(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 February 2002 (21.02.2002)

PCT

(10) International Publication Number
WO 02/15586 A3

(51) International Patent Classification[7]: G06T 1/00

(21) International Application Number: PCT/IB01/01447

(22) International Filing Date: 14 August 2001 (14.08.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/642,223 18 August 2000 (18.08.2000) US

(71) Applicant: HEWLETT-PACKARD COMPANY [US/US]; 3000 Hanover Street, Palo Alto, CA 94303-1181 (US).

(72) Inventors: LEVY, Avraham; Haenek Street 19b, 36084 Kiryat Tivon (IL). MERHAV, Neri; Naamat Street 24, 34670 Haifa (IL).

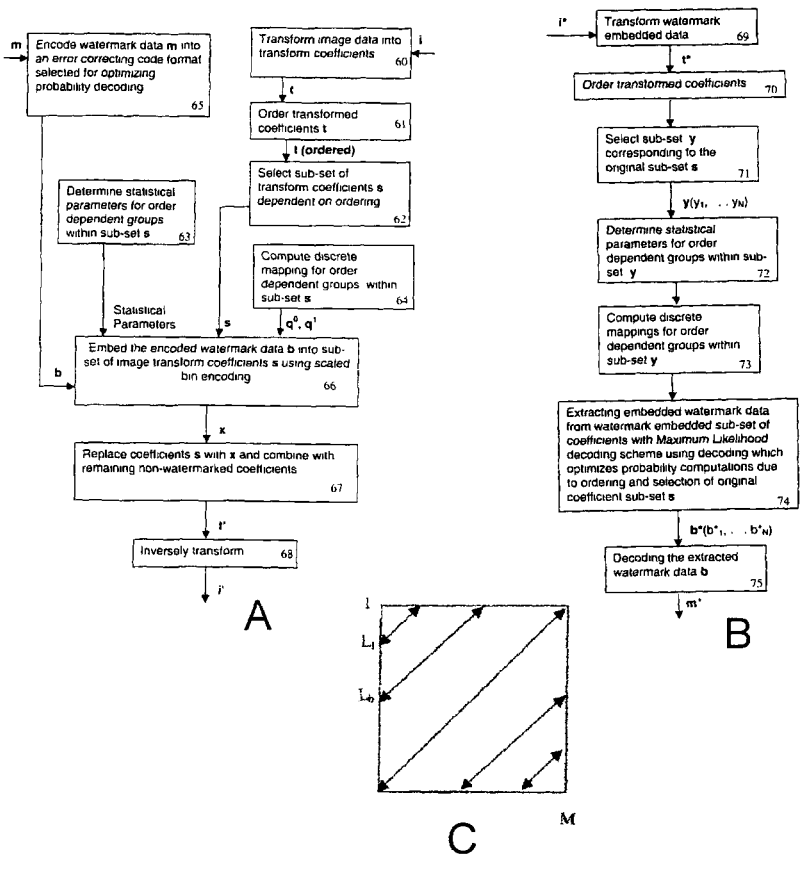
(74) Agent: HEMINGER, Susan, E.; Hewlett-Packard Company, Legal Department, IP Section, P.O. Box 272400, Ft. Collins, CO 80527-2400 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHOD AND SYSTEM OF WATERMARKING DIGITAL DATA USING SCALED BIN ENCODING AND MAXIMUM LIKELIHOOD DECODING



(57) Abstract: A transform domain watermarking technique which is based on a new encoding scheme referred to as *scaled bin encoding* which encodes a message in a set of transform coefficients by modifying their values in a way that preserves high image quality (i.e., low distortion levels) and adapts to expected noise level. Recapturing of the watermark image is performed via a decoding method using a maximum likelihood procedure (i.e., *maximum likelihood decoding*, based on the statistics of the transform coefficients and a worst case statistical model of the noise introduced to these coefficients by image processing operations or attack noise.

WO 02/15586 A3

Published:
— *with international search report*

(88) Date of publication of the international search report:
13 June 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.