

Exhibit 1

US006873743B2

(12) **United States Patent**
Steinberg(10) Patent No.: **US 6,873,743 B2**
(45) Date of Patent: **Mar. 29, 2005**(54) **METHOD AND APPARATUS FOR THE AUTOMATIC REAL-TIME DETECTION AND CORRECTION OF RED-EYE DEFECTS IN BATCHES OF DIGITAL IMAGES OR IN HANDHELD APPLIANCES**(75) Inventor: **Eran Steinberg**, San Francisco, CA (US)(73) Assignee: **Fotonation Holdings, LLC**, Peterborough, NH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 534 days.

(21) Appl. No.: **10/113,871**(22) Filed: **Mar. 29, 2002**(65) **Prior Publication Data**

US 2002/0176623 A1 Nov. 28, 2002

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/823,139, filed on Mar. 29, 2001, now Pat. No. 6,751,348.

(51) **Int. Cl.⁷** **G06K 9/40; G06K 9/00**(52) **U.S. Cl.** **382/275; 382/117**(58) **Field of Search** **382/115, 117, 382/162, 164, 165, 167, 168, 171, 172, 199, 278, 274-277; 358/518, 520, 522; 348/207, 239, 370, 576**(56) **References Cited****U.S. PATENT DOCUMENTS**

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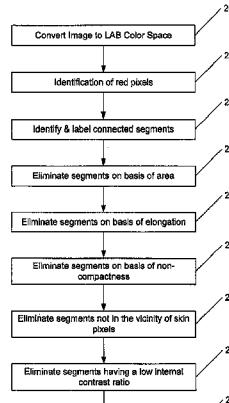
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ABSTRACT

An automatic, red-eye detection and correction system for digital images capable of real-time processing of images, including a red-eye detector module that determines without user intervention if a red-eye defect exists. If a defect is located in an image the portion of the image surrounding the defect is passed to a correction module that de-saturates the red components of the defect while preserving the other color characteristics of the defect region. The invention is designed to minimize the computational resources required to detect and correct red-eye defects and thus is particularly suited to applications requiring real-time processing of large volumes of digital images prior to acquisition or printing. This system can operate on images stored on personal computers, commercial printers or inside digital cameras as part of the acquisition process, or prior to display on personal digital assistants, mobile phones and other digital imaging appliances.

