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**Datasheet for the decision
of 30 March 2012**

Case Number: T 0874/08 - 3.5.04

Application Number: 98926532.7

Publication Number: 990344

IPC: H04N 1/60

Language of the proceedings: EN

Title of invention:

Gamut correction with color separation and methods and apparatuses for performing same

Applicant:

Electronics for Imaging, Inc.

Headword:

-

Relevant legal provisions:

EPC Art. 123(2)
RPBA Art. 13(1)(3)

Relevant legal provisions (EPC 1973):

EPC Art. 84, 54(1), 56

Keyword:

"Clarity (yes - after amendments)"
"Novelty and inventive step (yes - after amendments)"

Decisions cited:

-

Catchword:

-



Case Number: T 0874/08 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 30 March 2012

Appellant: Electronics for Imaging, Inc.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 17 December 2007
refusing European patent application
No. 98926532.7 pursuant to Article 97(1) EPC
1973.

Composition of the Board:

Chair: T. Karamanli
Members: M. Paci
C. Kunzelmann

Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division refusing European patent application No. 98 926 532.7 published as WO 98/58493 A1.
- II. The following prior art document was cited in the decision under appeal:
- D1: EP 0611231 A1
- III. The decision under appeal, announced on 7 December 2007, was based on the grounds that claim 1 according to the main request filed with letter of 7 November 2007 was not clear (Article 84 EPC 1973) and that, to the extent that its subject-matter could be understood, it lacked novelty (Article 54(1) and (2) EPC 1973) in view of D1 and that the subject-matter of claim 1 according to the auxiliary request filed during the oral proceedings of 7 December 2007 did not involve an inventive step (Article 56 EPC 1973) in view of D1.
- IV. In the notice of appeal the appellant maintained the requests on which the decision under appeal was based. With the statement of grounds of appeal the appellant filed a set of amended claims 1 to 20 as an auxiliary request.
- V. In a communication annexed to the summons to oral proceedings the board raised objections against both sets of claims based on Article 123(2) EPC (added subject-matter), Article 84 EPC 1973 (clarity), and Articles 54(1) or 56 EPC 1973 (novelty and inventive step, respectively).

- VI. With letters of 27 February 2012 and 21 March 2012 the appellant filed sets of amended claims according to a main request and first and second auxiliary requests, replacing all previous sets of claims on file.
- VII. Oral proceedings were held before the board on 30 March 2012. During the oral proceedings the appellant's representative filed a set of claims 1 to 9 according to a sole request replacing all previous requests on file.
- VIII. The appellant's final request is that the decision under appeal be set aside and that a patent be granted on the basis of the claims 1 to 9 according to the sole request filed during the oral proceedings of 30 March 2012.
- IX. Claim 1 according to the appellant's sole request reads as follows:
- "A method for creating a color separation table used for performing a gamut correction in a color separation process converting color information from a monitor color space to a printer color space, the printer color space defining a printer gamut, the method comprising:
- creating (251) a first color separation table (365) from original monitor chromaticity values (41, 42, 43) by converting color values in the monitor color space to output color values in the printer color space via the CIELAB color space;
- creating (253) a redefined monitor color space based on redefined monitor chromaticity values (45,46,47), the redefined chromaticity values being

redefined to cause a color on the monitor to print on the printer as a color having the same color name;

creating (255) a second color separation table (365a) from the redefined monitor color space by converting color values in the redefined monitor color space to output color values in the printer color space via the CIELAB color space; and

creating (259) the color separation table by:

for each color value of the monitor color space to be associated with an output color value in the printer color space, on the basis of the printer gamut surface generated in the CIELAB color space using the original monitor chromaticity values determining whether the output color value is in-gamut or out-of-gamut,

in case the output color value is at least a first distance in the CIELAB color space away from the gamut surface towards the in-gamut region, using the output color value from the first color separation table (365),

in case the output color value is at least a second distance in the CIELAB color space away from the gamut surface towards the out-of-gamut region, using the output color value from the second color separation table (365a), and

in case the output color value position with regard to the printer gamut is between the first distance and the second distance, using an output color value derived by blending output color values from the first color separation table (365) and from the second color separation table (365a)."

