Exhibit 1

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(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**

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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.

(21) Appl. No.: **10/113,871**

(22) Filed: **Mar. 29, 2002**

(65) **Prior Publication Data**

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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

5,177,694	A	1/1993	Graham et al.	364/526
5,218,555	A	6/1993	Komai et al.	364/526
5,329,596	A	7/1994	Sakou et al.	382/37
5,432,863	A *	7/1995	Benati et al.	382/167
5,488,429	A	1/1996	Kojima et al.	348/653
5,633,952	A	5/1997	Outa et al.	382/165
5,638,136	A	6/1997	Kojima et al.	348/653
5,678,041	A	10/1997	Baker et al.	395/609
5,748,764	A *	5/1998	Benati et al.	382/117
5,754,676	A	5/1998	Komiya et al.	382/132
5,765,029	A	6/1998	Schweid et al.	395/61

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

EP	1/126508	2/2001	H01L/21/00
JP	09237348 A	9/1997	G06T/7/60
WO	WO00/67204	11/2000	G06T/7/00

OTHER PUBLICATIONS

Forsyth, David A. et al., "Finding Naked People," Journal Review, 1996.

Forsyth, David A. et al., "Finding Pictures of Objects in Large Collections of Images," Proceedings, International Workshop on Object Recognition, Cambridge, 1996.

Flich, Margaret, et al., "Finding Naked People," Proceedings of 4th European Conference on Computer Vision, 1996.

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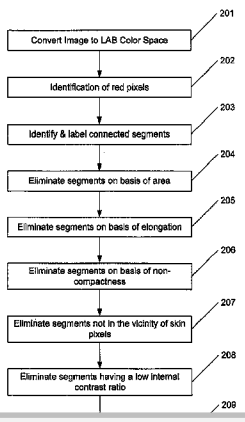
(57) **ABSTRACT**

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



U.S. PATENT DOCUMENTS

5,771,307	A		6/1998	Lu et al. 382/116
5,778,156	A		7/1998	Schweid et al. 396/61
5,796,869	A		8/1998	Tsuji et al. 382/203
5,805,730	A		9/1998	Yaeger et al. 382/228
5,813,542	A		9/1998	Cohn 209/581
5,828,779	A		10/1998	Maggioni 382/165
5,832,212	A		11/1998	Cragun et al. 395/188.01
5,835,722	A		11/1998	Humes 395/200.55
5,852,823	A		12/1998	De Bonet 707/6
RE36,041	E		1/1999	Turk et al. 382/118
5,857,014	A		1/1999	Sumner et al. 379/93.02
5,872,859	A		2/1999	Gur et al. 382/128
5,911,043	A		6/1999	Duffy et al. 395/200.33
5,937,404	A		8/1999	Csaszar et al. 707/9
5,949,904	A		9/1999	Delp 382/185
6,009,209	A	*	12/1999	Acker et al. 382/275
6,016,354	A	*	1/2000	Lin et al. 382/117
6,041,133	A		3/2000	Califano et al. 382/124
6,049,821	A		4/2000	Theriault et al. 709/203
6,065,055	A		5/2000	Hughes et al. 709/229
6,065,056	A		5/2000	Bradshaw et al. 709/229
6,067,339	A		5/2000	Berger 386/48
6,115,495	A		9/2000	Tachikawa et al. 382/165
6,122,400	A		9/2000	Reitmeier 382/168
6,128,397	A		10/2000	Baluja et al. 382/118
6,134,339	A	*	10/2000	Luo 382/115
6,148,092	A		11/2000	Qian et al. 382/118
6,182,081	B1		1/2001	Dietl et al. 707/102
6,204,858	B1	*	3/2001	Gupta 345/600
6,252,976	B1	*	6/2001	Schildkraut et al. 382/117
6,259,801	B1		7/2001	Wakasu 382/100
6,266,664	B1		7/2001	Russell-Falla et al. 707/5
6,278,491	B1	*	8/2001	Wang et al. 348/370
6,286,001	B1		9/2001	Walker et al. 707/9
6,407,777	B1		6/2002	DeLuca 348/576
6,631,208	B1	*	10/2003	Kinjo et al. 382/167
6,798,903	B2	*	9/2004	Takaoka 382/167
2001/0002931	A1		6/2001	Maes 382/100
2002/0126893	A1		9/2002	Held et al. 382/167
2002/0138450	A1		9/2002	Chen et al. 382/165

