

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GOOGLE LLC  
Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,  
Patent Owner.

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Case No. IPR2024-00960  
Patent 7,486,807

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**DECLARATION OF ROBERT STEVENSON, PH.D.**

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## **I. INTRODUCTION**

1. I have been retained by Google LLC (“Petitioner”) as an independent expert consultant in this proceeding before the Patent Trial and Appeal Board of the United States Patent and Trademark Office.

2. I am over 21 years of age and, if I am called upon to do so, I would be willing and able to testify as to the matters set forth herein.

3. My compensation is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of any related proceeding.

4. I understand that this proceeding involves U.S. Patent No. 7,486,807 (“the ’807 Patent”) (Ex. 1001). The application for the ’807 Patent was filed January 23, 2004, as U.S. Patent Application No. 10/762,450.

5. I have been asked by Petitioner to provide my opinion on whether the claims of the ’807 Patent would have been anticipated or obvious to a person of ordinary skill in the art (“POSITA”) at the time of the earliest claimed priority date of the ’807 Patent. In performing my analysis, I have been asked to assume that the priority date is January 29, 2003. My opinions are set forth below.

6. Throughout this declaration, I refer to specific pages, figures, or line numbers of various exhibits. These citations are illustrative and are not intended to suggest that they are the only support for the propositions for which they are cited.

## **II. SUMMARY OF OPINIONS**

7. This declaration considers claims 1-14 of the '807 Patent. Below, I set forth the opinions I have formed, the conclusions I have reached, and the bases for these opinions and conclusions. I believe the statements contained in this declaration to be true and correct to the best of my knowledge.

8. Based on my experience and knowledge of the art at the time of the earliest claimed priority date of January 29, 2003, it is my opinion that claims 1-14 of the '807 Patent would have been obvious based on the asserted grounds discussed below. A person of ordinary skill in the art ("POSITA") would have found it obvious to combine the prior art references I cite and would have been motivated to do so before the priority date.

## **III. QUALIFICATIONS AND BACKGROUND**

9. I believe that I am well qualified to serve as a technical expert in this matter based upon my qualifications, discussed in detail below. A copy of my curriculum vitae is included as Exhibit 1004, and it provides a comprehensive description of my academic and employment history. I am competent to write this declaration. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art. I have a bachelor's degree in Electrical Engineering from the University of Delaware and a Ph.D. degree in

Electrical Engineering from Purdue University. My Ph.D. research was on communications and signal processing.

10. I am presently a Professor in the Department of Electrical Engineering and in the Department of Computer Science and Engineering at the University of Notre Dame. I first joined the faculty at the University of Notre Dame as an Assistant Professor in the Department of Electrical Engineering in 1990. I was granted tenure and promoted to the rank of Associate Professor in August 1996. I attained the rank of Professor in the Department of Electrical Engineering in August 2002, and I continue to serve in that capacity. I have served concurrently as a Professor in the Department of Computer Science and Engineering at the University of Notre Dame from January 2003 through June 2018.

11. Since 2013 I have served as an Associate Chair of the Department of Electrical Engineering. I also serve as the Director of Undergraduate Studies in Electrical Engineering. In this role I oversee the department's undergraduate program in Electrical Engineering.

12. I spent the summer of 1992 at the Air Force Research Lab in Rome, New York, and I spent the summer of 1993 at the Intel<sup>®</sup> Corporation in Hillsboro, Oregon. Several leading computing companies, including Intel<sup>®</sup>, Sun Microsystems<sup>®</sup>, Apple<sup>®</sup> Computer, and Microsoft<sup>®</sup>, have supported my research at

Notre Dame. During the past 20 years, I have published over 100 technical papers related to the field of image processing and digital systems.

13. I am a member of the Institute of Electronics and Electrical Engineers (IEEE), The International Society for Optical Engineering, and the Society for Imaging Science and Technology. I am a member of the academic honor societies Eta Kappa Nu, Tau Beta Pi, and Phi Kappa Phi.

**A. Significant Research**

14. For the past 20 years, my work has focused on the design of techniques, hardware, and software for the processing of digital signals using digital computing devices. As an academic researcher, I attempt to develop novel ideas for systems, then publish and present those ideas to the technical community. My success as an academic is directly related to the insights and techniques that provide the basis for new generations of products. My early work on digital techniques for printing and image capture devices led to significant interaction with companies developing desktop computers products in the early 1990's as they tried to incorporate those ideas into their products.

15. My interaction with Apple's Imaging Group focused on various imaging devices such as digital cameras, scanners, and printers and how to best support those devices on desktop computers. At Intel, I worked in Intel's Architecture Lab at the time the MMX multimedia instructions were being

incorporated into the Pentium processor. My work there dealt with developing video compression techniques for CD-ROMs and network communications that were well matched to the Pentium architecture. I also gave a series of talks on how advanced communication and video processing techniques could be better supported on the Pentium platform. Similarly, my interaction with Sun Microsystems's group examined how advanced signal processing techniques could be best implemented using Sun's new Visual Instruction Set on the Sparc architecture.

16. I have also received significant support for my research from several U.S. Department of Defense Agencies. The Air Force Research Laboratory has funded my work to develop advanced parallel processing algorithms that exploited an ad-hoc network of mixed computers to achieve significant computational advantages over their previously implemented techniques. Other Department of Defense agencies have supported my work in image and video enhancement.

**B. Publications And Conferences**

17. I have published over 150 papers in international journals and international conferences.

18. I am an inventor of U.S. Patent No. 6,081,552, "Video Coding Using a Maximum A Posteriori Loop Filter," issued June 27, 2000.

19. Additional information concerning my background, qualifications, publications, conferences, honors, and awards are described in my Curriculum Vitae, a copy of which is provided as Exhibit 1004.

**C. Compensation and Previous Expert Opinions**

20. I am being compensated at my usual rate of \$700/hour for each hour of service that I provide in connection with this case, including time I spend consulting, writing this report, giving deposition testimony and testifying. My compensation does not depend in any way on the content of my testimony and is not affected by or dependent on the outcome of the case. If called to testify as to the contents of this report, I can and would testify truthfully and competently.

21. A listing of previous cases in which I have provided expert testimony in the past four years can also be found in Exhibit 1004.

**IV. MATERIALS CONSIDERED**

22. In forming my opinions, I have reviewed the following documents, as well as other documents cited throughout this declaration:

| Exhibit | Description                                                                                                                                                                        |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1001    | U.S. Patent No. 7,486,807 to Nagahashi (“the ’807 patent”)                                                                                                                         |
| 1002    | Prosecution History of U.S. Patent No. 7,486,807                                                                                                                                   |
| 1005    | U.S. Patent Appl. Pub. No. 2002/0188602 to Stubler et al. (“Stubler”)                                                                                                              |
| 1006    | U.S. Patent No. 6,038,333 to Wang (“Wang”)                                                                                                                                         |
| 1007    | Kah-Kay Sung and Tomaso. Poggio, “Example-Based Learning for View-Based Human Face Detection,” IEEE Transactions on Pattern Analysis & Mach. Intel., 20(1), pp. 39-51 (Jan. 1998). |
| 1008    | U.S. Patent No. 6,282,317 to Luo et al (“Luo”).                                                                                                                                    |
| 1009    | Jie Yang and Alex Waibel, <i>A Real-Time Face Tracker</i> , Proceedings of Third IEEE Workshop on Applications of Comput. Vision, WACV, pp. 142-147 (1996)                         |
| 1010    | Matthew Turk and Alex Pentland, <i>Eigenfaces for Recognition</i> , J. Cognitive Neurosci., 3(1), pp. 71-86 (1991)                                                                 |
| 1011    | Anil K. Jain and Richard C. Dubes, <i>Algorithms for Clustering Data</i> (Prentice-Hall, Inc. 1988)                                                                                |

23. I have also relied on my education, experience, research, training, and knowledge in the relevant art, and my understanding of legal principles described in this declaration.

24. All of the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my understanding of how a POSITA would have

understood the claims of the '807 Patent at the time of the earliest claimed priority date.

25. I reserve the right to supplement and amend any of my opinions in this declaration based on documents, testimony, and other information that becomes available to me after the date of this declaration.

## **V. LEGAL STANDARDS**

26. I am an engineer and not a lawyer. My understanding of the legal standards to apply in reaching the conclusions in this declaration is based on discussions with counsel for Petitioner, my experience applying similar standards in other patent-related matters, and my reading of the documents submitted in this proceeding. I have applied these legal standards in preparing this declaration.

27. I have been informed that there are two ways in which prior art may render a patent claim unpatentable. First, I have been informed that the prior art can “anticipate” a claim. Second, I have been informed that the prior art can render a claim “obvious” to a POSITA. I understand that a claim is patentable if it was not anticipated and would not have been rendered obvious by the prior art at the effective filing date of the patent.

28. I have been informed that a dependent claim is a patent claim that refers back to another patent claim. I have been informed that a dependent claim

includes all of the limitations of the claim to which it refers plus its own limitation(s).

29. I have been asked to provide my opinions as to whether the cited prior art discloses or renders obvious claims 1-14 of the '807 Patent from the perspective of a POSITA at the time of the earliest claimed priority date of January 29, 2003, as described in more detail below.

30. I have been informed that in IPR proceedings, such as this one, the party challenging the patent bears the burden of proving unpatentability by a preponderance of the evidence. I understand that a preponderance of the evidence means “more likely than not.”

31. For purposes of this declaration, I have been asked to provide my opinions on issues regarding unpatentability. I have been informed of the following legal standards, which I have applied in forming my opinions.

**A. Level of Ordinary Skill**

32. I have been informed that a POSITA is determined by considering several factors, including the (i) type of problems encountered in the art; (ii) prior art solutions to those problems; (iii) rapidity with which innovations are made; (iv) sophistication of the technology; and (v) educational level of active workers in the field.

33. I have been instructed to assume that a POSITA is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors discussed above. A POSITA is assumed to be person of ordinary creativity familiar with the prior art as of the priority date of the patent at issue.

**B. Prior Art**

34. I have been advised and understand that the information used to evaluate whether an invention was new and not obvious when made is generally referred to as “prior art.” I understand that in an IPR proceeding, prior art includes patents and printed publications that existed before the earliest claimed priority date or the earliest filing date of the patent (which I have been informed is also called the “effective filing date”). I have been informed and understand that a patent or published patent application is prior art if it was filed before the earliest filing date of the claimed invention and that a printed publication is prior art if it was publicly available before the earliest filing date.

**C. Anticipation**

35. I have been informed that under 35 U.S.C. § 102, a patent claim is unpatentable for anticipation if the claimed subject matter was patented or described in a printed publication before the effective filing date of the claimed invention. I have been informed that this is referred to as unpatentability by anticipation. I have been informed that a patent claim is anticipated under § 102 if

a single prior art reference discloses all the limitations of the claimed invention. I understand that limitations may be expressed or inherent such that the limitation is essential to the prior art.

**D. Obviousness**

36. I have been informed that for obviousness under 35 U.S.C. § 103, a patent claim is unpatentable if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a POSITA to which said subject matter pertains at the time the invention was made. I have been informed that this is referred to as unpatentability by obviousness.

37. I have been informed that an obviousness analysis includes the following considerations:

- a. Determining the scope and content of the prior art;
- b. Ascertaining the differences between the prior art and the claims at issue;
- c. Resolving the level of ordinary skill in the pertinent art; and
- d. Considering evidence of secondary indicia of nonobviousness (if available).

38. I have been informed that the relevant time for considering whether a claim would have been obvious to a POSITA is the time of invention. For my

obviousness analysis, counsel for Petitioner instructed me to assume that the date of invention for the challenged claims is January 29, 2003. My opinions would not change if I assumed another, e.g., later, date of invention.

39. I have been informed that a reference may be modified or combined with other references or with a POSITA's own knowledge if the person would have found the modification or combination obvious. I have also been informed that a POSITA is presumed to know all the relevant prior art, and the obviousness analysis may take into account the inferences and creative steps that a POSITA would employ.

40. I have been informed that an obviousness determination must be made from the perspective of a POSITA. I have also been informed that there is no requirement that the prior art contain an express suggestion to combine known elements to achieve the claimed invention, and that a suggestion to combine known elements to achieve the claimed invention may come from the prior art as a whole or individually. Also, the obviousness analysis may rely on the inferences and creative steps a POSITA would employ, as filtered through his or her knowledge as of the priority date. But I understand that obviousness grounds cannot be sustained by mere conclusory statements and must include some articulated reasoning and rationale to support a legal conclusion of obviousness.

41. In determining whether a prior art reference could have been combined with another prior art reference or other information known to a POSITA, I have been informed that the following principles may be considered:

- a. A combination of familiar elements according to known methods is likely to be obvious if it yields predictable results;
- b. The substitution of one known element for another is likely to be obvious if it yields predictable results;
- c. The use of a known technique to improve similar items or methods in the same way is likely to be obvious if it yields predictable results;
- d. The application of a known technique to a prior art reference that is ready for improvement to yield predictable results;
- e. Any need or problem known in the field and addressed by the reference can provide a reason for combining the elements in the manner claimed;
- f. A person of ordinary skill often will be able to fit the teachings of multiple references together like a puzzle; and
- g. The proper analysis of obviousness requires a determination of whether a POSITA would have a “reasonable expectation of success”—but not “absolute predictability” of success—in achieving the claimed invention by combining prior art references.

42. I have been informed that, when a work is available in one field, design alternatives and other market forces can prompt variations of it, either in the same field or in another. I have been informed that if a POSITA could have implemented a predictable variation and would have seen the benefit of doing so, that variation is likely to have been obvious. I have been informed that, in many fields, such as the mechanical or electrical arts, market demand—not scientific literature—may drive design trends. I have been informed that, when there was a design need or market pressure and there are a finite number of predictable solutions, a POSITA would have had a good reason to pursue those known options.

43. I have been informed that the law permits the application of “common sense” in examining whether a claimed invention would have been obvious to a POSITA. For example, I have been informed that combining familiar elements according to known methods and in a predictable way may suggest obviousness when such a combination would yield nothing more than predictable results. I understand, however, that a claim is not obvious merely because every claim element is disclosed in the prior art. A party asserting obviousness must provide a specific motivation to combine or modify the references as recited in the claims and explain why one skilled in the art would have reasonably expected to succeed in doing so.