Claims 2 to 9 are dependent on claim 1.

- X. The examining division's reasoning in the decision under appeal regarding claim 1 according to the then auxiliary request - which is the claim decided upon most closely resembling the present claim 1 - reads essentially as follows:

Article 56 EPC 1973 - Inventive step

D1, the closest prior art, discloses a method for creating a color separation table used for performing a gamut correction in a color separation process converting color information from a monitor color space to a printer color space (see page 6, lines 40 to 55, and figure 9), the method comprising the following steps:

 providing a first separation table from monitor chromaticity values (for the core region of low chromaticity values mentioned on page 6, line 53);

 creating redefined monitor chromaticity values for colors associated with out-of-printer-gamut colors (see mapping process on page 6, line 40);

 providing a second color separation table of the redefined monitor chromaticity values;

 creating the color separation table by:

 for each color value in the monitor color space, determining the position of the output color value with regard to the printer gamut,

 in case the output color value is in the printer gamut by a first distance (the length of the tail, which is zero in case of core values so that only the diamonds are depicted in figure 9), using the output color value from the first color separation table,

in case the output color value is outside the printer gamut by a second distance, using the output color value from the second color separation table (the non-zero length of the tails outside the printer gamut in figure 9),

in case the output color value position with regard to the printer gamut is between the first and second distances, using an output color value derived by blending output color values from the first color separation table and from the second color separation table (see page 6, lines 14 to 30).

Thus, if any difference between the subject-matter of claim 1 and that of D1 can be identified at all, then it merely relates to the terminology used. The subject-matter of claim 1 is therefore at least strongly suggested by the teaching of D1.

XI. The appellant's arguments regarding the present set of claims can be summarised as follows:

Admission of the amended claims filed during the oral proceedings

The amended claims filed during the oral proceedings were submitted in reaction to objections under Article 123(2) EPC and Article 84 EPC 1973 raised by the board for the first time during the oral proceedings. These amendments overcome all these objections, as well as those raised in the communication annexed to the summons to oral proceedings, and do not raise fresh issues. They should thus be admitted into the proceedings. The amendments are based *inter alia* on the following passages of the

application as filed: page 8, lines 8 to 10; page 17, lines 8 to 23; page 18, lines 17 to 28; and page 19, lines 1 to 10.

Novelty and inventive step

The method of D1 shown in figures 4 and 9 and the associated passages of the description, which forms the closest prior art, neither discloses nor suggests (at least) the following steps of claim 1 listed below in summarised form:

- creating a redefined monitor color space based on redefined monitor chromaticity values;
- using a first color separation table for color values at least a first distance in the CIELAB color space away from a printer gamut surface towards the in-gamut region;
- using a second color separation table for color values at least a second distance in the CIELAB color space away from a printer gamut surface towards the out-of-gamut region and
- blending these two tables for color values positioned in-between these two distances.

The above features, as defined by the specific wording used in claim 1, contribute to solving the problem of providing an enhanced gamut-mapping technique which corrects the gamut limitations of an output color printer while at the same time imposing fewer computational burdens and also allowing ease of control over the gamut-mapping process (see page 5, lines 19 to 21, of the application as filed).

Hence the subject-matter of claim 1 is new and inventive in view of D1. This conclusion also automatically applies to dependent claims 2 to 9.

Reasons for the Decision

1. The appeal is admissible.

Procedural matters

2. Admission of the amended claims filed during the oral proceedings

According to Article 13(1) RPBA (Rules of Procedure of the Boards of Appeal, OJ EPO 2007, 536), any amendment to a party's case after it has filed its grounds of appeal may be admitted and considered at the board's discretion. The discretion shall be exercised in view of *inter alia* the complexity of the new subject-matter submitted, the current state of the proceedings and the need for procedural economy. Article 13(3) RPBA further provides that amendments sought to be made after oral proceedings have been arranged shall not be admitted if they raise issues which the board or the other party or parties cannot reasonably be expected to deal with without adjournment of the oral proceedings.

