



(51) International Patent Classification:
H04N 7/26 (2006.01)

(21) International Application Number:
PCT/US2009/006653

(22) International Filing Date:
17 December 2009 (17.12.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/203,805 29 December 2008 (29.12.2008) US
61/203,807 29 December 2008 (29.12.2008) US

(71) Applicant (for all designated States except US): **THOMSON LICENSING** [FR/FR]; 1 rue Jeanne d'Arc, 92443 Issy-les moulineaux (FR).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **JOSHI, Rajan, Laxman** [IN/US]; 838 S. Barrington Avenue, #205, Los Angeles, CA 90049 (US).

(74) Agents: **SHEDD, Robert, D.** et al.; Thomson Licensing LLC, Two Independence Way||Suite 200, Princeton, NJ 08540 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR ADAPTIVE QUANTIZATION OF SUBBAND/WAVELET COEFFICIENTS

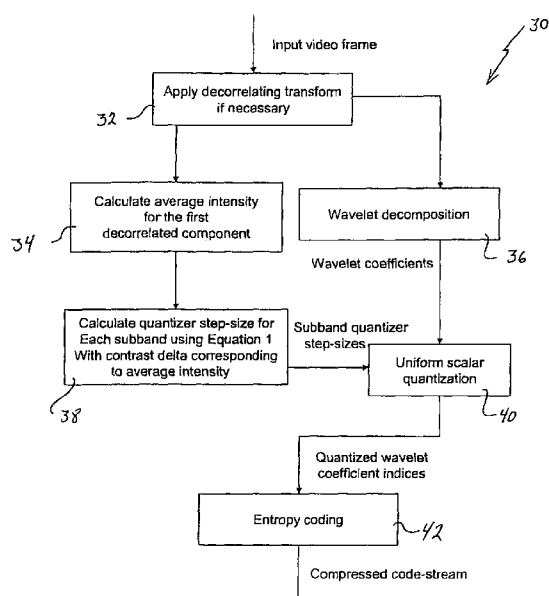


FIG. 3

(57) Abstract: According to one implementation, the present invention provides a method and apparatus to adapt the quantization steps-size used to quantize wavelet coefficients to the average brightness level of the corresponding pixels in a wavelet image or video coder. In another implementation, this method and apparatus produces a JPEG2000 Part 1 compliant code-stream.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
16 December 2010

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/006653

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/26

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)
H04N

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	TONG H H Y ET AL: "A perceptual model for JPEG applications based on block classification, texture masking, and luminance masking" IMAGE PROCESSING, 1998. ICIP 98. PROCEEDINGS. 1998 INTERNATIONAL CONFERENCE ON CHICAGO, IL, USA 4-7 OCT. 1998, LOS ALAMITOS, CA, USA, IEEE COMPUT. SOC, US LNKD- DOI:10.1109/ICIP.1998.999032, vol. 3, 4 October 1998 (1998-10-04), pages 428-432, XP010586898 ISBN: 978-0-8186-8821-8 abstract pages 428-430 ----- -/--	3,13,16

☒ Further documents are listed in the continuation of Box C.

☐ 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 document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

* & * document member of the same patent family

Date of the actual completion of the international search

5 August 2010

Date of mailing of the international search report

26/10/2010

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Lindgren, Johan

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2009/006653

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	HONTSCH I ET AL: "Locally-adaptive image coding based on a perceptual target distortion" ACOUSTICS, SPEECH AND SIGNAL PROCESSING, 1998. PROCEEDINGS OF THE 1998 IEEE INTERNATIONAL CONFERENCE ON SEATTLE, WA, USA 12-15 MAY 1998, NEW YORK, NY, USA, IEEE, US LNKD- DOI:10.1109/ICASSP.1998.678047, vol. 5, 12 May 1998 (1998-05-12), pages 2569-2572, XP010279383 ISBN: 978-0-7803-4428-0	1,2,5,6, 11,12, 14,15
Y	1-2.2, 3	3,7,8, 13,16
A	----- ZHENGHMA YU: "perceptual coding of digital images" SIGNAL PROCESSING, 2004. PROCEEDINGS. ICSP '04. 2004 7TH INTERNATIONAL CONFERENCE ON BEIJING, CHINA AUG. 31 - SEPT 4, 2004, PISCATAWAY, NJ, USA, IEEE, PISCATAWAY, NJ, USA LNKD- DOI:10.1109/ICOSP.2004.1441532, vol. 2, 31 August 2004 (2004-08-31), pages 1167-1172, XP010810607 ISBN: 978-0-7803-8406-4 the whole document	1-3,5-8, 11-16
X	----- INGO HÖNTSCHHONTSCH ET AL: "Locally Adaptive Perceptual Image Coding" IEEE TRANSACTIONS ON IMAGE PROCESSING, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 9, no. 9, 1 September 2000 (2000-09-01), XP011025651 ISSN: 1057-7149	1-3,5,6, 11-16
Y	page 1472 - page 1477	7,8
A	----- ZHEN LIU ET AL: "JPEG2000 encoding with perceptual distortion control" PROCEEDINGS 2003 INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (CAT. NO.03CH37429), BARCELONA, SPAIN, 14-17 SEPT. 2003; [INTERNATIONAL CONFERENCE ON IMAGE PROCESSING], IEEE PISCATAWAY, NJ, USA, vol. 1, 14 September 2003 (2003-09-14), pages 637-640, XP010670141 ISBN: 978-0-7803-7750-9 the whole document	1-3,5-8, 11-16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/006653

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.:
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.:
1-3, 5-8, 11-16

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: 1-3, 5-8, 11-16

Perceptual image coding by adaptive quantisation based on local mean intensity values.

2. claims: 4, 9, 10, 17

Making a JPEG2000 stream encoded with a variable dead zone quantiser (not included in the JPEG2000 part 1 standard) compatible with a JPEG2000 part 1 decoder by storing additional dead zone width information in a "COM marker segment".
