

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**5,748,764 A * 5/1998 Benati et al. 382/117
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(US)EP 1/126508 2/2001 H01L/21/00
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WO WO00/67204 11/2000 G06T/7/00(73) Assignee: **Fotonation Holdings, LLC**,
Peterborough, NH (US)

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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 534 days.Forsyth, David A. et al., "Finding Naked People," Journal
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ings of 4th European Conference on Computer Vision, 1996.(21) Appl. No.: **10/113,871**(22) Filed: **Mar. 29, 2002**(65) **Prior Publication Data**

US 2002/0176623 A1 Nov. 28, 2002

Primary Examiner—Andrew W. Johns*Assistant Examiner*—Amir Alavi(74) *Attorney, Agent, or Firm*—Sawyer Law Group LLP

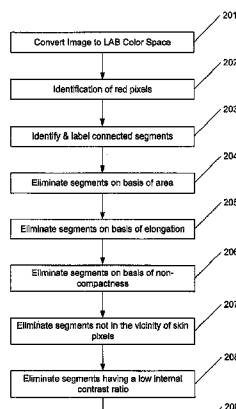
Related U.S. Application Data

(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**

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5,678,041 A 10/1997 Baker et al. 395/609(57) **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

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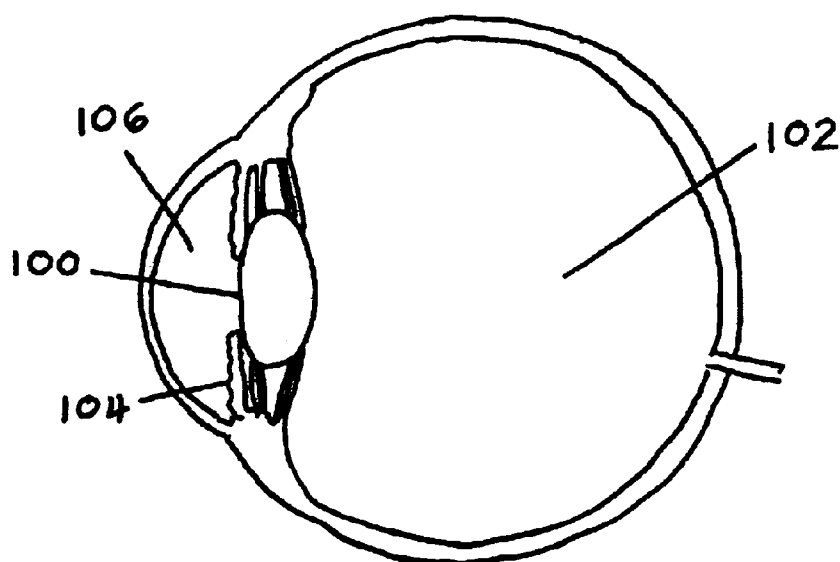


FIG. 1

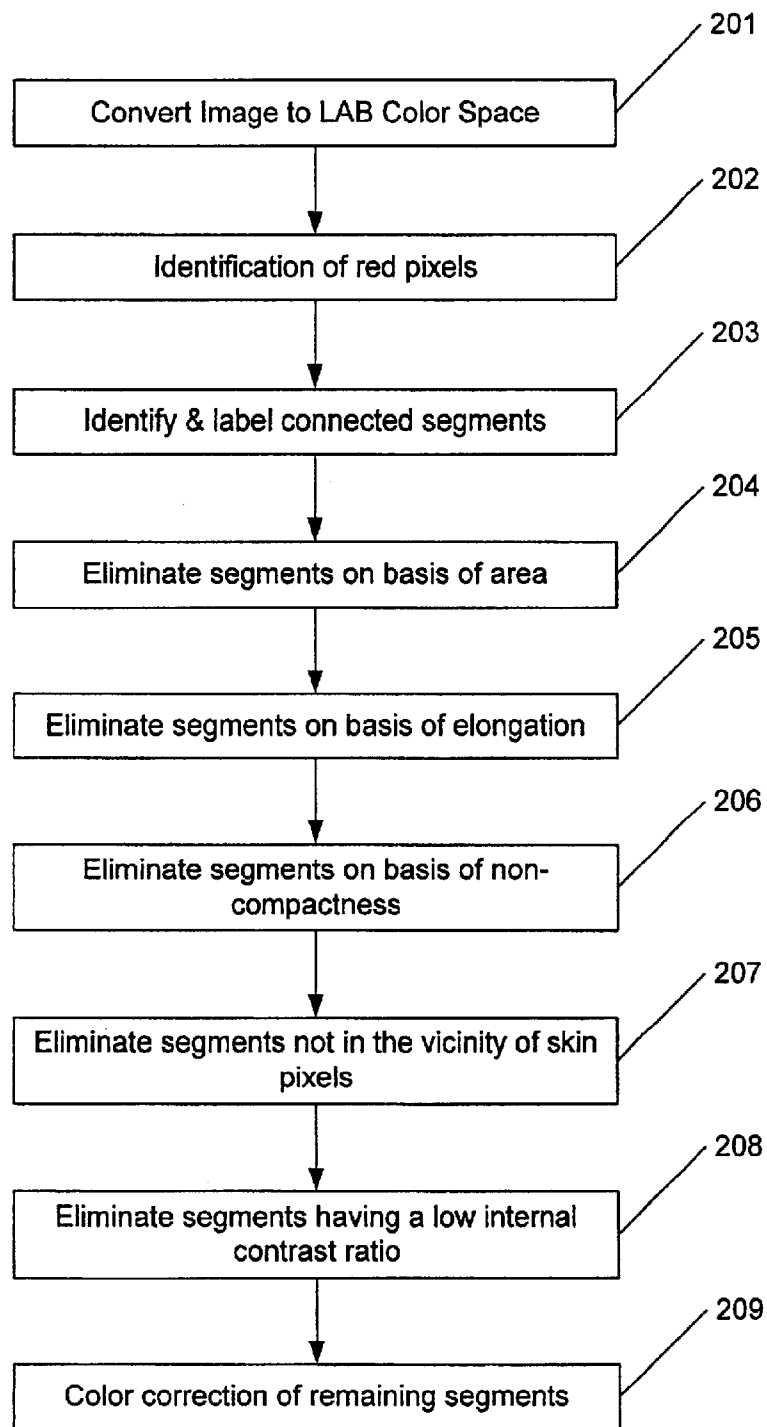


FIG. 2(a)



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