image sensors, which are set up at a prescribed angle and distance, and extracts features, and the distance and direction to an object, from the parallax between such information.

[0003]

[Problems to Be Solved by the Invention] In a conventional vehicle image processing device such as above, there have been problems such as the following. Namely, there have been problems in that:

(1) because the image of an object present in the distance will be small, it is difficult to extract its features;

(2) because the entire image that is taken in is processed, the volume of information is large; this makes the processing difficult and slows the processing down, and because the size of the processing device is large, it is difficult to use it as vehicle equipment;

(3) because the method of image processing cannot be freely changed, only specified information can be obtained;

(4) in addition, because it is impossible to accurately measure the distance to an object in a vehicle that is traveling, even if image information is obtained, it cannot be used effectively for warning the driver or for vehicle travel control.

[0004] An object of the present invention, which was devised in order to solve the problems of the prior art as described above, is to provide a vehicle image processing device that can perform appropriate image processing and can be practically realized for a vehicle.

[0005]

[Means for Solving the Problems] In order to achieve the object described above, the present invention is configured as recited in the claims. That is to say, the invention recited in claim 1 comprises an image sensor that is carried on the vehicle and into which is input image information on the vehicle surroundings; a distance measurement means that determines information on the distance and direction to a single object or a plurality of objects present outside the vehicle; an assessment means that assesses and sets an image processing method based on the distance and direction information; and an image processing means that performs image processing on the above image information determined by the image sensor, based on the image processing method set by the assessment means. The assessment means, for example as recited in claim 2, assesses and sets an image processing method including at least one type of processing among: processing to decide upon the region on which to perform image processing, processing to decide upon the object on which to perform image processing, and processing to enlarge/reduce/direction-convert a specified object in an image. Furthermore, the image sensor above, for example as recited in claim 3 enlarges/reduces/direction-converts a specified object in an image according to the enlargement/reduction/direction-conversion processing that is set by the assessment means. Furthermore, the invention recited in claim 4 is one that, in addition to the configuration described above, is configured to comprise a measurement means that detects the travel state of one's own vehicle and to decide upon the object on which the assessment means performs image processing according to the detection results of the measurement means. Furthermore, the invention recited in claim 5 is one that shows the specific configuration of a case in which the above vehicle image processing device is applied to a preceding vehicle detection device.

[0006]

[Operation] As described above, in the present invention, the assessment means decides upon the image processing method based on the measurement results of the distance measurement means. This image processing method refers to, for example as recited in claim 2, processing to decide upon the region on which to perform image processing, processing to decide upon the object on which to perform image processing, and processing to enlarge/reduce/direction-convert a specified object in an image. Furthermore, the image processing means performs image processing based on the above set image processing method. Accordingly, by processing with a focus on extracting image information targeting important objects requiring image processing, such as objects that block the travel of the vehicle, the range in which data processing is performed by the image processing means is limited, so the number of data items to handle is greatly reduced and the processing step is speeded up, making it possible to realize the extraction of the features of the object under scrutiny at high speed. Furthermore, as recited in claim 3, in an image sensor that enlarges/reduces/direction-converts a specified object in an image, an optimum image for image processing can be obtained, so that it is possible to obtain, from the image processing means, detailed information that cannot be obtained from data with fewer pixels, such as information by which one can recognize the license plate on a vehicle. Furthermore, in an invention, such as that recited in claim 4, which comprises a measurement means that detects the travel state of one's own vehicle, and wherein the assessment means decides upon the object on which to perform image processing according to the detection results, if multiple objects are present in front of the vehicle, the object to scrutinize can be selected according to the one's own vehicle's travel state or the like. Furthermore, in the invention recited in claim 5, the configuration is such that the distance and direction to a reflecting body are detected by a reflecting body detection means; an image processing region setting means is provided that sets the processing region in the image processing recognition means according to the results; and the image processing region is determined according to the distance and direction to the reflecting body. Thus it becomes possible to reliably detect the position of the preceding vehicle, and to restrict the region on which to perform image processing to a narrow range, and thus it becomes possible to perform real-time computation processing without using an ultra-high-speed computer.

[0007]

[Working Examples] In the following, this invention is described with reference to the drawings. FIG. 1 is a block diagram showing a first working example of this invention. In FIG. 1, a distance measurement means 60, which is for example radar that uses light, radio waves, ultrasound waves, or the like, can obtain information on the distance and direction to an object. Among [devices] that use light, there are those that measure the distance by combining a laser with a photosensor and measuring the elapsed time for the laser light to be reflected by the object and return. Note that, if the laser light that is emitted is scanned vertically and horizontally, the distance in each direction can be measured, so distance and direction information can be obtained. Furthermore, likewise [a device] that uses radio waves or ultrasound waves can be realized with essentially the same configuration. Furthermore, the assessment means 61 is a means that assesses and sets the image processing method based on the measurement results of the distance measurement means 60. Note that the above image processing method refers to, in this working example, processing to decide upon the region in which image processing is to be performed. Furthermore, the image sensor 62 is a means that inputs the image information on the surroundings on the vehicle; for example, it is a video camera that uses CCDs. Furthermore, the image processing means 63 is for example a means that causes pattern recognition to be performed. This image processing means 63 and the above assessment means 61 can be constituted by a computer, for example. Note that, S1 is a distance and direction signal, S2 is an image signal, S3 is an assessment signal, and S4 is a feature extraction signal.

