

(12) **United States Patent**  
Luo et al.(10) **Patent No.:** US 6,282,317 B1  
(45) **Date of Patent:** Aug. 28, 2001(54) **METHOD FOR AUTOMATIC DETERMINATION OF MAIN SUBJECTS IN PHOTOGRAPHIC IMAGES**(75) Inventors: **Jiebo Luo**, Pittsford; **Stephen Etz**, Fairport; **Amit Singhal**, Rochester, all of NY (US)(73) Assignee: **Eastman Kodak Company**, Rochester, NY (US)

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(21) Appl. No.: **09/223,860**(22) Filed: **Dec. 31, 1998**(51) **Int. Cl.<sup>7</sup>** ..... **G06K 9/46**(52) **U.S. Cl.** ..... **382/203**(58) **Field of Search** ..... 382/203, 204, 382/205, 206, 207, 168, 169, 173, 218, 195, 155, 156, 159, 160, 190, 202, 227(56) **References Cited**

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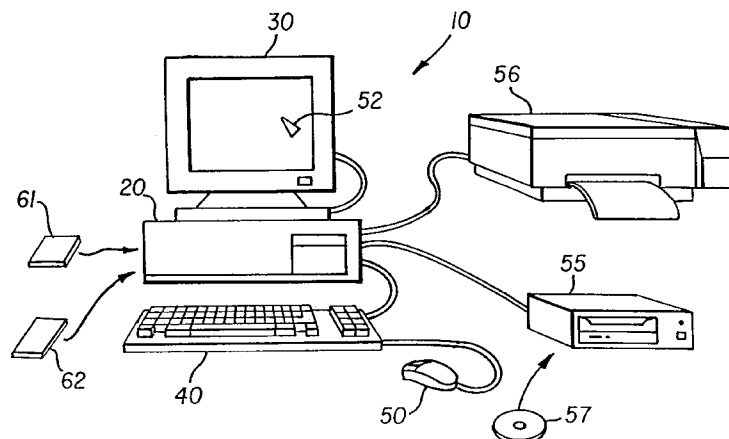
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(57) **ABSTRACT**

A method for detecting a main subject in an image, the method comprises: receiving a digital image; extracting regions of arbitrary shape and size defined by actual objects from the digital image; grouping the regions into larger segments corresponding to physically coherent objects; extracting for each of the regions at least one structural saliency feature and at least one semantic saliency feature; and integrating saliency features using a probabilistic reasoning engine into an estimate of a belief that each region is the main subject.