44. I have been informed that there is no rigid rule that a reference or combination of references must contain a “teaching, suggestion, or motivation” to combine references. But I also understand that the “teaching, suggestion, or motivation” test can be a useful guide in establishing a rationale for combining elements of the prior art. I have been informed that this test poses the question as to whether there is an express or implied teaching, suggestion, or motivation to combine prior art elements in a way that results in the claimed invention, and that it helps to counter the use of hindsight, which is impermissible. Likewise, if a prior art reference “teaches away” from a potential prior art combination, then a motivation to combine may not exist.

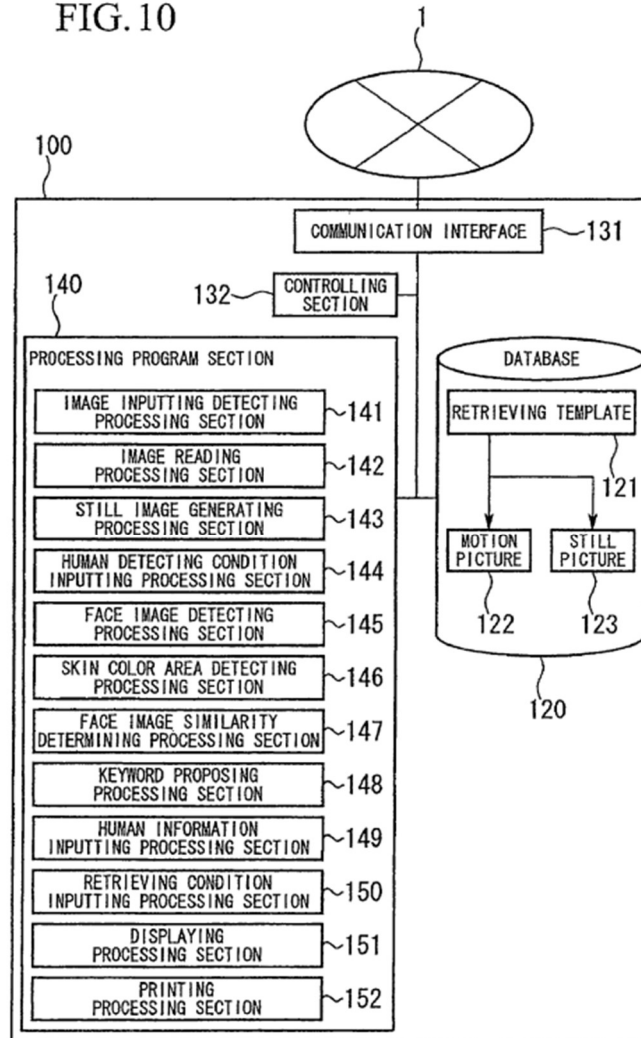
45. I am not aware of any evidence of secondary considerations, such as unexpected results, industry skepticism, long-felt unresolved need, commercial success, praise by others, or copying that would alter my opinions set forth below.

46. I have been informed that, in an obviousness analysis, prior art must be analogous art to the patent being considered. I have been informed that a prior art reference is considered to be analogous, or in the same field of art, if the reference is either (1) in the same field of endeavor as the challenged patent, regardless of the problems the challenged patent and the prior art address, or (2) reasonably pertinent to the particular problem being solved by the challenged patent.

## **VI. THE '807 Patent**

47. The '807 patent was filed January 23, 2004; issued February 3, 2009; and claims priority to Japanese Patent Application No. JP 2003-020805, filed January 29, 2003. Ex. 1001, cover. The '807 patent generally relates to “an image retrieving device for classifying and retrieving a digital image, a method for adding keywords in the image retrieving device, and a computer program therefor.” Ex. 1001, 1:12-16. The image retrieving device, which can be configured using a “PC (personal computer),” includes a “processing program section” comprised of various sub-sections for processing newly inputted images. Ex. 1001, 11:2-7, FIG. 10. Figure 10 below illustrates image retrieving device 100, processing program section 140, and subsections 141-152.

FIG. 10



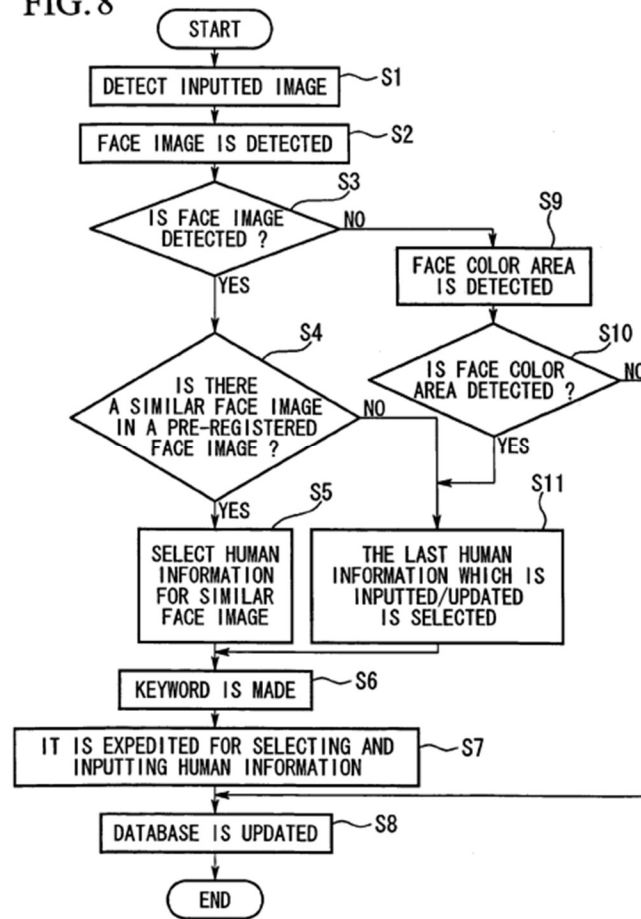
Ex. 1001, FIG. 10.

48. The computer detects an inputted image and an “object (such as a human) in the image,” then classifies and stores the images based on the object detected in the image. Ex. 1001, 3:53-59, 4:5-11. The image is “classified” and “saved in [a] database together with [a] keyword[]” that “relate[s] to the object in the image.” Ex. 1001, 4:5-7, 4:20-24. “If a predetermined object is detected[,] ... keywords which relate to the object are proposed” to a user, who then has the

option to “confirm[], add[], and correct[] the proposed keywords.” Ex. 1001, 4:11-

17. The user may also retrieve a stored image that “contains a specific object” using the keyword. 4:20-24. When the object in the image is a human face, for example, “the face image is detected” by a “face image detecting section” of the program section. Ex. 1001, 4:39-40. If the detected face is determined to be “similar” to face images in the database, the keyword which relates to the face image is proposed to the user so that the user may confirm, add, or correct the keyword.” Ex. 1001, 4:40-47. The user may also “retrieve the image which contains a specific person” using the keyword. Ex. 1001, 4:50-53. Figure 8 below illustrates a “flow chart for explaining processing steps for detecting a human and adding the keywords.” Ex. 1001, 6:35-36.

FIG. 8



Ex. 1001, FIG. 8.

## VII. LEVEL OF ORDINARY SKILL IN THE ART

49. In my opinion, a POSITA in the field of the '807 patent would have had at least a bachelor's degree in electrical engineering, computer science, or related discipline, and two years of experience in digital image analysis and processing. Relevant work experience can substitute for formal education and additional education could substitute for work experience.

50. At the time of the invention, I had already received a Ph.D. in Electrical Engineering and had been a professor of Electrical Engineering at the University of Notre Dame for over a decade. I also had worked in the field of image/video processing and analysis for over 15 years. So I would have exceeded the level of ordinary skill in the art and I am qualified to testify to what one of ordinary skill in the art would have known at that time.

### **VIII. CLAIM CONSTRUCTION**

51. I understand that, in this proceeding, the claims are construed according to their ordinary and customary meaning, in light of the specification and prosecution history, as understood by a POSITA at the time of the invention. I understand that this is the same claim construction approach used in district court litigation.

52. In my opinion, none of the claim terms require further construction for me to provide my opinions on whether the prior art anticipates or renders obvious the claims of the '807 patent.

### **IX. THE PRIOR ART**

53. As explained in Section X below, it is my opinion that claims 1-14 were anticipated by Stubler or would have been obvious to a POSITA based on Stubler or the combination of Stubler and Wang, each of which I have been instructed to assume is prior art.

**A. Stubler (Ex. 1005)**

54. U.S. Patent Application No. 2002/0188602 to Stubler et al (“Stubler”) was filed on May 7, 2001, and published on December 12, 2002. Stubler, cover page. I understand that Stubler is prior art to the ’807 Patent.

55. Stubler discloses a computer and method for “generating captions or semantic labels for an acquired image ... based upon similarity between the acquired image and one or more stored images that are maintained in an image database environment.” Stubler [0009].

56. The computer includes memory “in which the database to be searched is stored,” and “internal memory 20, such as a ROM,” for “stor[ing] the software for implementing the inventive method.” Stubler, [0021], [0024]. In practice, the computer acquires a new image “from a digital source such as the card reader 24 or the network interface 26.” Stubler, [0026], [0028]. Stubler’s software then processes the acquired image to extract “any capture metadata that may have been obtained by the capture device.” Stubler, [0028], [0037]. Stubler further explains that “region metadata” is “objectively derived from a region in the image” and “includes such detected regional features as face, skin, sky, grass, open space, background vs. foreground, and the like.” Stubler, [0029]-[0030]. Stubler’s system may use “[v]arious well-known techniques” including those described in Kah-Kay Sung & Tomaso Poggio, *Example-Based Learning for View-Based Human Face*

*Detection*, IEEE Transactions on Pattern Analysis & Mach. Intel., 20(1), pp. 39-51

(Jan. 1998) (Ex. 1007),<sup>1</sup> to detect a human face in the acquired image, and “histogram analysis” to detect “skin color in a chromatic space.” Stubler, [0030].

57. The computer uses the extracted data to determine whether the acquired image is “similar by time/date” or “shar[es] visually similar content” to stored images. Stubler, [0031], [0035]. This comparison allows the computer to determine whether the image is new or whether the image has “unlabeled” sections, in which case the “unlabeled image regions are presented to the user so that the user may apply a caption or semantic label to all of the regions simultaneously.” Stubler, [0012].

58. “If captioning or semantic labeling of the acquired images based on region metadata is desired (256), the database is searched (258) for any images with region metadata (e.g., face, sky, grass, skin, open space, etc.) similar to that of the acquired images, and repeated as needed (260) for similar regions until all images are analyzed. Then the *captions or semantic labels for the regional aspects* of the retrieved and matched images *are prepared as options* (262) for extension to the acquired images.” Stubler, [0040], FIG. 5. This “caption list or semantic label list, and/or regional annotation list,” is presented to the user “on the display

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<sup>1</sup> Stubler incorporates each of the listed documents by reference. Stubler, [0030].

device 32” as a “user-friendly list of capture [sic: caption] or semantic labels, and/or regional annotations, for each acquired image,” after which “the user may select and/or edit (270) the captions or labels.” Stubler [0040]-[0041], FIGS. 5-6.

59. In my opinion, Stubler is related to the same field of endeavor as the ’807 patent: digital image processing. *Compare* Stubler, [0001] *with* Ex. 1001, 1:13-16, 4:11-17. The ’807 patent and Stubler also relate to classifying and retrieving a digital image and adding, correcting, or confirming keywords related to a detected object in the digital image. *Compare* Stubler, [0001], *with* Ex. 1001, 1:13-16. Stubler is also directed to the same problem as the ’807 patent: improving image classification and retrieval using image labels. *Compare* Stubler, [0009] *with* Ex. 1001, 3:52-59. Thus, it is my opinion that Stubler is analogous art to the ’807 patent.

**B. Wang (Ex. 1006)**

60. U.S. Patent No. 6,038,333 to Wang (“Wang”) was filed on March 16, 1998, and issued on March 14, 2000. Wang, cover page. I understand that Wang is prior art to the ’807 patent.

61. Wang discloses a computer system and method for “search[ing] for similar faces of an input face in a face image database such that person-identifying information associated with the similar faces can be retrieved from [a] database to identify the input face.” Wang, 2:23-28, 2:46-57.

62. Wang's system includes an "analysis system" having a "face detection and feature extraction system" that "detects if an input image ... contains a face image" and "extracts" "face feature data from the input image if the input image is detected to contain a face." Wang, 3:46-51, 6:14-16. Wang's detection system may use "neural network-based face detection technology to detect the face in the input face image." Wang, 6:43-7:3. According to Wang, this neural network-based technology not only "detect[s] most faces," but "makes the face detection robust [and] relatively fast." Wang, 6:66-7:1. It also "allows the detection system to detect different kinds of faces with different poses and lightings." Wang, 7:1-3.

63. Once the face is detected, the system "computes the face feature data of the detected face" using "known face feature extraction schemes" and sends the data to a "search engine." Wang, 7:4-11, 7:28-34. The search engine "compares the extracted face feature data with each stored face feature data to output similarity scores based on the predetermined similarity measure" and retrieves "person-identifying data" (e.g., "text data" including "the name of the person") and the "pixel data of the similar image[]" from the profile database 13 "for display after the search." Wang, 4:27-33, 7:38-58.

64. "If no matching face feature data is found in the profile database ..., the analysis system 12 makes such indication to the user" after which, the user may "stor[e] the input face image in the profile database 13 along with the associated

face feature data and the person-identifying data.” Wang, 6:1-7, 7:59-8:5. For example, the system may “ask[] the user to input the person-identifying data of the input face image via the input/output system.” Wang, 6:8-11, 7:65-8:5.

65. In my opinion, Wang is in the same field of endeavor as the ’807 patent: digital image processing. *Compare* Wang, 1:7-12, *with* Ex. 1001, 1:13-16. And both the ’807 patent and Wang relate to classifying and retrieving a digital image and adding, correcting, or confirming keywords related to a detected object in the digital image. *Compare* Wang, 1:7-12, 2:23-28, 8:19-31, FIGS. 2-3B *with* Ex. 1001, 1:13-16, 4:11-17. Furthermore, Wang is directed to the same problem as the ’807 patent: improving image classification and retrieval using image labels. *Compare* Wang, 1:7-12, 2:23-28, 8:19-31 *with* Ex. 1001, 3:52-59. Thus, it is my opinion that Wang is analogous art to the ’807 patent.