27 Claims, 15 Drawing Sheets

US 6,873,743 B2

Page 2

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Mar. 29, 2005

Sheet 1 of 15

US 6,873,743 B2

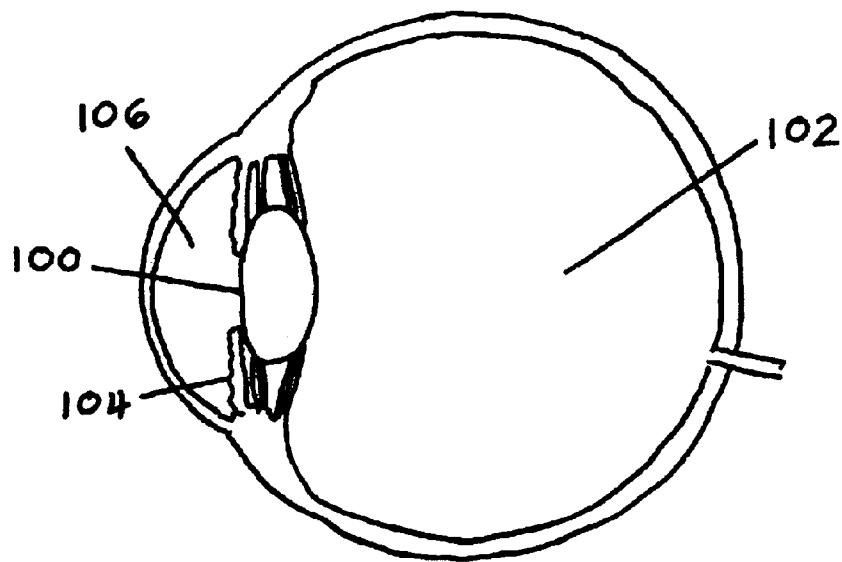


FIG. 1

U.S. Patent

Mar. 29, 2005

Sheet 2 of 15

US 6,873,743 B2

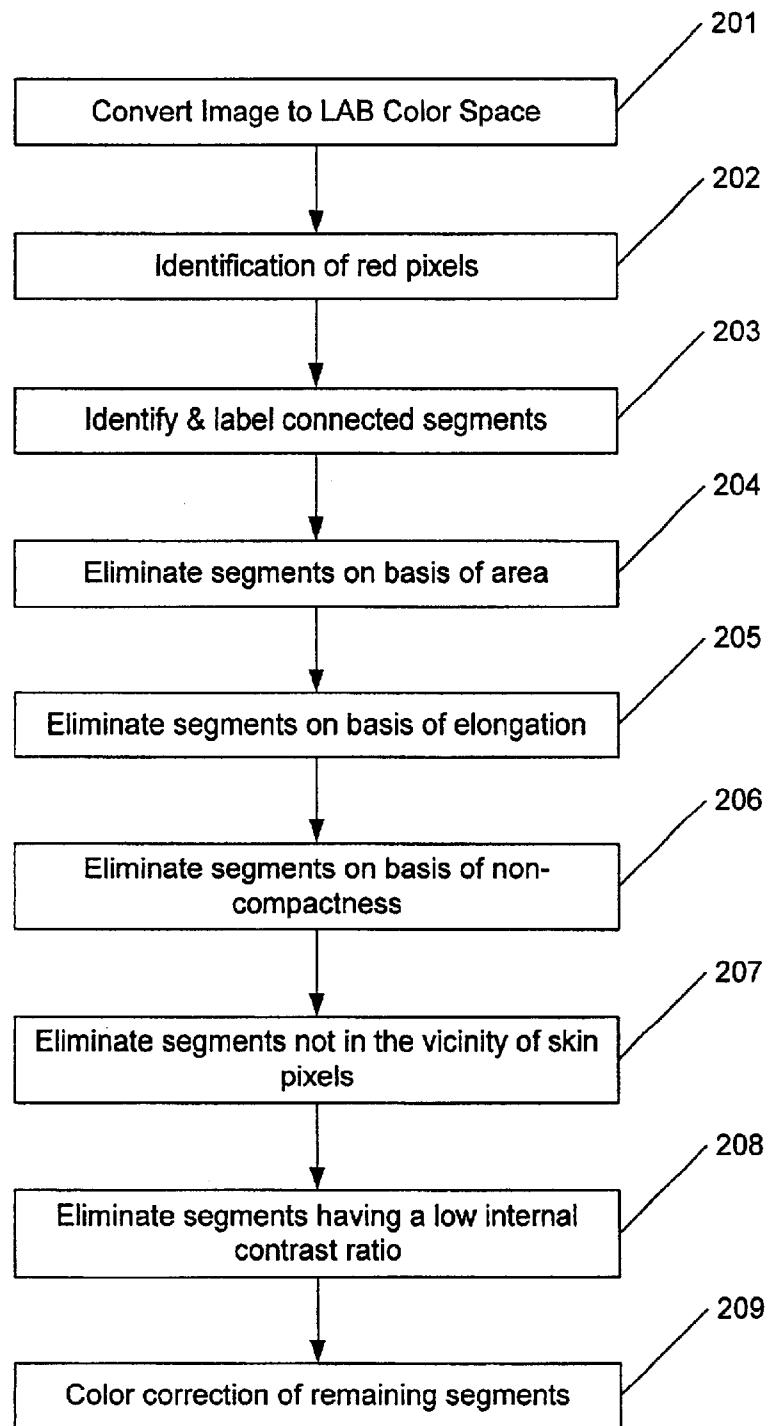


FIG. 2(a)

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