[0008] Next, FIG. 2 is a diagram that shows the positional relationship between the vehicle and the object outside the vehicle; (a) is the top view, and (b) is the side view. In FIG. 2, 64 is the vehicle, and 65 is the object outside the vehicle. Furthermore, FIG. 3 is a chart listing an example of distance measurement results, and FIG. 4 is a flowchart showing the processing procedure in the device in FIG. 1. In the following, the operation of the working example in FIG. 1 is described with reference to FIG. 2 to FIG. 4. First, the distance and direction of an object 65 that is present in front of the vehicle is measured by a distance measurement means 60 (not shown in FIG. 2) that is provided at the front end of one's own vehicle 64. If θx is set to the vehicle's horizontal direction and θy to the vertical direction (see FIG. 2), with this distance measurement means 60, data showing the distance to each bearing can be obtained in a matrix $L(\theta x,\theta y)$. An example of the distance measurement results shown in FIG. 3 are the results of the case in which there is an object 65 to the right [*sic*] as shown in FIG. 2. The assessment means 61 infers the position of the object based on the above measurement results. This inference method is carried out for example as follows. Namely, for each $L(\theta x,\theta y)$, the value is compared with a neighboring $L(\theta x',\theta y')$. Furthermore, because the values of $L(\theta x,\theta y)$ and $L(\theta x',\theta y')$ vary greatly at the border regions between where the object is present and where the object is not present, it is clear that the object is present at that position. In the above example, the object is inferred to be to the right. In addition, the assessment means 61 sets the method of image processing based on the above results. In the case of this working example, processing to decide upon the region on which to perform image processing is used as the method of image processing. Therefore the assessment means 61 decides that the region on which to perform image processing is that surrounding the location of the object. In the decision method at this time, the region is made larger than the object by multiplying the inferred size of the object by a certain suitable value. Next, with respect to image information about the front of the vehicle determined by the image sensor 62, based on information sent from the assessment means 61, the image processing means 63 sets the region on which to perform image processing, and performs data processing focusing on that region. In the above example, image processing focuses on objects to the right. As above, as a result of detecting the distance and direction of objects that means 61 performing processing focusing on extracting image information targeting that object, the range in which data processing is performed by the image processing means 63 is restricted, so the number of data items to be handled is greatly reduced, the processing step is speeded up, and extraction of the features of the object under scrutiny can be realized at high speed.

[0009] Next, FIG. 5 is a block diagram showing the second working example of the present invention. In this working example, the present invention is applied to an image processing device in which detailed image information is required for the object. In FIG. 5, the distance measurement means 66 is the same as in FIG. 1 above. Furthermore, the assessment means 67 infers the distance and direction to an object in the same way as in FIG. 1, but in addition it outputs a signal that controls the image sensor 68. Furthermore, the image sensor 68 is an image sensor that can enlarge, reduce, focus on, and rotation-control the image information according to control signals given from the assessment means 67 above. For such an image sensor, one can use a video camera device that has a lens that has a zoom mechanism, and a mechanism that can rotate the camera as a whole. Furthermore, the image processing means 69 is, for example, a detailed image processing means that can recognize a vehicle license plate. Note that S1 is a distance and direction signal, S2 is an image signal, S3 is an assessment signal, S4 is a feature extraction signal, and S5 is an enlargement/reduction/direction conversion signal. In the environment shown in FIG. 2 above, an object is present to the right. With the distance measurement means 66, distance data is obtained in a matrix in the same way as in FIG. 1 above. Based on the above results, the assessment means 67 infers the distance and direction to the object in the same way as in the first working example above, and controls the pan, tilt, zoom, and focus adjustment mechanism of the image sensor 68. For example, if the data shown in FIG. 3 above is obtained, the camera is moved to the right side, and the focus is adjusted to match the distance. With such processing, the optimum image for image processing can be obtained. Therefore, detailed information that cannot be obtained from data with few pixels, such as information by which a vehicle's license plate can be recognized, can be obtained from the image processing means 69. Note detailed information that can be obtained with the above image processing means 69 includes the brake lamps of the preceding vehicle, the lighting of its turn signals, the size of the vehicle, its direction of travel, and the like, and the features of these can be extracted. Furthermore, as a result of the image processing means 69 performing image processing for the object of scrutiny that is set by the assessment means 67, features of pedestrians or buildings can also be extracted, and one can also recognize the situation in terms of traffic signs, the position of traffic signals, the presence of any railroad crossings, road equipment and the like.