**37 Claims, 9 Drawing Sheets**

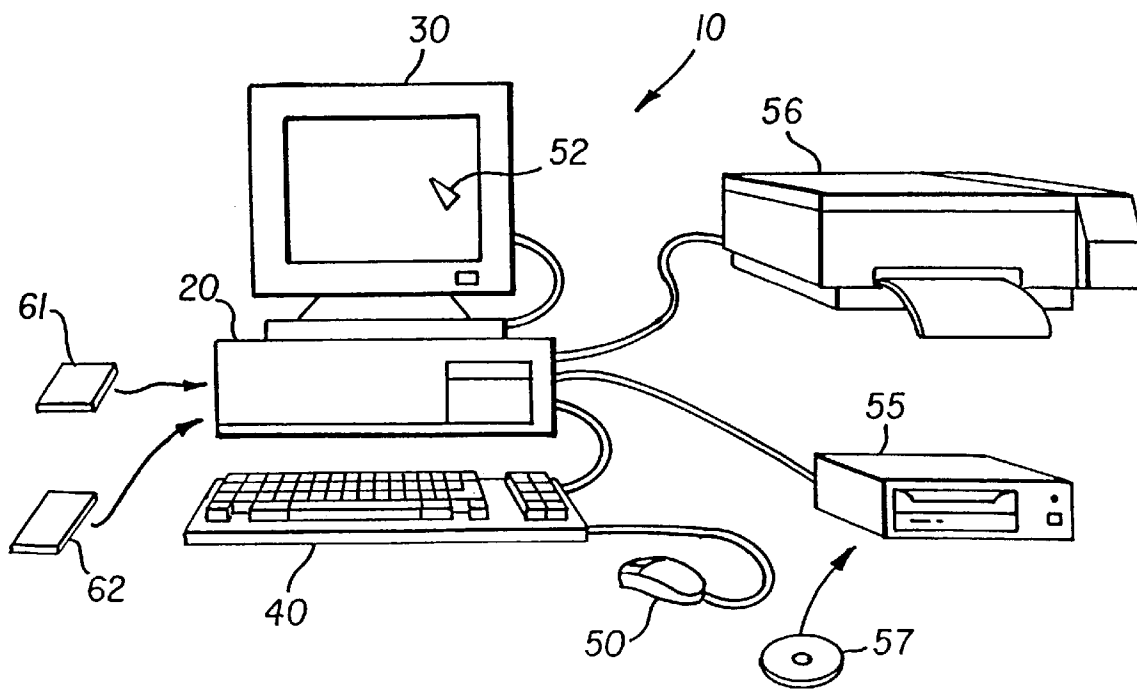


FIG. 1

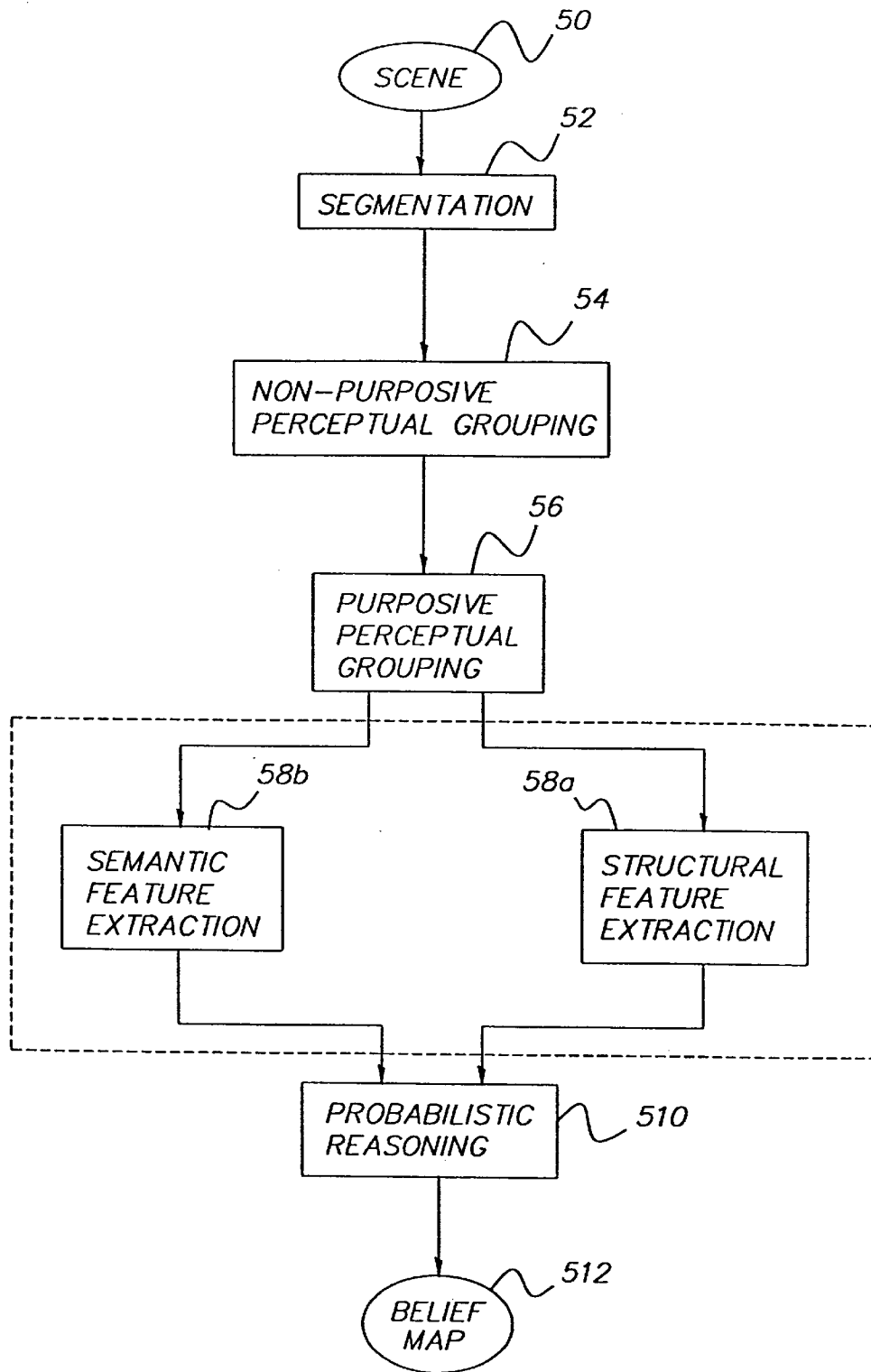


FIG. 2

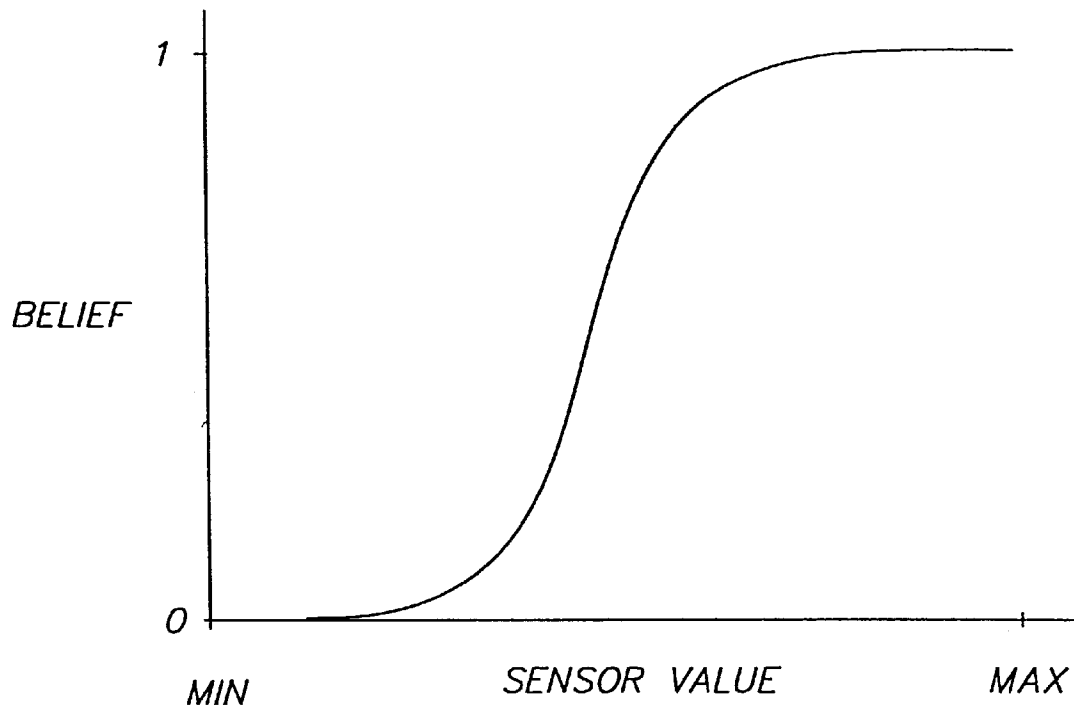


