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[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR MULTI-STAGE AUTO-ENHANCEMENT OF PHOTOGRAPHS

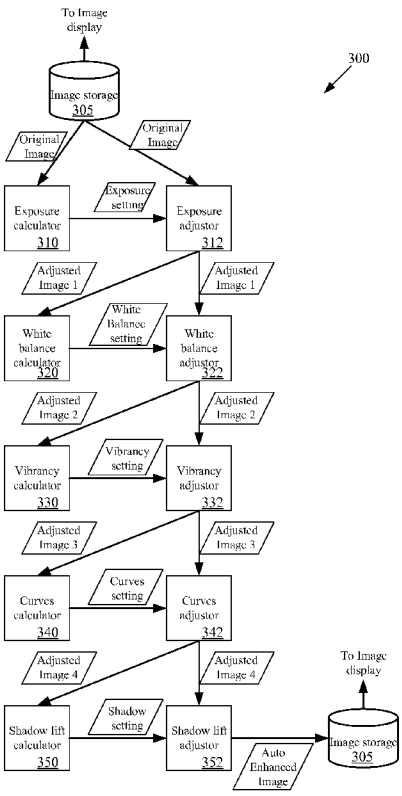

FIGURE 3

(57) Abstract: Some embodiments of the image editing and organizing application described herein provide a multi-stage automatic enhancement process. The process takes an input image and feeds it through multiple different enhancement operations. The multiple enhancement operations of some embodiments are carried out in a particular order. In some embodiments, the particular order starts with exposure adjustment, then a white balance adjustment, then a vibrancy adjustment, then a tonal response curve adjustment, then a shadow lift adjustment.

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MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
INV. G06T5/00 G06T5/40
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PRATT W K ED - PRATT W K: "Digital Image Processing (Third Edition), Chapter 10 Image Enhancement", 1 January 2001 (2001-01-01), DIGITAL IMAGE PROCESSING : PIKS INSIDE, NEW YORK : JOHN WILEY & SONS, US, PAGE(S) 243 - 296, XP002407529, ISBN: 978-0-471-37407-7	1-6
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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 February 2014	07/03/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Krawczyk, Grzegorz

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Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/123952 A1 (PARKKINEN JAANA [FI] ET AL) 29 May 2008 (2008-05-29) paragraphs [0041] - [0043], [0045], [0053]; figure 10	1-9
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X	PING-HSIEN LIN ET AL: "Tri-histogram Equalization based on first order statistics", CONSUMER ELECTRONICS, 2009. ISCE '09. IEEE 13TH INTERNATIONAL SYMPOSIUM ON, IEEE, PISCATAWAY, NJ, USA, 25 May 2009 (2009-05-25), pages 387-391, XP031484555, ISBN: 978-1-4244-2975-2 sections II.A, III.A and III.B; figure 2	1-9
X	US 2011/129148 A1 (KISILEV PAVEL [IL] ET AL) 2 June 2011 (2011-06-02)	1-6
A	paragraphs [0029] - [0030]; figures 5,10,12	7-9
X	US 2006/267923 A1 (KEROFSKY LOUIS J [US] KEROFSKY LOUIS JOSEPH [US]) 30 November 2006 (2006-11-30)	10-14
Y	paragraphs [0148] - [0149]; figure 13	15,16
Y	US 2010/034458 A1 (TADA JUNJI [JP]) 11 February 2010 (2010-02-11) paragraph [66ff]; figure 13	15,16
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KEN PARULSKI ET AL: "Chapter 12: Color image processing for digital cameras", 1 January 2003 (2003-01-01), DIGITAL COLOR IMAGING HANDBOOK, CRC PRESS, USA, PAGE(S) 727 - 757, XP002584581, ISBN: 978-0-8493-0900-7	34-39, 41,42
Y	sections 12.2.3, 12.5, 12.6, 12.6.4; figure 12.3	40,43,44

X	WEN-CHUNG KAO ET AL: "Design considerations of color image processing pipeline for digital cameras", IEEE TRANSACTIONS ON CONSUMER ELECTRONICS, IEEE SERVICE CENTER, NEW YORK, NY, US, vol. 52, no. 4, 1 November 2006 (2006-11-01), pages 1144-1152, XP011152988, ISSN: 0098-3063, DOI: 10.1109/TCE.2006.273126	34-39, 41,42
Y	section III.; figure 1	40,43,44

X	US 2011/090240 A1 (COHEN NOY [IL]) 21 April 2011 (2011-04-21)	34-39, 41,42
Y	paragraphs [0028] - [0045]; figure 1	40,43,44

Y	US 2003/235333 A1 (LIN YUN-TING [US]) 25 December 2003 (2003-12-25) figure 3	40,43,44

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/042948

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☒ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

1-16, 34-44

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-9

   Adjusting luminance in an image. A tonal response curve is generated based on a histogram and used for remapping luminance values.

   ---

2. claims: 10-16

   Adjusting shadow levels of an image. A set of histograms is generated, each identifying a different characteristic of an image, and used for determining a shadow lift setting level.

   ---

3. claims: 17-20

   Selective image enhancement. A variable gamma adjustment is applied to pixels excluding, under a particular condition, the skin-tone colored pixels.

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4. claims: 21-23

   Creating a formula for setting shadow lift levels. Mathematical regression is performed on statistics of a plurality of images.

   ---

5. claims: 24-33

   Adjusting saturation level of pixels. A saturation modification level is determined based on a histogram of saturation levels of pixels.

   ---

6. claims: 34-44

   Automatic image enhancement. A sequence of enhancements is applied to an image, wherein settings of each subsequent enhancement are determined based on an image resulting from preceding enhancements.

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7. claims: 45-47

   Graphical user interface (GUI). A number of sliders is provided whose values can be automatically determined by an automatic image enhancement activation control.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2013/042948

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