In the present case, the appellant filed during the oral proceedings a set of amended claims 1 to 9 according to a sole request replacing all previous requests on file.

The board is satisfied that the amended claims filed during the oral proceedings were submitted in reaction to objections under Article 123(2) EPC and Article 84 EPC 1973 raised by the board for the first time during the oral proceedings, and did not raise fresh issues.

The board also noted that the amendments did not increase the complexity of the subject-matter of claim 1 and could be examined as to novelty and inventive step on the basis of the facts and arguments already on file. Minor amendments were made in dependent claims 2 to 9 and previous claims 10 to 18 were deleted. The board was thus in a position to deal with these amendments without adjourning the oral proceedings.

For the above reasons the board decided to exercise its discretion under Article 13(1) RPBA to admit the amended claims into the proceedings.

Article 123(2) EPC and Article 84 EPC 1973

3. The board is satisfied that the amended claims filed by the appellant comply with the requirements of Article 123(2) EPC i.e. they do not introduce subject-matter extending beyond the content of the application as filed. The amendments are based *inter alia* on the following passages of the application as filed: page 8, lines 8 to 10; page 17, lines 8 to 23; page 18, lines 17 to 28; and page 19, lines 1 to 10.

The board is also satisfied that the extensive amendments to the claims have overcome the objections of lack of clarity raised in the reasons for the

decision under appeal and that the present claims meet the requirements of Article 84 EPC 1973.

Novelty (Article 54(1) EPC 1973)

4. Disclosure of D1

D1 discloses a method for creating a color separation table (see "three-dimensional look-up table" on page 6, lines 48 to 50) used for performing a gamut correction in a color separation process converting color information from a monitor color space to a printer color space, the printer color space defining a printer gamut (see the monitor-to-printer gamut correction shown in the device-independent CIELAB color space in figures 9 and 10).

More specifically, the method of D1 involves the following steps (see page 3, lines 19 to 35):

- forming one or more subsets of (monitor) color values in an intermediate device-independent color space (e.g. CIELAB: see page 4, lines 26 to 35);
- assigning a color transform (i.e. a color separation table) to each subset;
- applying to the remaining color values which are not in any of the subsets a color transform which maximises local continuity and smoothness (see also page 5, lines 37 to 38; page 6, lines 14 to 30 and 56 to 57; and page 7, lines 4 and 5), the color transform being preferably a cost-minimising function corresponding to the elastic relaxation of a lattice of nodes (see page 5, lines 39 to 57, and figure 6).

In the board's view, D1 does not disclose at least the following features (in particular those highlighted in **bold** by the board) of the method of claim 1:

- creating (253) **a redefined monitor color space** based on **redefined monitor chromaticity values** (45, 46, 47), the redefined chromaticity values being redefined to cause a color on the monitor to print on the printer as a color having the same color name;

- in case the output color value is **at least a first distance** in the CIELAB color space away **from the gamut surface towards the in-gamut region**, using the output color value from the first color separation table (365),

- in case the output color value is **at least a second distance** in the CIELAB color space away **from the gamut surface towards the out-of-gamut region**, using the output color value from the second color separation table (365a), and

- in case the output color value position with regard to the printer gamut is **between the first distance and the second distance**, using an output color value derived by blending output color values from the first color separation table (365) and from the second color separation table (365a).

5. Further features considered by the examining division as known from D1

In the decision under appeal (see point 2.1 of the Reasons) the examining division took the view, with regard to claim 1 of the then auxiliary request, that the method step of creating redefined monitor chromaticity values could be read onto the mapping

process described in figure 9 and on page 6, lines 40 to 55, of D1.

The board considers that, irrespective of whether the examining division's analysis was correct in this respect, the wording of the corresponding method step in **present** claim 1 is now clearly distinguished from D1 in that it specifies that the monitor chromaticity values are redefined "to cause a color on the monitor to print on the printer as a color having the same color name" and that a "redefined monitor color space" is created based on these redefined monitor chromaticity values, none of these features being disclosed in D1.