## **X. GROUNDS OF UNPATENTABILITY**

66. Based on my review of the materials set forth above, including my application of the knowledge of a POSITA, it is my opinion that claims 1-14 of the ’807 Patent would have been anticipated or obvious to one of ordinary skill in the art as of January 29, 2003.

67. In particular, it is my opinion that claims 1-14 of the ’807 Patent would have been anticipated or obvious to a POSITA based on the following grounds:

| Grounds | Claims       | Basis                                          | Prior Art        |
|---------|--------------|------------------------------------------------|------------------|
| 1       | 1-14         | anticipation or,<br>alternatively, obviousness | Stubler          |
| 2       | 2-5 and 9-12 | obviousness                                    | Stubler and Wang |

**A. Ground 1: Claims 1-14 Are Anticipated or Obvious over Stubler**

68. Claim 1 is generally directed to a computer (called “image retrieving device”) and program (called “section”) for performing various image processing tasks. Independent claim 8 is directed to the corresponding method of processing the images and claim 14 relates to the corresponding computer readable medium storing the program for performing the image processing. As explained in detail below, Stubler discloses or renders obvious the same, including implementing its disclosed image processing methods using “software” or a “computer program” “stored in [a] conventional computer readable storage medium” such as “random access memory (RAM), or read only memory (ROM); or any other physical device or medium employed to store a computer program.” Stubler, [0021], [0023], [0024]. The “software needed for implementation of the method is within the ordinary skill in such arts.” Stubler, [0021].

**1. Independent claim 1**

- a. [1preamble]: “An image retrieving device for classifying and retrieving an image by detecting an object in the image and adding a keyword, the image retrieving device comprising:”**

69. If the preamble is limiting,<sup>2</sup> in my opinion, Stubler discloses [1preamble] because Stubler discloses a computer (image retrieving device) for “clustering” (classifying) an image by detecting or extracting “regional features” (also called “region metadata”) in the image (detecting an object in the image) and adding “captions or semantic labels” (adding a keyword) to the image, and “retrieving” the image using the same region metadata and label. Stubler, [0023], [0009], [0011], [0021], [0030], FIGS. 2-3.

70. Stubler’s computer includes a program for “detect[ing] regional features,” such as a “face, skin, sky, grass, open space, background vs. foreground, and the like” (objects) in an acquired image and “generat[ing] captions or semantic labels for an acquired image ...based upon similarity between the acquired image and one or more stored images that are maintained in an image database environment.” Stubler, [0030], [0009], [0011]. Stubler’s “captions or labels,” types

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<sup>2</sup> I have no opinion whether the preambles of the claims are limiting. But if they are, it is my opinion that they are disclosed or rendered obvious for the reasons discussed herein.

of keywords, reflect the content of the “region metadata ” and are “used as powerful tools for the storage, retrieval, and management of digital images within a digital image database environment.” Stubler, [0011], [0040], [0041]; *see also* Stubler, [0002] (“[A]ll of the images could be annotated with caption text or semantic labels, stored in a relational database and retrieved by keyword”). Thus, the computer (image retrieving device) detects objects (e.g., region metadata corresponding to faces) in the images and “assign[s] captions or semantic labels” (keywords) to the image in which the object is detected. Stubler, [0011].

71. Stubler further discloses using the detected objects and captions or semantic labels to cluster (classify) an image. Stubler, [0012], [0035]. For example, Stubler describes searching an image database for similar images and captions or semantic labels to determine whether the stored captions or semantic labels should be “extended” to a new/acquired image. Stubler [0012], [0035], FIG. 2. When “similarities are found (130) between the acquired images” (new images in which an object was detected) and “database images,” “preexisting captions or semantic labels from the matched clusters and groups in the database are extended (140) to the acquired images” having the detected object. Stubler, [0012], [0035]. That is, the acquired images are classified and stored using a caption or semantic label (keyword) that correspond to the objects (e.g., a face) detected in the image.

72. Annotated Figure 2 below illustrates a process by which the computer (image retrieving device) uses a program to classify (blue) an image by detecting/extracting “regional features” or metadata (detecting an object in the image) (gold) and adding captions or semantic labels (green) to the image.

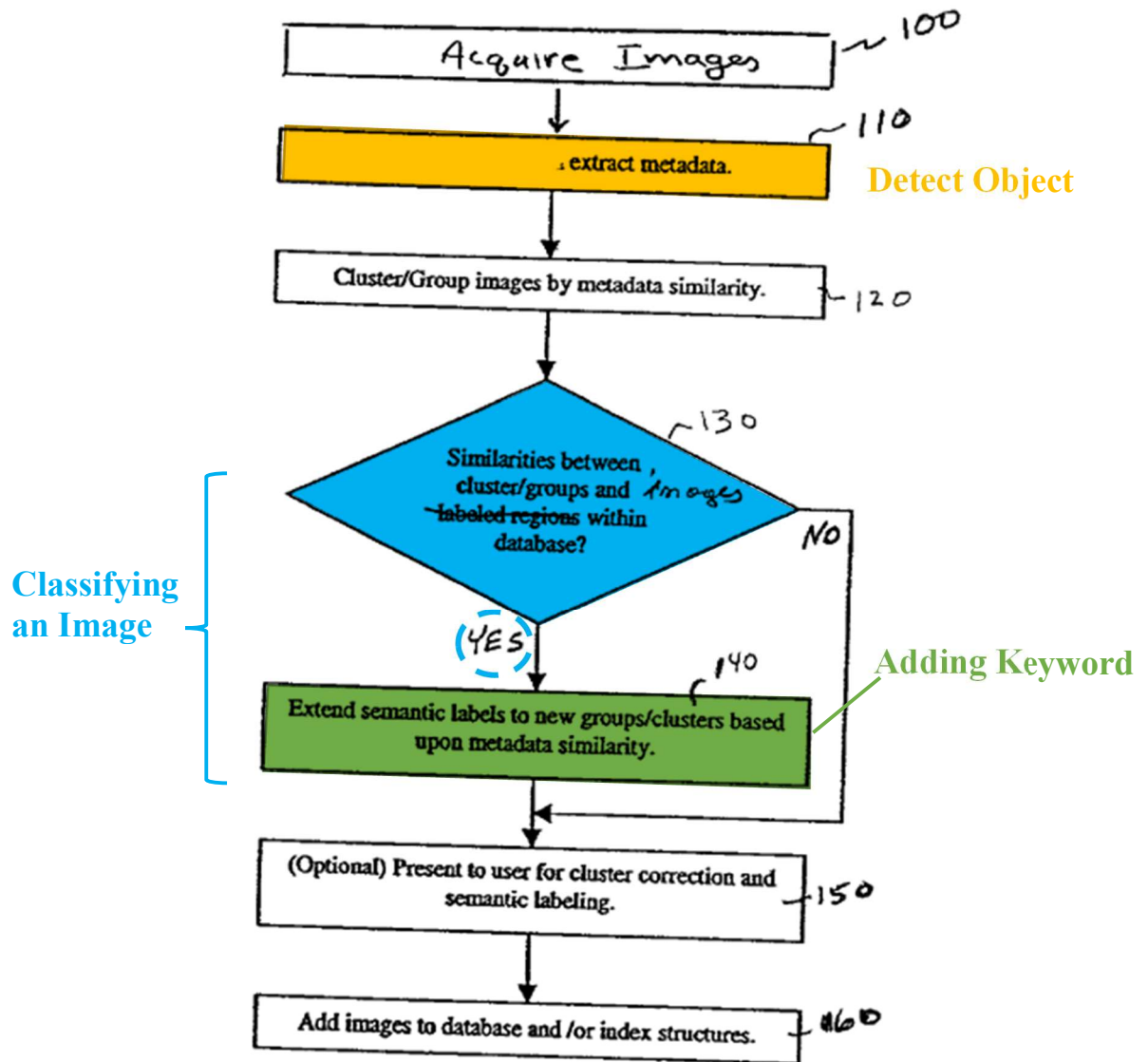
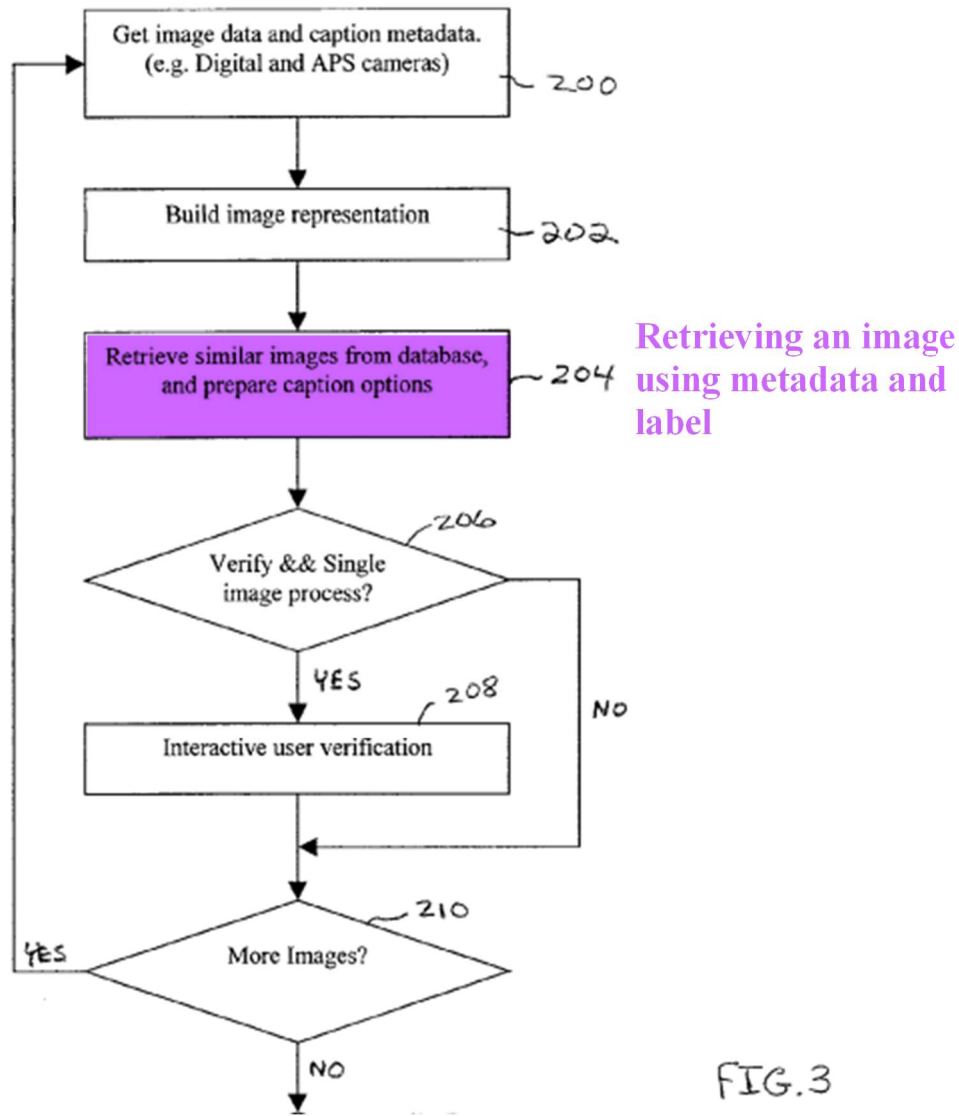


Figure 2 Block diagram of similarity based semantic labeling

Stubler, FIG. 2 (annotated).

73. Stubler further discloses using the detected objects and captions or semantic labels to retrieve an image. Stubler, [0002], [0035]. For example, Stubler explains that, “[i]f captioning or semantic labeling of the acquired images based on region metadata [(the detected object)] is desired (256), the database is searched (258) for any images with region metadata (e.g., face, sky, grass, skin, open space, etc.) similar to that of the acquired images, and repeated as needed (260) for similar regions until all images are analyzed.” Stubler, [0039] (emphasis added). That is, “a search of the database is performed, and similar images are retrieved (204) from the database” so that “a set of caption or semantic label options” can be “prepared” for the acquired images. Stubler, [0037], [0039], FIG. 3. Step 204 of Figure. 3 (excerpted below) shows this (purple).



Stubler, FIG. 3 (annotated, excerpted).

74. Stubler also explains that the acquired images may be stored in the database based on their matched region metadata (e.g., face, sky, grass, skin, open space, etc.) and the “labels associated with them,” so that they can be searched and retrieved. Stubler, [0012], [0035], [0040]; *see also* Stubler, [0002] (“[A]ll of the images could be annotated with caption text or semantic labels, stored in a

relational database *and retrieved* by keyword”) (emphasis added), [0011] (“A further advantage is that these semantic labels can subsequently be used as powerful tools for the storage, retrieval, and management of digital images within a digital image database environment.”).

75. Thus, it is my opinion that Stubler discloses a computer (image retrieving device) for classifying and retrieving an image by extracting “region metadata” (detecting an object in the image) in the image and adding “captions or semantic labels” (a keyword) to the image. Stubler, [0002], [0009], [0011], [0021], [0023], [0039], FIGS. 2-3.

**b. [1a]: “an image storing section for storing the image which is supposed to be classified and retrieved together with the keyword in a database and an object of the image being previously contained in the database;”**

76. In my opinion, Stubler discloses [1a] because it discloses a “software program” (image storing section) for storing in a database the “acquired image” (image to be classified and retrieved), “associated” and/or “preexisting captions or labels associated with the selected stored images” (the keyword), and “one or more stored images having metadata similar to the extracted metadata” (an object of the image being previously contained in the database). Stubler, [0009], [0012], [0021], [0024], [0035], [0039]-[0041]; *see* Ex. 1001, 4:5-7, 6:4-14 (describing image storing section as software).