[0010] Next, FIG. 6 is a block diagram of a third working example of the present invention. In FIG. 6, a distance measurement means 70 is the same as that used in the first working example. Furthermore, a vehicle speed sensor 71 measures the travel speed of the vehicle; for example, it detects the rotation speed of a wheel per unit time, and calculates the speed of the vehicle from the length of the circumference of the wheel, or it reflects light or radio waves onto the road surface and calculates the speed by way of the Doppler effect. Furthermore, a steering angle sensor 72 detects the steering angle; for example, it makes use of a steering wheel that has a built-in rotary encoder. Furthermore, a human interface 73, which is a device that exchanges information between the image processing device and an occupant, is for example an operation switch and a display device provided inside the cab of the vehicle. An occupant operates this operation switch to input signals to the image processing device, and the information of the image processing device is given to the occupant by being displayed on a display device. Furthermore, an image sensor 74 is the same as that used in the second working example above. Furthermore, an assessment standard setting means 75 is a means (described in detail below) that sets the assessment standard for an assessment means 76. Furthermore, 76 is the assessment means, and 77 is an image processing means. The assessment standard setting means 75, the assessment means 76 and the image processing means 77 can be constituted by, for example, a computer. Note that S1 is a distance and direction signal, S2 is an image signal, S3 is an assessment signal, S4 is a feature extraction signal, and S5 is an enlargement/reduction/direction conversion signal, S6 is a vehicle speed signal, S7 is a steering angle signal, S8 is a standard value setting signal, and S9 is a standard signal.

[0011] Next, the operation is described. If there are multiple objects present in front of the vehicle, it becomes necessary to set multiple image processing regions, but in this working example, the configuration is such that in a case such as this, the object that is to be scrutinized varies depending on the size of, and distance to, the object, as well as the travel state of one's own vehicle and the like. The assessment standard setting means 75 sets the assessment standard for the assessment means 76. That is to say, the assessment means 76 assesses what kind of environment one's own vehicle is currently in, and in accordance with this, the object to be scrutinized is decided upon, but in the above assessment, the assessment standard setting means 75 sets the assessment standard. For example, detection of the state of one's own vehicle is performed by detecting the travel speed and steering angle by way of a vehicle speed sensor and a steering angle sensor, and if the travel speed is greater than or equal to a prescribed value and the steering angle is less than or equal to a prescribed value, it can be assessed that it is traveling along a highway, while if the steering angle is greater than or equal to a prescribed value and the vehicle speed is less than or equal to a prescribed value, it can be assessed that it is traveling near an intersection, but the assessment standard setting means 75 sets the threshold values for the vehicle speed values and steering angle values that will be the standard for this assessment. The settings for these standard values are input using a human interface 73 such as operation switches. As stated above, the assessment means 76 assesses obstacles in front as the objects that are to be scrutinized if it assesses that it is traveling along a highway, and assesses the traffic signal in front as the object that is to scrutinized if it assesses that it is traveling near an intersection. Furthermore, image processing is performed by the image processing means 77 on the object that is to be scrutinized. Note that, in the above description, a case in which the setting of the standard values of the assessment standard setting means 73 is performed using a human interface 73 is described, but one can also perform the environment setting automatically, by way of inputting the image processing results. For example, if the present invention is applied to a system in which the image processing means 77 detects white lines on the road, then using the property that a continuous white line will not be detected near an intersection, if an absence of the white line is detected, the assessment will be that it is near an intersection, and the object that is to be scrutinized can be set to be the traffic signal in front. Summarizing the above, we have the following. First, the distance and direction to an object is measured by the distance measurement means 70. Depending on these measurement results and the travel situation of the vehicle, the assessment standard setting means 75 and the assessment means 76 decide upon the object on which to perform image processing. For example, if it is assessed as traveling on a highway, the preceding vehicle is taken as the object, and if it is assessed as traveling near an intersection, the traffic signal is determined to be the object. But setting can be made as appropriate depending on the situation, so this is not limited to the above example. Furthermore, when performing image processing, the assessment means 76 makes an adjustment (enlargement/reduction/direction conversion, or the like) to the image sensor 74 so as to result in the optimum image, and decides which part of the image taken in from the image sensor 74 is to be processed. The image processing means 77, which has taken in the image of the image sensor 74, performs feature extraction of the object in accordance with the targeted object. This feature extraction may be, for example, detection of an obstacle, detection of the lighting up of brake lamps on a vehicle for which there is risk of a collision, recognition of restricted speed as indicated on a traffic sign, or the like. In addition, by calculating the temporal change in the distance information, the relative speed between one's own vehicle and the targeted object can also be detected. Note that, as in the second working example, in this working example as well, detailed information obtained by the image processing means 77 includes the brake lamps of the preceding vehicle, the lighting-up of turn signals, the size of a vehicle, the direction of travel, and the like, and these features can be extracted. Furthermore, with regard to the object of scrutiny that is set by the assessment means 76, as a result of the image processing means 77 performing image processing, the features of pedestrians or buildings can be extracted, and one can recognize the situation, including traffic signs, the positions of traffic signals, the presence any railroad crossings, road equipment and the like. Furthermore, additional distance measurement means 70 or image sensors 74 can be installed as necessary, such as on the front, rear, left, or right of the vehicle. In this case, the features of an object can be extracted in independent directions.