* cited by examiner

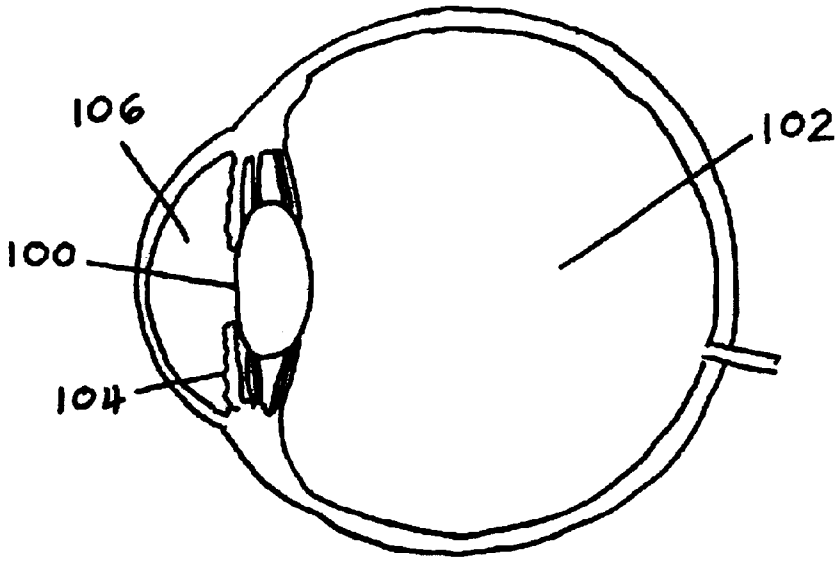


FIG. 1

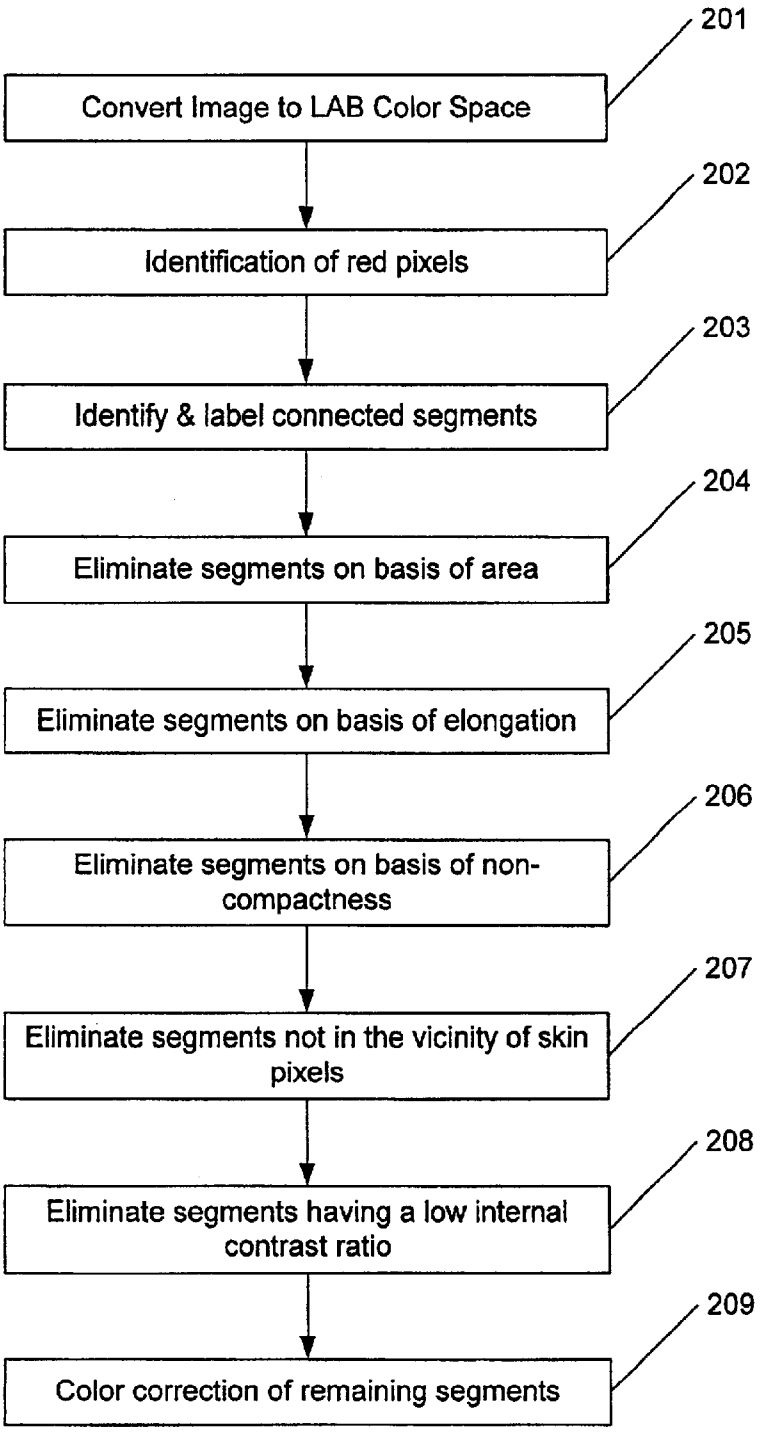


FIG. 2(a)

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