77. First, as explained above, Stubler implements its disclosed image processing methods, including its method of storing images and other data using “software” or a “computer program” “stored in [a] conventional computer readable storage medium” such as “random access memory (RAM), or read only memory (ROM); or any other physical device or medium employed to store a computer program.” Stubler, [0021], [0023], [0024]. Regarding storing the acquired image, Stubler discloses that the “[n]ewly captioned and labeled images could also be sent *to the database memory 12*” for “storage.” Stubler, [0012], [0027] (emphasis added); *see also* Stubler, [0041] (“[I]mage groups are stored in the database.”). An exemplary process for storing the acquired images to be classified and retrieved (blue) is illustrated in annotated Figure 2 below:

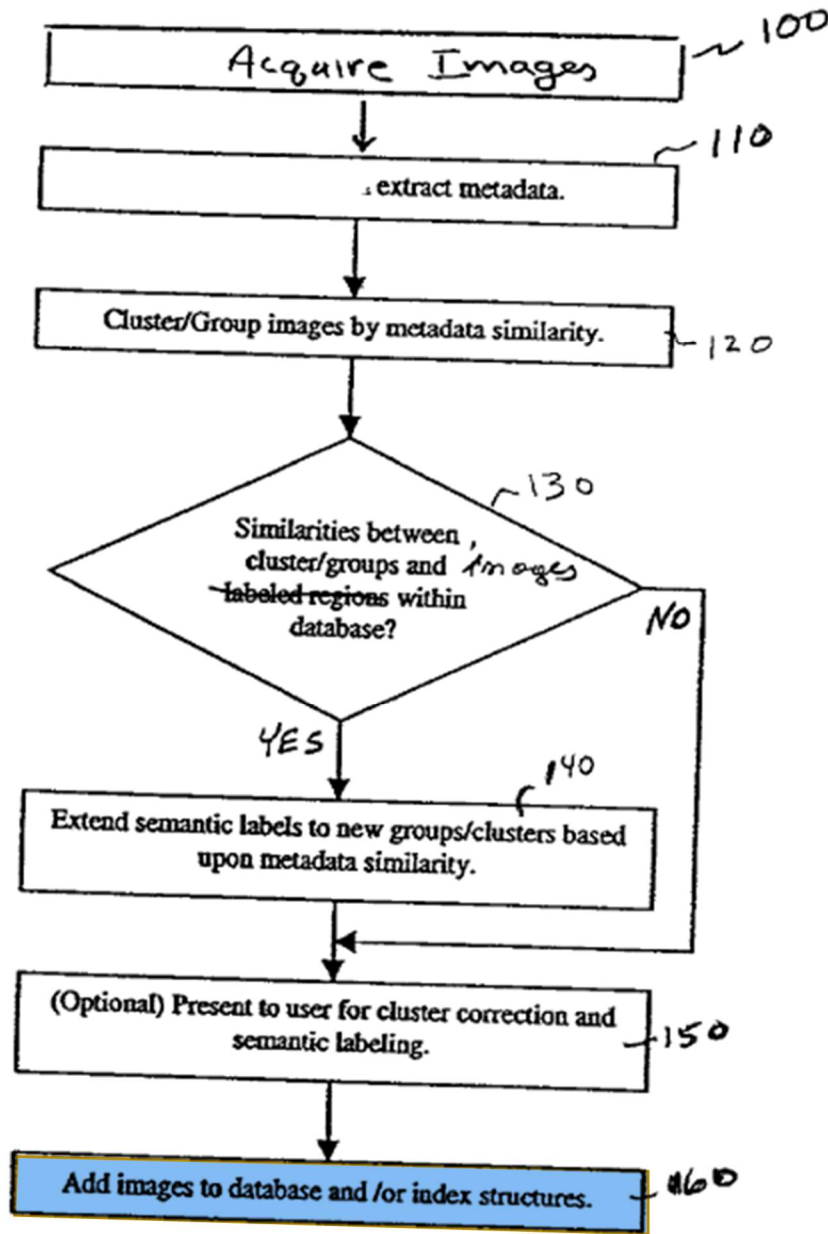


Figure 2 Block diagram of similarity based semantic labeling

Stubler, FIG. 2 (annotated).

78. As explained in [1preamble], the acquired image is supposed to be classified and retrieved. Stubler, [0002] (“[A]ll of the images could be annotated

with caption text or semantic labels, stored in a relational database and retrieved by keyword”), [0011] (“A further advantage is that these semantic labels can subsequently be used as powerful tools for the storage, retrieval, and management of digital images within a digital image database environment.”). The newly acquired images are also “indexed” (another form of classification) when “[f]inally” stored. Stubler, [0036] (“Finally, the images are added (160) to the database and/or its index structure.”), FIG. 2.

79. Second, Stubler discloses storing the newly acquired image (image to be classified and retrieved) together with its associated “captions or semantic labels” and/or previously stored captions or semantic labels. Stubler, [0022], [0024], [0027], [0035]. For example, Stubler discloses storing the “captions or semantic labels” applied to the newly captured image in the database. Stubler, [0027] (“Newly captioned and labeled images could also be sent to the database memory 12 or to the server 16 for indexing and storage.”), [0041], FIG. 6. Annotated Figure 6 below illustrates storing the captions or semantic labels (keywords) associated with the newly acquired image in the database (blue) during the “Interactive User Verification” process.

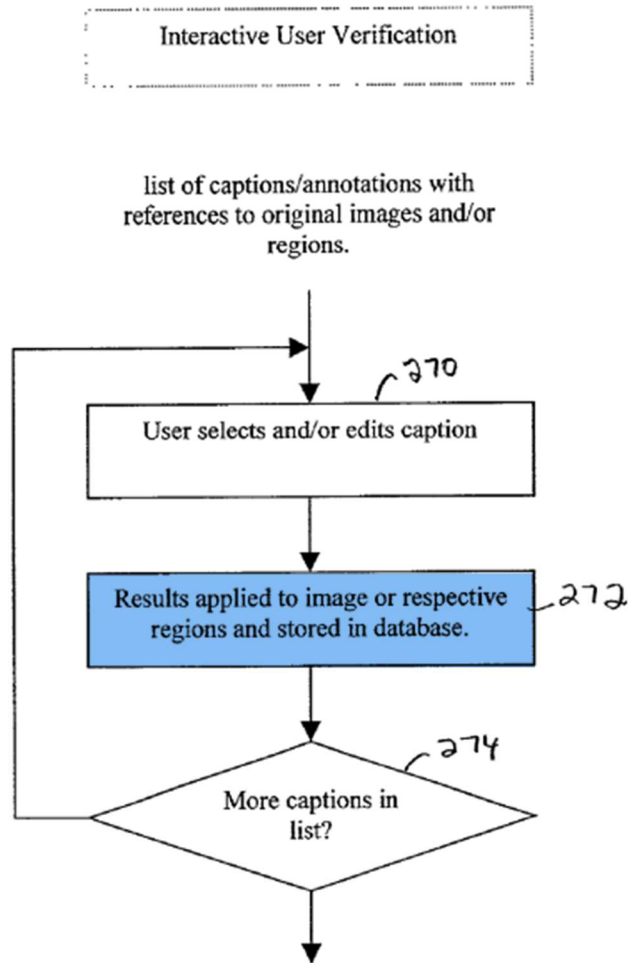


FIG. 6

Stubler, FIG. 6 (annotated).

80. Regarding the previously stored image captions or semantic labels, Stubler explains that “[t]he images in the database will have preexisting captions or semantic labels associated with them. These captions and semantic labels may have been derived from the instant process, as previously applied to acquired images that are now stored in the database, or from some other process, including manual annotation.” Stubler, [0035]. Thus, Stubler discloses storing the newly acquired images together with their captions or semantic labels and/or previously stored captions or semantic labels (keywords).

81. Stubler further discloses storing the newly acquired image with a previously contained/previously acquired object of the image because as explained in [1preamble], the newly acquired images are stored and classified with previously contained images containing the same “region[al] metadata” (object). Stubler, [0035], [0041], claim 25. For example, Stubler explains that when “captioning or semantic labeling of ... acquired images based on region metadata is desired (256), *the database is searched (258) for any images with region metadata (e.g., face, sky, grass, skin, open space, etc.) similar to that of the acquired images*, and repeated as needed (260) for similar regions until all images are analyzed.” Stubler, [0040] (emphases added), FIG. 5. That is, the database is searched for an object of the image that is previously contained in the database. When a match is found, the newly acquired image is classified with images

containing the same regional metadata. Stubler, [0040], claim 25 (method including “automatically extending the global captions or labels to other images in the group having the same global metadata and the regional captions or labels to other images in the group having *the same regional metadata*” (emphasis added)). Thus Stubler also discloses storing the acquired image with an object of the image previously contained in the database.

82. I have also been asked to consider whether Stubler discloses 1[a] if the “image storing section” *is* a database<sup>3</sup> for storing the image which is supposed to be classified and retrieved together with the keyword in a database and an object of the image being previously contained in the database. In my opinion, Stubler discloses this, as described above. Stubler, [0012], [0035], [0036], [0040]-[0041], claim 25, FIGS. 2, 5-6. That is, Stubler discloses a database for storing a newly acquired image, Stubler, [0002], [0011], [0036], FIG. 2, together with their captions or semantic labels and/or previously stored captions or semantic labels (keywords), Stubler, [0022], [0024], [0027], [0035], FIG. 6, and region metadata

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<sup>3</sup> It is my opinion that such an argument would appear to impart ambiguity or redundancy to the claim, which would effectively read “[*a database*] for storing the image which is supposed to be classified and retrieved together with a keyword *in a database*.”

(an object of the image) previously contained in the database. Stubler, [0035], [0040], [0041], claim 25.

**c. [1b]: “an image inputting detecting section that detects an inputted image that is newly inputted to the image retrieving device;”**

83. In my opinion, Stubler discloses or renders obvious [1b] because Stubler’s computer “assign[s] captions or semantic labels to new images.” Stubler, [0023]. For example, its software detects a newly inputted image when the image is “loaded for the first time” from an external device, such as a memory card, or when the images have “not yet been annotated” or are “unlabeled” (e.g., new). Stubler, [0006], [0012], [0021], [0022], [0023], [0026], [0029]; *see* Ex. 1001, 7:19-21, 11:10-12.<sup>4</sup>

84. Stubler explains that its computer, using a “memory card reader,” may acquire images from an external “memory card” for processing.<sup>5</sup> Stubler, [0026], [0028] (“Initially, images are acquired (100), e.g., from a digital source such as

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<sup>4</sup> The ’807 patent does not identify process for detecting a new image. *See* Ex. 1001, 7:19-21, 11:10-12.

<sup>5</sup> New images may also be acquired using “a network interface 26 for acquiring images from a network source, such as e-mail, through the interconnecting network 18.” Stubler, [0026].

the card reader 24 or the network interface 26, and metadata is extracted (110) from certain features in or related to the images.”), FIG. 2. Stubler further explains that its computer/software program identifies images that have “not yet been annotated” or are “unlabeled.” Stubler, [0006], [0012], [0022], [0029], claims 5-6, FIG. 2.

85. Stubler’s computer “assign[s] captions or semantic labels to new images.” Stubler, [0023]. A POSITA would have understood that Stubler’s software detects a newly inputted image when it “acquire[s]” the image from the external memory card because acquiring the image requires identifying the presence of an external image file. Stubler, [0028]. The “new[ly] acquired image” is newly inputted because it does not originate from within the computer and is “loaded for the first time” into memory from the external memory card. Stubler, [0006], [0028], [0035]. A POSITA would have also understood that Stubler detects newly inputted images because by ascertaining whether the newly acquired images require labeling, for example, because the image has “not yet been annotated” or is “unlabeled,” or “similarities” between the inputted image and stored images do not exist. Stubler, [0006], [0012], [0022], [0035], FIG. 2. Accordingly, a POSITA would have understood that Stubler detects a newly inputted image to the image retrieving device.

86. Stubler explains that the functionality and methods described “would ordinarily be implemented as a software program” and that “the software needed for implementation of the method is within the ordinary skill in such arts.” Stubler, [0021]. Stubler also explains that the functionality could be “implemented as a computer program” stored in various types of memory. Stubler, [0021].

87. I have also been asked to consider whether, if Stubler is found not to disclose [1b], Stubler would have rendered obvious 1[b] to a POSITA. In my opinion, it would have.

**i. Motivation**

88. In my opinion, a POSITA would have been motivated and found it obvious to implement a computer program or software for detecting a newly inputted image in Stubler’s computer to ensure the device knows when an image is available for processing, and whether to extend stored captions or labels to the image. Further, a POSITA would have found it obvious to try integrating detecting functionality into Stubler’s system, which would yield the predictable result of informing the computer (image retrieving device) when an image is available for processing. A POSITA would have also appreciated that this detection would have improved Stubler’s system by automating the process through which inputted images are identified. Indeed, automating the image detecting process such that the system knows when a new image has been inputted and is ready for processing

would have furthered Stubler's goal of "reducing the effort required of the user."

Stubler, [0022].

**ii. Expectation of Success**

89. In my opinion, a POSITA would have recognized that modifying Stubler's computer (image retrieving device) to include an image inputting detecting section for detecting a newly inputted image would have only required routine skill to implement. *See e.g.*, Stubler, [0021]. Indeed, Stubler explains that "the software needed for implementation of the method is within the ordinary skill in such arts;" therefore, a POSITA would have reasonably expected to succeed in implementing this element through software or a computer program. Stubler, [0021].

90. Furthermore, detecting a newly inputted image would have been a straightforward application of known, conventional software operations used according to their known functions to yield predictable results. For example, a POSITA would have availed themselves to known, conventional, software operations, and implemented code that enables the computer to detect a newly inputted image (e.g., by determining that it originates from an external source) to yield predictable results.

**d. [1c]: “an object acknowledging section for acknowledging an inputted object in the inputted image that has been detected by the image inputting detecting section;”**

91. In my opinion, Stubler discloses [1c] because, as explained in [1preable], the computer program or software stored on the computer readable storage medium “detect[s]<sup>[6]</sup> regional features,” such as “face, skin, sky, grass, open space, background vs. foreground, and the like” (objects) in the newly acquired image. Stubler, [0011], [0021], [0030]. The inputted object or “regional feature[]” is detected in the newly inputted image detected by the inputting detection section described in [1b].

92. For example, Stubler’s program can use “[v]arious well-known techniques,” such as algorithms, to detect objects, such as a human face, in the newly acquired image, including those described in Sung (Ex. 1007); U.S. Patent Application No. 09/223,860, titled “Method for Automatic Determination of Main

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<sup>6</sup> According to the ’807 patent, objects can be “acknowledged” by being “detected.” Ex. 1001, 4:7-11 (“a new predetermined object which is inputted in the image (such as a human or a car) is acknowledged (detected) by the object acknowledging section.”).