[0012] Next, a working example in which the present invention is applied to the detection of the preceding vehicle is described. In terms of conventional preceding vehicle detection devices, there are those that make use of the reflection of electromagnetic waves, as described for example in JP-61-023985-A and the like. This is such that, by emitting electromagnetic waves (for example, laser light or the like) while sweeping through a prescribed angle, receiving the wave reflected from a reflecting body, and calculating the distance to the reflecting body based on the propagation delay time from the emission to the reception of the electromagnetic wave at prescribed sweep angles, the distance and direction from one's own vehicle to the reflecting body is detected, and information on the direction and distance from one's own vehicle to a reflecting object can be obtained. Note that, in general, reflex reflectors are installed at the rear of a vehicle in order to improve its visibility from behind, and this reflex reflector, being a reflecting body, reflects laser light and other electromagnetic waves, making easy detection possible. Furthermore, in addition to this, a device has also been devised in which, using a television camera or the like, which is oriented to the front of the vehicle, the scenery in front of the vehicle is input, image processing is performed on the image that is input, and the preceding vehicle or road is recognized.

[0013] However, a conventional preceding vehicle detection device such as this has presented the following problems. First, in a preceding vehicle detection device that makes use of the reflection of an electromagnetic wave such as laser radar, it is possible that there will be, not only reflex reflectors provided on the rear of the vehicle as reflecting bodies, but also corner reflectors and the like on a guard rail installed on the shoulder of the road, and thus there is the problem that it is very difficult to select only the reflection from the reflex reflectors on the preceding car from among a large number of reflecting bodies. Furthermore, it is relatively easily possible to compare the amount of change per unit time in the detected distance to the reflecting body with one's own vehicle travel speed, and to distinguish whether the reflecting body is a stationary object or a moving object, and to recognize only moving objects as vehicles. But with this method there is the problem that, for a vehicle or like that is stopped at the tail end of congestion on a highway, an assessment will be made to the effect that, because it is a stationary object, it is not a vehicle, and thus the position of the preceding vehicle cannot be detected, and because of this, it is impossible to perform high-precision travel control or to give suitable warning for approaching another vehicle too closely. Furthermore, in a preceding vehicle detection device that image-processes the image from a television camera and recognizes the preceding vehicle, with the current technology, it is relatively easily possible to use image processing to recognize the white lines that indicate the edge of the roadway or traffic lanes, but one cannot expect very high precision for distinguishing a preceding vehicle. Furthermore, for distinguishing a preceding vehicle, it is also necessary to perform processing many times, which makes it necessary to process a large volume of image information. Then there is the problem that, if this is applied to vehicle automatic travel or warning devices for a rear-end collisions or the like, it is essential that such processing be performed at high speed (in real time), which requires a very-high-speed computer. Furthermore, in technology that uses ordinary image processing for purposes other than preceding vehicle detection, the region within the entire screen on which image processing must be performed (the region under scrutiny) is limited, and various types of processing will be performed within this [region]; thus, a method can be applied that reduces the overall calculation volume, but if a preceding vehicle is to be detected, the preceding vehicle could be present in any region with respect to the screen of one's own vehicle's camera, and one cannot simply set the region to be scrutinized, so the problem has been increases in speed are not possible with this method. This working example solves such problems of the prior art, makes it possible to reliably detect the preceding vehicle, and provides a preceding vehicle detection device that can be practically realized, even without an ultra-high-speed computer.

[0014] FIG. 7 is a functional block diagram of this working example. In FIG. 7, a reflecting body detection means 1 detects the distance and direction from one's own vehicle to a reflecting body by emitting electromagnetic waves in the direction of travel of one's own vehicle while sweeping a prescribed angle range, receiving the reflected wave from the reflecting body, and calculating the distance to the reflecting body based on the propagation delay time from emission to reception of the electromagnetic wave at prescribed sweep angles. This reflecting body detection means 1 corresponds to the parts, in

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.

WHAT WILL YOU BUILD? | sales@docketalarm.com | 1-866-77-FASTCASE