(12) **United States Patent**
Bhattacharjya

(10) **Patent No.: US 6,862,366 B2**
(45) **Date of Patent: Mar. 1, 2005**

(54) **TECHNIQUES FOR SCRATCH AND DATE REMOVAL FROM SCANNED FILM**

(75) Inventor: **Anoop Bhattacharjya**, Campbell, CA (US)

(73) Assignee: **Seiko Epson Corporation**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 705 days.

(21) Appl. No.: **09/952,691**

(22) Filed: **Sep. 13, 2001**

(65) **Prior Publication Data**

US 2003/0053707 A1 Mar. 20, 2003

(51) **Int. Cl.**[7] **G06K 9/00; G06K 9/40**
(52) **U.S. Cl.** **382/164; 382/262; 382/275**
(58) **Field of Search** 382/162–165, 382/167, 172–173, 251, 254, 260, 262, 264, 300, 274–276; 358/463, 534; 348/241, 607, 625; 356/237.1

(56) **References Cited**

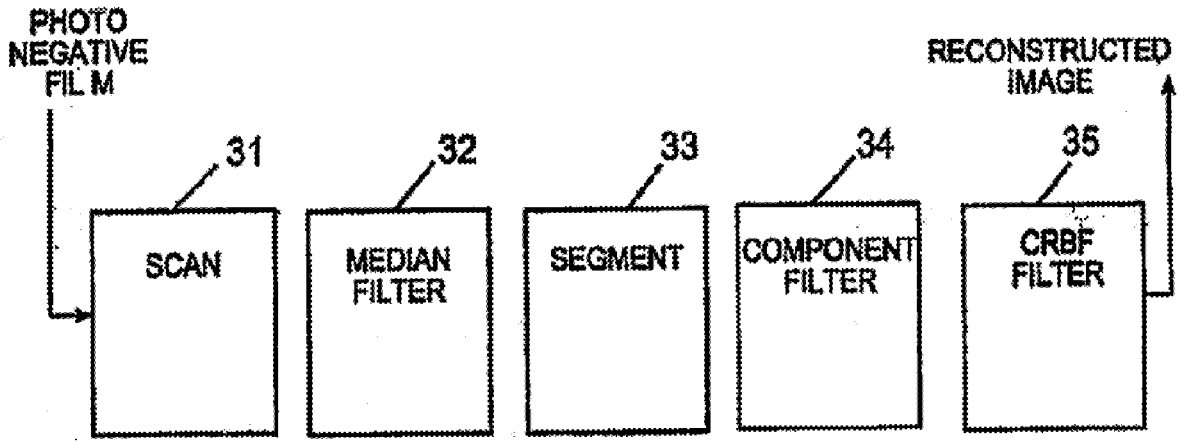
U.S. PATENT DOCUMENTS

4,941,185 A		7/1990	Massmann	382/275
5,384,865 A		1/1995	Loveridge	382/262
5,627,918 A		5/1997	Camasso	382/254
5,694,228 A		12/1997	Peairs et al.	358/538
5,892,853 A		4/1999	Hirani et al.	382/280
5,974,194 A		10/1999	Hirani et al.	382/262
6,035,072 A		3/2000	Read	382/275
6,075,590 A	*	6/2000	Edgar	356/237.1
6,075,889 A	*	6/2000	Hamilton et al.	382/167
6,163,324 A		12/2000	Holder	345/505
6,167,152 A		12/2000	Schildkraut	382/163
6,192,155 B1	*	2/2001	Fan	382/232
6,393,160 B1	*	5/2002	Edgar	382/275
6,418,243 B1	*	7/2002	Skoglund et al.	382/274
6,476,803 B1	*	11/2002	Zhang et al.	345/419
6,498,867 B1	*	12/2002	Potucek et al.	382/274
6,640,015 B1	*	10/2003	Lafruit et al.	382/260
6,683,995 B2	*	1/2004	Ford et al.	382/275

* cited by examiner

Primary Examiner—Andrew W. Johns
Assistant Examiner—Amir Alavi
(74) *Attorney, Agent, or Firm*—Michael T. Gabrik

(57) **ABSTRACT**

Techniques for removing from scanned film regions of "missing data" which may include date regions, or may be the result of spots, scratches or folds on the film. Such techniques are particularly designed to handle larger regions of missing data, such as "thick" scratches. The techniques of the present invention segment missing data regions (which may include characters in a date field) and perform component filtering which involves determining the area/perimeter ratio of each segmented missing data region. Only those regions whose area/perimeter ratio is less than a certain threshold are kept for closest-to-radial-based-function (CRBF) filtering to estimate colors from neighboring pixels to fill in the missing data regions.

21 Claims, 4 Drawing Sheets