Subjects in Photographic Images,” (Luo, Ex. 1008<sup>7</sup>), and Jie Yang and Alex Waibel, *A Real-time Face Tracker*, Proceedings of Third IEEE Workshop on Applications of Computer Vision, WACV , pp. 142-47 (1996) (Yang, Ex. 1009). Stubler, [0030]. Stubler’s program can also use, for example, “histogram analysis” to “detect skin color in a chromatic space” corresponding to a face contained the inputted image. Stubler, [0030]. These well-known techniques are incorporated by reference into Stubler, and further discussed in claim 2, *infra*.

93. Accordingly, it is my opinion that Stubler discloses a computer program or software for acknowledging an object, such as a face, in the detected inputted image.

- e. **[1d]: “a keyword proposing section for proposing the keyword on a display, the keyword which relates to the inputted object which is acknowledged by the object acknowledging section; and”**

94. In my opinion, Stubler discloses [1d] because a computer program or software stored in the computer readable storage medium proposes the “captions or semantic labels” extended to the objects, such as a regional feature or region

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<sup>7</sup> Luo issued as US Patent No, 6,282,317 on August 28, 2001, prior to the earliest priority date of the ’807 patent. Luo (Ex. 1008), cover page. Citations to Luo are to the issued patent.

metadata (e.g., face), identified by the analyses in [1c] (e.g., the keyword that relates to the acknowledged input object) “to the user for verification.” Stubler, [0021], [0024], [0036], [0040].

95. As explained for [1preamble], when “similarities are found (130) between the acquired images and the database images,” such as similarities in region metadata, “then the preexisting captions or semantic labels from the matched clusters and groups in the database are extended (140) to the acquired images.” Stubler, [0012], [0035]. Stubler further discloses that the images may be classified using a “hierarchical clustering method,” such as described in Anil K. Jain and Richard C. Dubes, *Algorithms for Clustering Data* (Prentice-Hall, Inc. 1988) (Jain, Ex. 1011). Stubler, [0031], [0036]; *see infra* claim 6. Thus, the acquired images are classified with proposed labels (keywords) based on having similar region metadata (detected objects) according to a prescribed process (algorithm). Stubler, [0012], [0031], [0035].

96. The images, their proposed “extended captions or semantic labels,” and classifications (also called “groups” or “clusters”) may be presented to the user using “standard output” “display device 32” connected to the computer. Stubler, [0027], [0036], [0040], [0041].

97. For example, Stubler explains that,

[i]f captioning or semantic labeling of the acquired images based on region metadata is desired (256), the database is searched (258) for any images with region metadata [inputted object acknowledged by the object acknowledging section in [1c]] (e.g., face, sky, grass, skin, open space, etc.) similar to that of the acquired images, and repeated as needed (260) for similar regions until all images are analyzed. Then the *captions or semantic labels for the regional aspects* of the retrieved and matched images *are prepared as options* (262) for extension to the acquired images.

Stubler, [0040] (emphases added), FIG. 5.

98. This “caption list or semantic label list, and/or regional annotation list” is presented to the user “on the display device 32” as a “user-friendly list of [*sic*: caption] or semantic labels, and/or regional annotations, for each acquired image.” Stubler, [0040], [0041]; *see also* Stubler, [0041] (“[T]he list is presented to the user, e.g., on the display device 32, and the user may select and/or edit (270) the captions or labels.”), FIGS. 5-6. Annotated Figures 5 and 6 below illustrate a process by which captions or semantic labels (also called “annotations”) (keywords) are prepared for proposal to the user on a display (grey), presented to the user on a display for verification (light green), and edited by the user (green). Stubler, FIGS. 5-6.

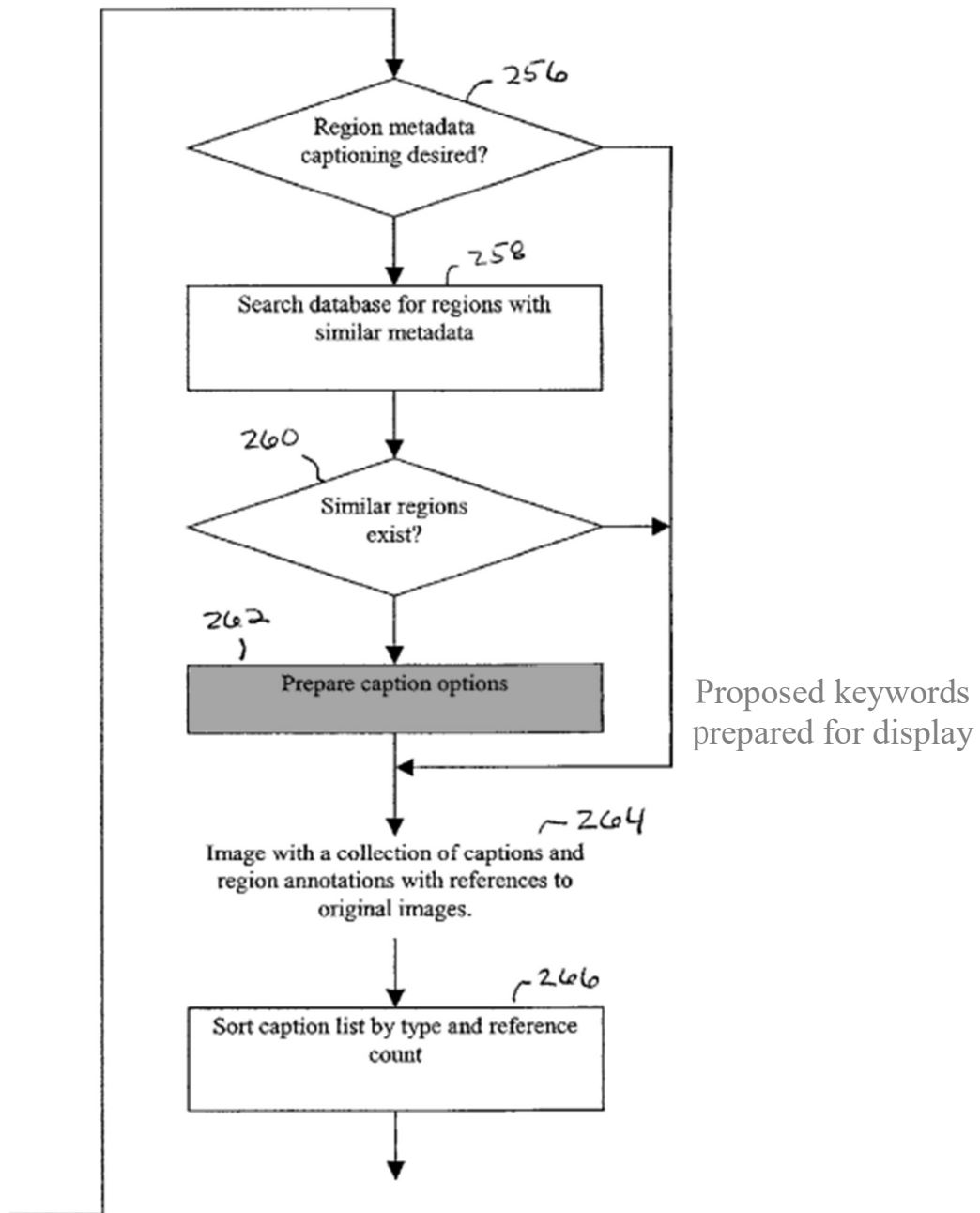


FIG 5

Stubler, FIG. 5 (annotated, excerpted).

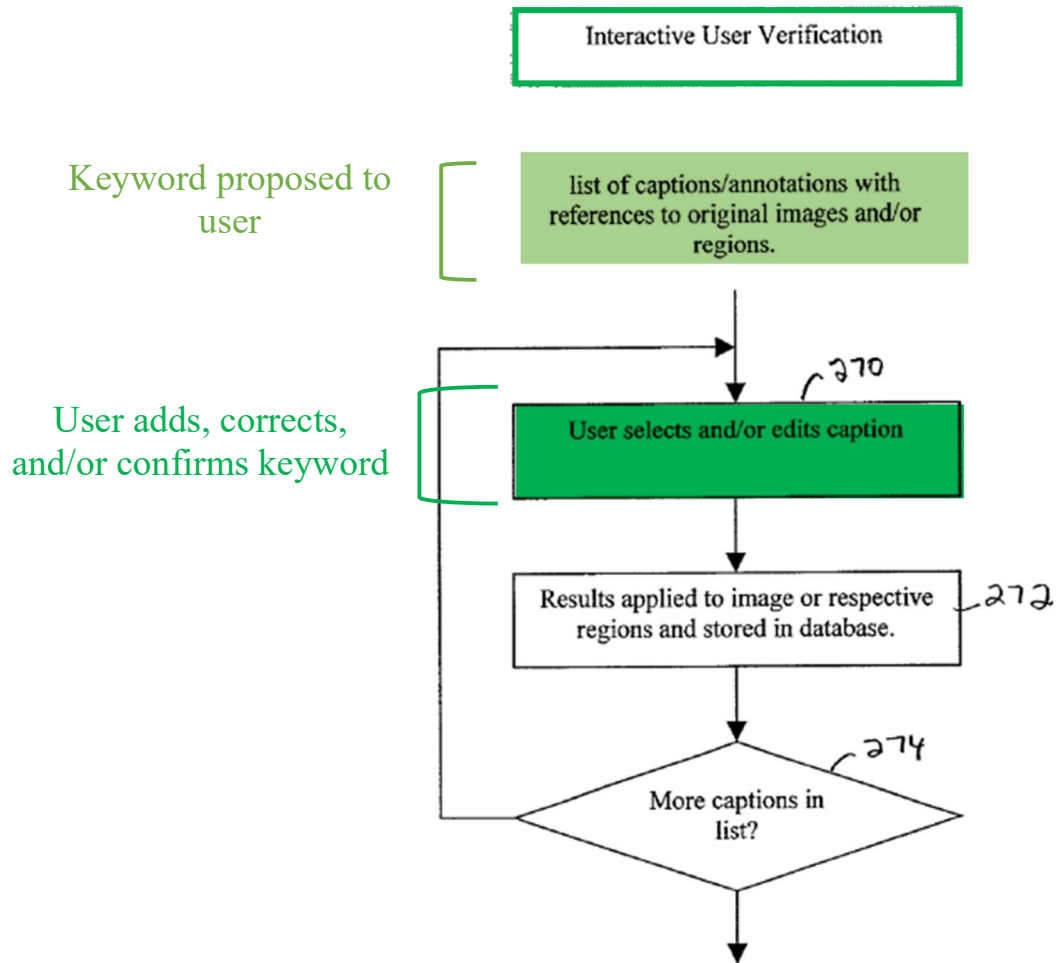


FIG. 6

Stubler, FIG. 6 (annotated).

99. Accordingly, it is my opinion that Stubler discloses a computer program or software (a keyword proposing section) for proposing the captions and

semantic labels for the detected regional metadata (e.g., faces) of the acquired image (keyword that relates to the inputted object which is acknowledged by the object acknowledging section) on the computer's display.

- f. **[1e]: “an object information inputting section for confirming by the user, adding, and correcting the keyword which is proposed by the keyword proposing section when the inputted object acknowledged by the object acknowledging section is similar to the object of the image previously contained in the database. ”**

100. In my opinion, Stubler discloses [1e] because the computer includes an “interactive user verification” computer program or software stored in the memory on the computer allows the user to “verify” (e.g., confirm, add, and correct) the proposed caption or semantic label associated with the acquired image when the region metadata (object), e.g., a face, in the image is similar to one previously contained in the database. Stubler, [0025], [0037], [0040], [0041] FIG. 6.

101. As explained in [1d], Stubler discloses that,

[i]f captioning or semantic labeling of the acquired images based on region metadata is desired (256), the database is searched (258) for any images with region metadata (e.g., face, sky, grass, skin, open space, etc.) similar to that of the acquired images, and repeated as needed (260) *for similar regions* until all images are analyzed. Then the *captions or semantic labels for the regional aspects* of the retrieved and *matched images are prepared as options*.

Stubler, [0040] (emphases added).

102. The prepared list is then “presented to the user, e.g., on the display device 32,” as a “user-friendly list of capture [sic: caption] or semantic labels, and/or regional annotations, for each acquired image.” Stubler, [0040]-[0041]. Once presented with the list, the user may verify the labels for the image, for example, the user may “select and/or edit (270) the captions or labels” shown in the list for the “respective regions (for region metadata)” and “the image (for capture and global metadata),” which allows the user to confirm or correct a label or add a new label through the selection and editing process. Stubler, [0037], [0041], FIGS. 3, 5-6, claim 30; *see also* Stubler, [0036] (user may “rearrange the clusters to correct any erroneously associated images” or “assign captions or semantic labels to the resultant groups at any level of the hierarchy with the caption or label being applied to each member of the group.”). This disclosure is consistent with the ’807 patent which explains that “the user confirms, adds, or corrects the proposed keywords in the object information inputting step.” Ex. 1001, 5:61-63; *see also* Ex. 1001, 7:41-43 (“The object information inputting section 106 serves for a user to *select* an object information among the proposed keywords *or to input/update the keywords.*”(emphases added)), 12:7-11 (“[T]he user may select the human information according to the keyword information which [is] proposed

by the image detecting device 100 or the user may input/update the keyword (see FIGS. 3 and 4”).

103. Annotated Figure 6 below shows an example of how the user “edit[s]”, (adds or corrects) and/or “select[s]” (confirms) the proposed caption or semantic label (keyword). Stubler, [0041], FIG. 6. A POSITA would have understood that “editing” includes adding and/or correcting a proposed caption or semantic label because, for example, the user can change the label to be either a different previously stored label or a new label that was not previously stored. A POSITA also would have known that such additions or corrections were routine—for example, to fix an improperly extended label or to add a label to region metadata (e.g., to label a different face or a new person for the identified face) that was overlooked in the image. After the user finishes editing or selecting the captions or semantic labels, “the results are applied (272) to the image (for capture and global metadata) or to respective regions (for region metadata) and stored in the database.” Stubler, [0041], FIG. 6.