FIG. 3

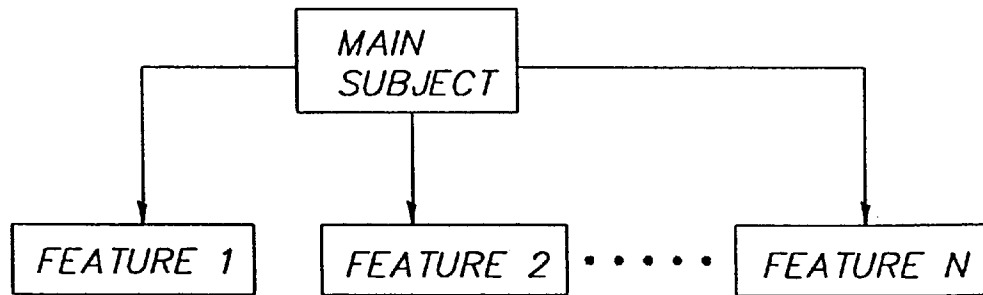


FIG. 7

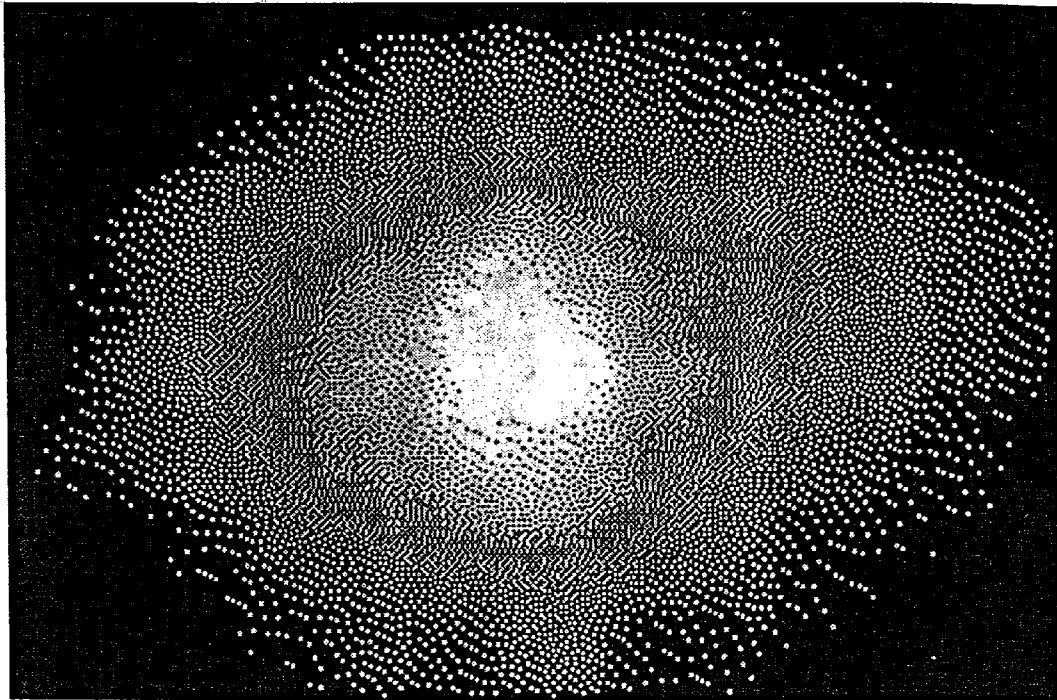


Fig. 4a

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