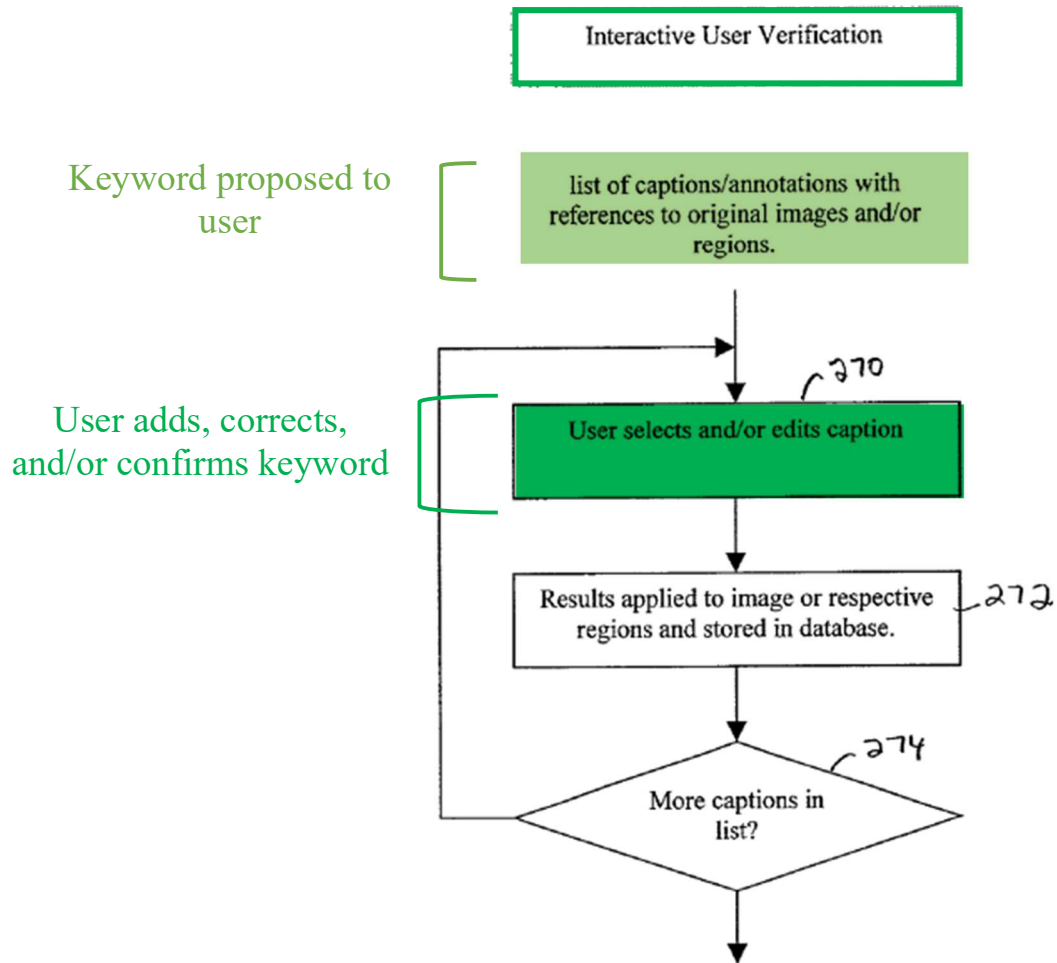


FIG. 6

Stubler, FIG. 6 (annotated).

104. Accordingly, it is my opinion that Stubler discloses a computer program or software that allows the user to confirm, add, and correct the caption or

semantic label (keyword) that is proposed by the keyword proposing section when the inputted object acknowledged by the object acknowledging section is similar to the object of the image previously contained in the database. Stubler, [0025], [0037], [0040], [0041], FIG. 6, claim 30.

105. I have also been asked to consider whether, if Stubler is found not to disclose [1e], Stubler would have rendered obvious [1e] to a POSITA. In my opinion, it would have.

**i. Motivation**

106. In my opinion, a POSITA would have been motivated and found it obvious to incorporate functionality for confirming, adding, and/or correcting the proposed caption or semantic label into Stubler's interactive user verification program, to provide the user with an array of editing tools that ensures the images are properly labeled. Such a modification would have furthered Stubler's goal of allowing the user to "verify" the caption or semantic labels associated with the region metadata in the image and ensured proper image classification. Stubler, [0037], [0041]. For example, including this functionality in Stubler's system would have allowed the user to confirm that the proposed label is correct (e.g., by selecting the proposed caption or semantic label from the list and thereby confirming that the proposed label should be extended to the acquired image); correct an improperly extended label (e.g., by editing a proposed label that does

not correctly identify the object, such as the wrong name proposed for a face); and/or add to the proposed caption or semantic label (e.g., by editing the label's text to include additional words, replacing the proposed label with a label that does not already exist in the database, such as a new name for a person identified in an image, or by adding another label that corresponds to another object in the same image). A POSITA would have been motivated to provide these functionalities so that a user could properly identify various objects in an image without having to rely solely on the program's own determinations and also to better help the program identify various objects that the user is taking images of.

107. Further, a POSITA would have found it obvious to try integrating this functionality into Stubler's system to yield the predictable result enabling the user to verify, update, or otherwise correct the proposed caption or semantic label by selecting or editing the captions so that the erroneous proposals can be corrected and the correct captions can be applied. A POSITA would have also appreciated that this functionality would have improved Stubler's system by ensuring the user has the requisite tools to properly classify images and subsequently retrieve them from storage using the proper/desired caption or semantic labels. The modification would have also required only routine skill to implement because as Stubler explains, "the software needed for implementation of the method is within the ordinary skill in such arts." Stubler, [0021].

**ii. Expectation of Success**

108. It is also my opinion that incorporating functionality for confirming, adding, and/or correcting proposed captions or semantic labels into Stubler's "interactive user verification" program would have only required routine skill to implement and been well within the POSITA's ability to implement. Stubler, [0021], [0037], [0040]-[0041]. Stubler acknowledges this, explaining that "the software needed for implementation of the method is within the ordinary skill in such arts." Stubler, [0021].

109. In my opinion, a POSITA would have commonly implemented user interfaces for these systems as part of the routine process for building such systems. Software libraries were commonly available that would have allowed a POSITA to add user buttons, text editing boxes, drop down menus, and other common user interface elements, with minimal coding. At the time of the invention, it was common for me, and would have also been common for a POSITA, to add such features to existing code to improve user friendliness, even if it was not needed for the task. In my opinion, POSITAs at the time also would have done the same to expand the functionality of Stubler's systems and to improve the user's interface using the expanded the functionality. Such additional effort would have been viewed by a POSITA as minimal compared to the design and implementation of the complex parts of the system, but also been viewed as

beneficial to improve the functionality and user experience of the system. A POSITA would have been motivated to utilize such established, standard software procedures and to create the necessary code to reliably achieve predictable outcomes, such as editing (e.g., with a common textbox or drop down menu) or confirming (e.g., by selection) the suggested caption or semantic label. Thus, implementing the functionality of confirming, adding, and/or correcting proposed caption or semantic label would have been a straightforward application of known, conventional software operations (label verification) used according to their known functions to yield predictable results (allowing the user to confirm the label, alter the label, and insert a new label for the proposed captions or semantic labels).

**2. Claim 2:**

- a. [2preamble]: “An image retrieving device according to claim 1, wherein the object acknowledging section includes:”**

110. In my opinion, Stubler discloses [2preamble]. Stubler’s computer includes an object acknowledging section as explained in [1c]. Stubler, [0011], [0030]. The software may use “[v]arious well-known techniques” or algorithms to detect a human face in the acquired image and/or a “histogram analysis” to “detect skin color in a chromatic space, for example, those described Sung (Ex. 1007), as explained in [2a]-[2c] below.

**b. [2a]: “a human detection condition inputting section for setting up conditions for determining whether or not the image contains a human;”**

111. In my opinion, Stubler discloses the additional limitations of [2a] because the software for acknowledging an object (as explained in [1c]) detects *human* faces using well-known techniques, including, for instance, “typical face detection method[s]” described in Sung, Luo, and Yang, each of which is incorporated by reference. Stubler, [0030] (describing and incorporating by reference Sung (Ex. 1007), Luo (Ex. 1008), and Yang (Ex. 1009)).

112. For example, Stubler teaches that Sung discloses “a typical face detection method” to detect human faces in Stubler’s system and incorporates Sung by reference. Stubler, [0030]. Sung discloses “a generic human face detection system that finds vertically oriented and unoccluded frontal views of human faces.” Sung (Ex. 1007), 1.<sup>8</sup> The system uses a “distribution-based generic face model” algorithm that trains a “decision procedure on a sequence of ‘face’ and ‘nonface’ examples, to empirically discover a set of operating parameters and thresholds that differentiate[] ‘face’ patterns from ‘nonface’ patterns.” Sung (Ex. 1007), 2. Stubler explains that U.S. Patent Application 09/223,860 to Luo, which is also incorporated by reference, teaches “identifying a main subject”

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<sup>8</sup> Unless otherwise noted, citations are to the exhibit page number.

in an image. Stubler, [0030]. Luo discloses a “primitive face detection algorithm” that “combines the flesh map output by the flesh detection algorithm with other face heuristics to output a belief in the location of faces in an image. Each region in an image that is identified as a flesh region is fitted with an ellipse.”

Luo (Ex. 1008), 13:19-32. Stubler explains that Yang discloses a “typical model for representing skin color in a chromatic space utilizing [a] histogram analysis,” and is also incorporated by reference. Stubler, [0030]. Yang discloses various techniques for detecting human faces, including using “[e]igenfaces,” which are “commonly used to identify faces”; “clustering techniques”; and “searching for ... skin-color.” Yang (Ex. 1009), 1. *See also* Turk (Ex. 1010), 1 (using “eigenfaces” to “locate and track a subject’s head, and then recognize the person by comparing characteristics of the face to those of known individuals.”).

113. Detecting a human’s face correlates to detecting human skin and faces. For example, facial detection algorithms at the time typically relied on various features, such as facial structure and skin color. Techniques, such as eigenfaces, excelled at identifying facial structure, but did not utilize skin color, and could misidentify some objects as faces that were not. Color-based clustering techniques, such as identifying skin color, could identify skin, but also tended to include other objects that contained similar tones. It was, therefore, common to combine different techniques, such as facial recognition and skin color detection,

to provide more robust facial detection, e.g., to detect only areas with correct facial structure, as identified with eigenface approaches, and areas with correct skin colors, as identified by color-based clustering, so that only areas meeting both criteria would have been identified as containing faces. In my opinion, a POSITA would have appreciated the benefits of this implementation to avoid false positives for facial detection, would have understood the impact to improve facial detection, and would have easily been able to implement such approaches, as indicated by Stubler.

114. These techniques in Stubler describe “conditions”<sup>9</sup> where the software determines whether an acquired image includes a *human* face; thus, Stubler discloses [2a], including through its incorporation of Sung, Luo, and Yang, discloses [2a]. Stubler, [0030]; Sung (Ex. 1007), 2; Luo (Ex. 1008), 13:19-32; Yang (Ex. 1009), 1.

**c. [2b]: “a face image detecting section for detecting a face image in the image; and”**

115. In my opinion, Stubler discloses the additional limitations of [2b] because, as explained for [2a], Stubler’s software detects human *faces* using well-

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<sup>9</sup> The ’807 patent also describes “conditions” as techniques for determining an object. Ex. 1001, 4:35-38 (describing skin color detection as a “condition” for determining whether an image includes a human).

known techniques, including, for instance, the “typical face detection method[s]” described in Sung, Luo, and Yang, which are incorporated by reference into Stubler. Stubler, [0030]; Sung (Ex. 1007), 2; Luo (Ex. 1008), 13:19-32; Yang (Ex. 1009), 1.

- d. **[2c]: “a face image similarity determining section for detecting a face image which is detected by the face image detecting section so as to detect a similar face image stored in the database according to the detected face imaged.”**

116. In my opinion, Stubler discloses the additional limitations of [2c] because its software “measur[es] similarities between the images,” e.g., similarities between the region metadata (“e.g., faces”) in the images, using known algorithms. Stubler, [0011]-[0012], [0031], [0034].

117. As explained for [1preamble] and [1a], Stubler discloses storing previously acquired image objects (e.g., faces) in a database. Stubler, [0035], [0040], [0041], claim 25. For example, Stubler explains that when “captioning or semantic labeling of ... acquired images based on region metadata is desired (256), *the database is searched (258) for any images with region metadata (e.g., face, sky, grass, skin, open space, etc.) similar to that of the acquired images*, and repeated as needed (260) for similar regions until all images are analyzed.” Stubler, [0040] (emphases added), FIG. 5.

118. Stubler further explains that a “determination of facial similarity” may be ascertained using the algorithms described in Matthew Turk and Alex Pentland, *Eigenfaces for Recognition*, J. Cognitive Neurosci., 3(1), pp. 71-86 (1991) (Turk, Ex. 1010), which Stubler incorporates by reference. Stubler, [0034].

**3. Claim 3: “An image retrieving device according to claim 2 wherein the object information inputting section serves as a personal information inputting section for confirming, adding, and correcting a personal information.”**

119. In my opinion, Stubler discloses or renders obvious the additional limitations of claim 3 because, as explained in [1e], “the user may select and/or edit (270) the captions or labels” associated with images corresponding to similar faces. Stubler, [0030]-[0031], [0041].

120. For example, Stubler explains that “many salient features of images exist only in the mind of the user and need to be communicated somehow to the machine in order to index the image.” Stubler, [0002]. A POSITA would have understood that such salient features would have encompassed personal information corresponding to the regional metadata, e.g., names corresponding to the detected face(s) or place(s), in the image to be indexed. For example, Stubler discloses that “keyword-based attributes” (semantic labels and captions) are meant to be “personally meaningful to the user,” and a POSITA would have understood that personal information, such as the name or relationship of a person whose face is in the image, is one of the simplest and most intuitive salient keywords to use to

index or label the image. Stubler, [0004], [0028]; *see also* Wang, 4:27-33

(“[P]erson-identifying data of a face image may include the name of the person, affiliation or employment of the person, and time and occasion of last meeting or all of the previous meetings with the person”).

121. As one example, a personal information label, such “*Susie*” or “*sister*,” would have also been more “personally meaningful” than a label that merely corresponds to a generic attribute, such as “*girl*” or “*brunette woman*,” and also be based on personal information of Susie in the image. Thus, a POSITA would have understood that Stubler’s software (object information inputting section) serves as a personal information inputting section for confirming, adding, and correcting personal information. *See also supra* [1e] (explaining why Stubler discloses or renders obvious confirming, adding, and correcting a proposed keyword).

122. I have also been asked to consider whether, if Stubler is found not to disclose the additional limitations of claim 3, Stubler would have rendered obvious the additional limitations of claim 3 to a POSITA. In my opinion, a POSITA would have found claim 3 obvious because it would have comported with Stubler’s goal of ascribing “personally meaningful” captions or semantic labels to the acquired and stored images and improved the classifying and retrieval process. Stubler, [0004], [0011], [0028].

**a. Motivation**

123. In my opinion, a POSITA would have been motivated and found it obvious to use Stubler's computer program or software (object information inputting section), as discussed in [1e], to allow the user to classify and label the images using the "personally meaningful" descriptors disclosed by Stubler. Stubler, [0004], [0011], [0028].

124. Indeed, Stubler does not restrict the user's input for captions or labels to a particular type of information and a POSITA would have understood that the user, once prompted, would be free to type personal information (or any other kind of information) while editing or adding to the proposed caption or semantic label. Using the program for this purpose would have furthered Stubler's goal of allowing the user to "verify" the caption or semantic labels associated with "personally meaningful" region metadata in the image (such as name corresponding to a place or face) and ensured proper image classification. Stubler, [0028], [0037], [0041].

125. For example, the a POSITA would have been motivated to allow the user to confirm, add, or correct personal information using the object information inputting section to allow the user to correct an improperly extended label, such as a name label that does not correctly identify the face of a person within the image,

and/or to add a label to region metadata that was overlooked in the image, such as a name label corresponding to another face within the image..

126. Further, a POSITA would have found it obvious to try integrating this functionality into Stubler's system to yield the predictable result of improving image classification and retrieval using captions or semantic labels that particularly identify, e.g., the person or place in the image. The modification would have also required only routine skill to implement because as Stubler explains, "the software needed for implementation of the method is within the ordinary skill in such arts." Stubler, [0021].

**b. Expectation of Success**

127. It is also my opinion that a POSITA would have had a reasonable expectation of success in using Stubler's object information inputting section software (described in [1e]) to allow a user to confirm, add, and/or correct personal information corresponding to an object in the image, which would have merely required using Stubler's existing software and hardware in accordance with their intended purpose, such as inputting information, as explained in [1e]. Stubler does not limit the keywords, captions, or labels that can be input or altered by a user; therefore, a POSITA would have reasonably expected personal information inputs to comply with Stubler's existing functionality. Furthermore, personal information, such as a name, is merely a word that is used to correlate similar images and so

would operate the same as Stubler's other detection, recommendation, and correlation software.

128. A POSITA would have reasonably expected to succeed in inputting personal information as part of Stubler's editing process which would have merely required using Stubler's existing software and hardware in accordance with their intended purpose, such as inputting information, as explained in [1e]. For example, a POSITA would have expected a user to succeed in typing (using Stubler's keyboard) a name (a type of personal information) of the person whose face is identified in the image, when editing (by adding or correcting) the proposed caption or semantic label. Such edits would have been expected when e.g., adding (to) a label corresponding to the name of the person/place in the image or correcting a label so that it correctly identifies the name of a the person/place in the image.

129. Thus, using Stubler's disclosed user verification program to confirm, add, and/or correct personal information contained in the proposed caption or semantic label would have been a straightforward application of known, conventional software operations used according to their known functions to yield predictable results.

4. **Claim 4: “An image retrieving device according to claim 2 further comprising a skin color area detecting section for detecting a skin color area in the image, wherein the skin color area detecting section is used when the human is detected.”**

130. In my opinion, Stubler discloses the additional limitations of claim 4 because, as explained in [1c] and [2a], Stubler’s computer (image retrieving device) includes software for detecting human “skin,” which is type of “region metadata,” when the human is detected, for example, using well-known techniques described in Yang. Stubler, [0011], [0030].

131. Stubler explains that “[v]arious well-known techniques may be used to detect region metadata” in the acquired image, including “skin color.” Stubler, [0030]. A POSITA would have understood that Stubler may employ several of the disclosed techniques to allow multiple types of region metadata to be detected in the image, without limitation. Stubler, [0030], [0038] (“[I]f region metadata is determined (234) to be desirable, the *region features* are extracted (236) in order to build a region representation. As described earlier, the *region features include without limitation* face, skin, sky, grass, open space, and the like.”) (emphases added), FIG. 4.

132. One such technique is “described in an article by J. Yang and A. Waibel, ‘A Real-time Face Tracker,’ *Proceedings of Third IEEE Workshop on Applications of Computer Vision, WACV* 1996, pp. 142-147,” which Stubler

incorporates by reference. Stubler, [0030]. This technique “utilize[es] [a] histogram analysis” to detect “skin color in a chromatic space” when detecting a human face. Stubler, [0030]. Yang describes a “procedure for creating the skin-color model” and using the model to “locate a face.” Yang (Ex. 1009, 3-4). Yang includes an example of locating a face in a “straightforward way” by finding “face color clusters” using the “skin-color model.” Yang (Ex. 1009), 4. In one example:

“[e]ach pixel of the original image is converted into the chromatic color space and then compared with the distribution of the skin color model. Since the skin colors occur in a small area of the chromatic color space, the matching process is very fast”

Yang (Ex. 1009), 4.

133. Thus, the skin color is detected when a human face is detected. As explained for [2a], a POSITA would have understood that detecting a human correlates to detecting human skin and/or faces. This understanding of Stubler is consistent with the '807 patent. Ex. 1001, 5:4-6 (“[T]he human is detected *by the skin color* detecting section in addition to a function for detecting the human by using the face image detecting section.”(emphasis added)), 8:37-39 (“There are various *methods for detecting a human* by using not only a face image, but also an edge information and a template. *Here, the face color is used.*”(emphases added)). Thus, Stubler’s discloses—by incorporating Yang’s teachings—a skin color area

detecting section for detecting a skin color area in the image that is used when a human is detected.

**5. Claim 5: “An image retrieving device according to claim 2, wherein the keyword proposing section proposes the keyword to the image which is inputted last in a case in which the similar face image is not detected by the face image similarity determining section.”**

134. In my opinion, Stubler discloses or renders obvious the additional limitations of claim 5 because its keyword proposing section implemented in a computer program or software extends “date/time” associated captions or labels from the most recent image (the keyword to the image which is inputted last) when “new[ly] acquired image[s]” do “not shar[e] visually similar content” with the previously stored images in the database (in a case in which the similar face image is not detected by the face image similarity determining section). Stubler, [0035].

135. As explained for [1c] and claim 2, Stubler discloses detecting a face in an acquired image and determining whether the detected face is similar to other faces in the database using e.g., the algorithms described in Turk (Ex. 1010), which Stubler incorporates by reference. Stubler, [0034]. “If similarities are found (130) between the acquired images and the database images, then the preexisting captions or semantic labels from the matched clusters and groups in the database are extended (140) to the acquired images” such that the “group of images

clustered by visual similarity may share a caption or semantic label.” Stubler, [0035], FIG. 2.

136. If, however, the newly acquired image shares a “similar date/time to previously labeled images (regions) in the database” but does “*not* shar[e] visually similar content” with the “previously labeled images (regions) in the database,” the software/program “only” extends the “date/time associated captions or semantic labels” from the last labeled image (the image sharing the associated date/time but not visually similar) to the acquired image. Stubler, [0035]; *see also* [0034]: (“[I]n the preferred embodiment time/date information is used and may be directly subjected to cluster analysis”).

137. Thus, it is my opinion that Stubler discloses extending the “date/time associated captions or semantic labels” (keyword) of a “previously labeled image” having a similar date/time to the acquired image (image which is inputted last) when no visual similarities (e.g., between faces) are detected. Stubler, [0031], [0035].

**6. Claim 6: “An image retrieving device according to claim 1 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

138. In my opinion, Stubler discloses the additional limitations of claim 6 because Stubler discloses “assign[ing] captions or semantic labels” to “associated

images” grouped according to a “hierarchical clustering method.” Stubler, [0031], [0036].

139. As explained in [1preamble], Stubler discloses that, when “similarities are found (130) between the acquired images and the database images, ... the preexisting captions or semantic labels from the matched clusters and groups in the database are extended (140) to the acquired images.” Stubler, [0012], [0035]. That is, the acquired images are classified based on their similar metadata (detected objects) and captions or labels (keywords).

140. Stubler explains that this classification may use a “hierarchical clustering method,” such as the one described in Jain (Ex. 1011), which Stubler incorporates by reference. Stubler, [0031], [0036], claim 25. Stubler explains that “[i]f a hierarchical clustering method is employed ... the group of images may be presented through a tree mechanism” where each “level of the hierarchy” is “represented by a single image.” Stubler, [0036]; *see also* Jain (Ex. 1011), 8-9 (describing the hierarchical tree structure). Once hierarchically grouped, the user may “rearrange the clusters to correct any erroneously associated images” or “assign captions or semantic labels to the resultant groups at any level of the hierarchy with the caption or label being applied to each member of the group.” Stubler, [0036].

141. Thus, Stubler discloses adding a label (keyword) according to a hierarchal structure that is used to present database search results in “tree” form (according to a retrieving template) where the tree form or template is formed using the keywords at each level of the tree hierarchy. Stubler, [0036].

## 7. Independent Claim 7

- a. **[7preamble]: “A method for adding keywords in an image retrieving device for classifying and retrieving an image by detecting an object in the image and adding a keyword, the method comprising:”**

142. In my opinion, Stubler discloses [7preamble] because Stubler discloses a computer (image retrieving device) executing “a method of generating captions or semantic labels for an acquired image” (adding keywords) for “clustering” (classifying) and “retrieving” an image based on the “captions or semantic labels” (keyword) “assign[ed]” to the image and its detected “shared [region] metadata” (objects detected in the image), as explained above in [1preamble], [1c]-[1e]. Stubler, [0021], [0023]-[0024], [0009], [0011], FIGS. 2-3.

143. Stubler also discloses adding a keyword to the image for the detected object, as explained in [1preamble], [1d], and [1e].

- b. **[7a]: “storing the image which is supposed to be classified and retrieved together with the keyword in a database and an object of the image being previously contained in the database;”**

144. Claim element [7a] is substantively similar to [1a]. In my opinion, Stubler discloses [7a] for reasons discussed for [1a], *supra*.

- c. **[7b]: “detecting an inputted image that is newly inputted to the image retrieving device by an image inputting detection section;”**

145. Claim element [7b] is substantively similar to [1b]. In my opinion, Stubler discloses [7b] for reasons discussed for [1b], *supra*.

- d. **[7c]: “acknowledging an inputted object in the inputted image that has been detected by the image inputting detecting section:”**

146. Claim element [7c] is substantively similar to [1c]. In my opinion, Stubler discloses [7c] for reasons discussed for [1c], *supra*.

- e. **[7d]: “proposing the keyword on a display, the keyword which relates to the inputted object which is acknowledged by an object acknowledging section; and”**

147. Claim element [7d] is substantively similar to [1d]. In my opinion, Stubler discloses [7d] for reasons discussed for [1d], *supra*.

- f. **[7e]: “confirming by the user, adding, and correcting the keyword which is proposed by a keyword proposing section when the inputted object acknowledged by the object acknowledging section is similar to the object of the image previously contained in the database.”**

148. Claim element [7e] is substantively similar to [1e]. In my opinion, Stubler discloses [7e] for reasons discussed for [1e], *supra*.

**8. Independent Claim 8**

- a. [8preamble]: “A computer readable medium storing a computer program for operating an image retrieving device which classifies and retrieves an image by detecting an object in the image and adding a keyword, the storage medium comprising:”**

149. In my opinion, Stubler discloses [8preamble] because Stubler discloses a “software program” or “computer program” “stored in a conventional computer readable storage medium” of a computer (image retrieving device) and for “implementing the inventive method,” as explained above in [1preamble], [1c]-[1e]. Stubler, [0021], [0023]-[0024].

150. Stubler’s computer, executing the computer program stored on the computer readable medium, classifies and retrieves an image by detecting an object in the image and adding a keyword, as explained in claims 1 and 7. Stubler, [0023], [0009], [0011], FIGS. 2-3; *supra*, claims 1, 7.

- b. [8a]: “storing the image which is supposed to be classified and retrieved together with the keyword in a database and an object of the image being previously contained in the database;”**

151. Claim element [8a] is substantively similar to [1a] and [7a]. In my opinion, Stubler discloses [8a] for reasons discussed for [1a] and [7a], *supra*.

- c. **[8b]: “detecting an inputted image that is newly inputted to the image retrieving device by an image inputting detecting section;”**

152. Claim element [8b] is substantively similar to [1b] and [7b]. In my opinion, Stubler discloses [8b] for reasons discussed for [1b] and [7b], *supra*.

- d. **[8c]: “acknowledging an inputted object in the image that has been detected by the image inputting detecting section;”**

153. Claim element [8c] is substantively similar to [1c] and [7c]. In my opinion, Stubler discloses [8c] for reasons discussed for [1c] and [7c], *supra*.

- e. **[8d]: “proposing the keyword on a display, the keyword which relates to the inputted object which is acknowledged by an object acknowledging section; and”**

154. Claim element [8d] is substantively similar to [1d] and [7d]. In my opinion, Stubler discloses [8d] for reasons discussed for [1d] and [7d], *supra*.

- f. **[8e]: “confirming by the user, adding, and correcting the keyword which is proposed by a keyword proposing section when the inputted object acknowledged by the object acknowledging section is similar to the object in the image previously contained in the database.”**

155. Claim element [8e] is substantively similar to [1e] and [7e]. In my opinion, Stubler discloses [8e] for reasons discussed for [1e] and [7e], *supra*.

- 9. Claim 9: “An image retrieving device according to claim 2 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

156. Claim 9 is substantively similar to claim 6, except that it depends from claim 2 instead of claim 1. In my opinion, Stubler discloses the additional limitations of claim 9 for reasons discussed for claim 6, *supra*.

- 10. Claim 10: “An image retrieving device according to claim 3 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

157. Claim 10 is substantively similar to claim 6, except that it depends from claim 3 instead of claim 1. In my opinion, Stubler discloses the additional limitations of claim 10 for reasons discussed for claim 6, *supra*.

- 11. Claim 11: “An image retrieving device according to claim 4 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

158. Claim 11 is substantively similar to claim 6, except that it depends from claim 4 instead of claim 1. In my opinion, Stubler discloses the additional limitations of claim 11 for reasons discussed for claim 6, *supra*.

- 12. Claim 12: “An image retrieving device according to claim 5 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

159. Claim 12 is substantively similar to claim 6, except that it depends from claim 5 instead of claim 1. In my opinion, Stubler discloses the additional limitations of claim 12 for reasons discussed for claim 6, *supra*.

- 13. Claim 13: “A method according to claim 7, wherein the keyword is added according to a retrieving template which is formed by keywords which have a hierarchical structure.”**

160. Claim 13 is substantively similar to claim 6, except that it depends from claim 7 instead of claim 1. In my opinion, Stubler discloses the additional limitations of claim 13 for reasons discussed for claim 6, *supra*.

- 14. Claim 14: “A computer readable medium storing a computer program according to claim 8, wherein the keyword is added according to a retrieving template which is formed by keywords which have a hierarchical structure.”**

161. Claim 14 is substantively similar to claim 6, except that it depends from claim 8 instead of claim 1. In my opinion, Stubler discloses the additional limitations of claim 14 for reasons discussed for claim 6 *supra*.

**B. Ground 2: Claims 2-4 and 9-12 Are Obvious over Stubler and Wang**

**1. Claim 2**

162. It is also my opinion that claim 2 would have been obvious over Stubler and Wang, as discussed below.

**a. [2preamble]: “An image retrieving device according to claim 1, wherein the object acknowledging section includes:”**

163. Stubler discloses or renders obvious claim 1, as explained above.

164. In my opinion, Wang discloses an “object acknowledging section” as recited in claim 1 that renders obvious the additional limitations of the “object acknowledging section” recited in [2a]-[2c], as explained below.

165. For example, Wang discloses a “computer or computer-enabled system,” such as a “personal computer, a notebook computer, a mini-computer, a hand-held computer, a personal communicator, a workstation, a network computer, a server computer, or a mainframe computer” (image retrieving device) that includes a “face detection and feature extraction system 43” and “search engine” (object acknowledging section) that “detects if an input image ... contains a face image,” “extracts” “face feature data from the input image if the input image is detected to contain a face,” and identifies “stored” face feature data “that matches or is similar to the extracted face feature data.” Wang, 4:1-10, 3:46-51, 7:29-49.

166. The face detection and feature extraction system “is a functional module and can be implemented by software, hardware, and firmware,” like the “object acknowledging section” of the ’807 patent and Stubler. Wang, 6:14-22; Stubler, [0021]; Ex. 1001, FIG. 10.

**b. [2a]: “a human detection condition inputting section for setting up conditions for determining whether or not the image contains a human;”**

167. In my opinion, Wang discloses the additional limitations of [2a] because Wang’s face detection and feature extraction system includes a “neural network-based face detection scheme” (human detection condition inputting section) for setting up conditions for determining “if the input face image contains any face.” Wang, 6:35-66. As explained in Ground 1, it is my opinion that detecting a human face discloses determining whether the image contains a human.

168. For example, Wang’s face-detection scheme filters an inputted image by looking for “predetermined eye locations” (a condition for determining whether a human face exists) in “each location in the image” and uses an “arbitrator” to “merge detections from individual filters and eliminate overlapping detections.” Wang, 6:57-66, 7:12-18. Wang also discloses that the system “compares ... extracted face feature data” of the detected face image “with each stored face feature data to output similarity scores based on the predetermined similarity measure” or “threshold.” Wang, 7:38-48.

169. Wang uses, for example, the “eye locations” condition and/or “predetermined similarity measure” or “threshold” conditions to determine whether a human face, and thus a human, is contained in the image, as explained below, in [2b]. Wang, 6:35-66, 7:38-48.

**c. [2b]: “a face image detecting section for detecting a face image in the image; and”**

170. In my opinion, Wang discloses the additional limitations of [2b] because Wang’s system uses “face feature extraction technology” (face image detecting section) that “computes the face feature data of the detected face.” Wang, 7:4-11.

171. For example, Wang discloses that the “face feature extraction process” may be accomplished “by first normalizing, warping (i.e., rotating and scaling), and masking the face to produce a reference face that has a set of predetermined eye locations,” and projecting “the standardized face into an Eigen-face space to compute the face coefficients or face feature data of the detected face,” as is known in the art. Wang, 7:12-28. Thus, like the “face detecting section” of Stubler and the ’807 patent, Wang’s extraction process detects “whether or not a

face image is contained in the image by analyzing the image” using facial  
“patterns.”<sup>10</sup> Ex. 1001, 8:23-28.

- d. **[2c]: “a face image similarity determining section for detecting a face image which is detected by the face image detecting section so as to detect a similar face image stored in the database according to the detected face imaged.”**

172. In my opinion, Wang discloses the additional limitations of [2c] because Wang’s system also includes search engine programming for “find[ing] and locat[ing] any face feature data stored in [a] profile database 13 that matches or is similar to the extracted face feature data” from the inputted image. Wang, 7:29-49.

173. For example, Wang’s search engine “compares the extracted face feature data” of the detected face image “with each stored face feature data to output similarity scores based on the predetermined similarity measure” or “threshold[.]” Wang, 7:38-48. The similarity measure may “include[.] a set of thresholds” that is used to determine a “similarity score” based on how many differences exist between the thresholds and the compared features. Wang, 7:41-48. If sufficient similarities between the compared face features and the

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<sup>10</sup> Eigen faces, like those disclosed in Wang, correspond to known facial patterns. Stubler, [0034]; Turk (Ex. 1010), 1.

“predetermined similarity measure” or “threshold[]” (e.g., “similarity score”) are found, the images containing faces that are similar to the stored face features may be stored and retrieved together. Wang, 7:38-48.

**i. Motivation to Combine**

174. As discussed for Ground 1, Stubler discloses and incorporates by reference various techniques for determining whether or not the image contains a human, detecting a face image in the image, and detecting a face image that is detected by the face image detecting section so as to detect a similar face image stored in the database according to the detected face imaged. Stubler, [0011], [0030], [0034]; *supra* claim 2. Wang further informs the types of techniques that would have been suitable for performing the functions recited in claim 2.

175. Wang’s device is described as a handheld mobile terminal, which, in my opinion, would have suggested to a POSITA that, in addition to being useful on small devices, that it could also be useful for larger computers that have more processing power. Therefore, a POSITA would have been motivated and would have found it obvious to also, or alternatively, implement Wang’s face detection and feature extraction functions described in [2preamble]-[2c] above, in a more complete computing platform, such as the computer described in Stubler. The implementation details described in Wang using a “functional module” “implemented by software, hardware, and firmware” would have been easily

incorporated into Stubler's computer and program to identify faces in the acquired images and to assess similarities between the faces in acquired images and stored images, as envisioned by Stubler. Stubler, [0030]-[0034]; Wang, 6:14-22. Given the additional processing power, more substantial development environments, the larger screens, variety of input devices, and the connectivity of the platform described in Stubler, implementing the techniques and approaches described in Wang on Stubler's computer would have been straightforward for a POSITA. Such an implementation would have aligned with Stubler's express goal of detecting an assessing similarity between faces in images. Stubler, [0030], [0032]-[0035].

176. Further, in my opinion, a POSITA would have found it obvious to try integrating Wang's face detection functionality into Stubler's system, or to substitute or augment Stubler's face detection and face image similarity determining sections with those taught by Wang, to yield the predictable and desired result of identifying faces and ascertaining facial similarities. Decl., ##. A POSITA would have also appreciated that Wang's technology and functionality would have improved Stubler's system because Wang's "neural network-based face detection technology makes the face detection robust," "relatively fast," and ensures that "most faces" are detected; therefore, a POSITA would have been motivated to incorporate Wang's face detection functionality into Stubler's system. Wang, 6:66-7:3.

**ii. Expectation of Success**

177. It is also my opinion that a POSITA would have had a reasonable expectation of success in implementing Wang's face detection and feature extraction system into Stubler's system because it would have merely required augmenting Stubler's existing computer program or software to include Wang's processes for detecting faces in inputted images. Stubler indicates that "[v]arious well-known techniques may be used to detect region metadata," and Wang provides one such technique. Stubler, [0030]. Stubler also explains that the "software needed for implementation of the method is within the ordinary skill in such arts" thus, a POSITA would have thus been able to implement Wang's software processes as part of Stubler's method. Stubler, [0021].

178. Thus, it is my opinion that implementing Wang's face detection and feature extraction system (computer program or software) would have been a straightforward application of known, conventional software operations (detecting faces using Wang's method) used according to their known functions to yield predictable results (the face detection desired by Stubler). Further, a POSITA would have recognized that such a modification would have only required routine skill to implement. Stubler, [0021], [0030], [0031].

2. **Claim 3: “An image retrieving device according to claim 2 wherein the object information inputting section serves as a personal information inputting section for confirming, adding, and correcting a personal information.”**

179. Stubler discloses or renders obvious the additional limitations of claim 3 for reasons discussed in Ground 1, *supra*. Therefore, it is also my opinion that Stubler and Wang render obvious claim 3.

180. I have been asked whether Wang also renders obvious the additional limitation of claim 3. In my opinion, it does because Wang discloses providing a user interface for inputting “person-identifying data” for an acquired image, such as “text data” including “the name of the person.” Wang’s interface, like Stubler’s, “is a functional module and can be implemented by software, hardware, and firmware.” Wang, 4:24-40, 6:14-22.

181. For example, Wang describes various types of “person-identifying data” that are “fully searchable” and stored in Wang’s database with the faces they correspond to. Wang, 4:22-27, 6:1-7. Wang explains that:

[t]he person-identifying data of a face image may include the name of the person, affiliation or employment of the person, and time and occasion of last meeting or all of the previous meetings with the person. The employment information may include name of the company the person is currently working for, [and] the title and position of the person within the company. In addition, the person-identifying data may also include other

information, such as telephone and fax numbers and/or e-mail address, the name of the third person who introduced the person, and/or other types of person-identifying information.

Wang, 4:27-40. Wang thus discloses that the keywords to be confirmed, added, or corrected by Stubler's system can be "person-identifying information," such as "the name of the person," "affiliation or employment," "title and position," "telephone" or "fax" numbers, "e-mail address," or other "person-identifying information." Wang, 4:27-40.

**a. Motivation to Combine**

182. In my opinion, a POSITA would have been motivated and found it obvious to incorporate Wang's teaching that the object information inputting section serves as a personal information inputting section for confirming, adding, and correcting a personal information (e.g., name, email, or telephone number) into Stubler to better allow the user to classify and label the objects in the images (e.g., faces) using "personally meaningful" descriptors, as desired by Stubler. Stubler, [0004], [0028], [0037], [0041]. Wang, 4:27-40.

183. The combined system would have retained Stubler's functionality of allowing the user to edit and/or select (add, confirm, and/or correct) the proposed caption or semantic label (as discussed in [1e] for Ground 1)—thereby continuing to serve as an information inputting section for confirming, adding, and correcting

information (the proposed captions or semantic labels). The combination would have been desirable to a POSITA because it would have extended Stubler's functionality to allow the user to input or include captions or semantic labels corresponding to personal information *per se* such as a name, email or telephone number, as taught by Wang. Stubler, [0004], [0037], [0041]. Wang, 4:27-40. A POSITA would have been motivated to include this functionality taught by Wang into Stubler because, for example, users frequently associate images with people who are in them, including sharing images of particular people, thus a POSITA would have been motivated to include functionality to correlate images with the people in them by allowing the user to use captions and labels corresponding to personal information, such as names.

**b. Expectation of Success**

184. In my opinion, a POSITA would have had a reasonable expectation of success in using the Stubler-Wang software to operate as a personal information inputting section for confirming, adding, and correcting personal information (e.g., name, email, or telephone number) corresponding to an object (e.g., a face) in the acquired image because it would have merely required using Stubler's existing software and hardware in accordance with their intended purpose (inputting information), which is not specific to any particular type of caption or label and, therefore, would operate similarly whether the caption or label is personal

information or another identifier. A POSITA would have recognized that such an implementation would have only required routine skill to implement, and that implementing Wang's teaching to use personal information as a caption or label would have been a straightforward application of known, conventional software operations (caption or label input or editing software, such as in Stubler and Wang) used according to their known functions to yield predictable results (the image is classified with the person-identifying caption or label). (Stubler, [0021], [0030], [0031]; *see also supra* Ground 1, claim 3.

3. **Claim 4: "An image retrieving device according to claim 2 further comprising a skin color area detecting section for detecting a skin color area in the image, wherein the skin color area detecting section is used when the human is detected."**

185. Stubler discloses the additional limitations of claim 4 for reasons discussed in Ground 1, *supra*. Therefore, it is also my opinion that Stubler and Wang render obvious claim 4.

4. **Claim 9: "An image retrieving device according to claim 2 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure."**

186. Stubler discloses the additional limitations of claim 9 for reasons discussed in Ground 1, *supra*. Therefore, it is also my opinion that Stubler and Wang render obvious claim 9.

5. **Claim 10: “An image retrieving device according to claim 3 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

187. Stubler discloses the additional limitations of claim 10 for reasons discussed in Ground 1, *supra*. Therefore, it is also my opinion that Stubler and Wang render obvious claim 10.

6. **Claim 11: “An image retrieving device according to claim 4 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

188. Stubler discloses the additional limitations of claim 11 for reasons discussed in Ground 1, *supra*. Therefore, it is also my opinion that Stubler and Wang render obvious claim 11.

7. **Claim 12: “An image retrieving device according to claim 5 wherein the keyword is added according to a retrieving template which is formed by keywords which have hierarchical structure.”**

189. Stubler discloses the additional limitations of claim 12 for reasons discussed in Ground 1, *supra*. Therefore, it is also my opinion that Stubler and Wang render obvious claim 12.

## **XI. CONCLUSION**

190. For the reasons set forth in Section GROUNDS OF UNPATENTABILITYX, it is my opinion that one skilled in the art would have found claims 1-14 of the '807 Patent anticipated or obvious.

191. In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

192. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Declaration of Robert Stevenson, Ph.D.  
U.S. Patent No. 7,486,807

Date: 6/13/24

Respectfully submitted,



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Robert L. Stevenson, Ph.D.