The examining division also argued (under point 2.1 of the Reasons) that figure 9 of D1 discloses the step of using the first color separation table for output color values which are in the printer gamut by a first distance (the core values shown with no tail) and the second color separation table for output color values which are outside the printer gamut by a second distance (the highly saturated colors outside the printer gamut shown with a tail).

The board does not share the above argument for the following reasons. There is no disclosure in D1 that the "core region of colors with low saturation" and the "highly saturated colors corresponding to the gamut boundary of the video display" mentioned on page 6, lines 48 to 57, are defined by reference to a distance from the printer gamut surface. Figures 9 and 10, in fact, both show that in the CIELAB color space the "highly saturated colors corresponding to the gamut

boundary of the video display", i.e. the colors on the dashed line, are partly inside, partly outside, of the printer gamut. These color values are thus not all "at least a second distance in the CIELAB color space away from the gamut surface towards the out-of-gamut region" as stated in present claim 1. As to the "core region of color with low saturation", it presumably consists of all the colors which have no tail in figures 9 and 10 because these colors are constrained to remain unchanged by a color transform based on a colorimetric mapping strategy (see D1, page 6, lines 53 to 54). This core region is shown in figures 9 and 10 of D1 as being entirely inside the printer gamut; however, it does not stop at a (given) first distance from the printer gamut surface as defined in the method of present claim 1.

Hence the examining division's above argument does not convince the board.

6. Conclusion on novelty

For the above reasons, the method of claim 1 is novel in the sense of Article 54(1) EPC 1973 in view of D1. The same conclusion applies to the subject-matter of claims 2 to 9, which are dependent on claim 1.

Inventive step

7. According to page 5, lines 19 to 21, of the application as filed, the method of the invention solves the problem of providing an enhanced gamut-mapping technique which corrects gamut limitations of an output color device while at the same time imposing fewer

computational burdens and also allowing ease of control over the gamut-mapping process.

The board is satisfied that the features of claim 1, in particular those which are not known from D1 (see point 3 *supra*), contribute to the solution of this problem:

- the creation of a redefined monitor color space based on monitor chromaticity values redefined to cause a color on the monitor to print on the printer as a color having the same color name improves the color matching for highly saturated monitor color values while potentially simplifying the generation of the second color separation table because the same color transform as for the generation of the first color separation table - but with redefined monitor chromaticity values instead of the original monitor chromaticity values - can be used;
- the application of the first and second separation tables to first and second regions of color values defined by reference to first and second distances from the printer gamut surface provide an easy way of determining the boundaries of these two regions; and
- the blending of the first and second color separation tables provides a potentially simple (i.e. not computationally burdensome) way of generating a color separation table for the color values positioned in the transition region between these two regions.

D1 teaches to form subsets of color values by grouping them based either on a common property, such as flesh tones, or on a purpose, such as a single object in a

scene (see page 4, lines 42 to 44). Each subset is then assigned a different color transform based on a strategy adapted to the subset, such as a colorimetric reproduction strategy for skin tones or a color enhancement strategy for highly saturated colors (see D1, page 4, lines 44 to 47; from page 4, line 53, to page 5, line 1; and from page 6, line 58, to page 7, line 4). Each subset of color values when represented in the CIELAB color space may be a single point, a line, a surface or a volume, as shown in figures 5(A) to 5(D).

The delimitation of subsets of color values based on a common property (e.g. flesh tones) or on a purpose (e.g. a single object in a scene) is a teaching that goes against delimiting the subsets by reference to a given distance from the printer gamut surface. Moreover, D1 teaches to apply different mapping strategies, such as colorimetric reproduction and color enhancement, to different subsets, which implies different algorithms/techniques for generating the corresponding color separation tables. In contrast thereto, the method of claim 1 merely redefines the monitor color space based on redefined monitor chromaticity values, thus leaving the door open to the possibility of using the same algorithms/techniques for creating the first and second color separation tables. Hence not only is there no suggestion in D1 of redefining the monitor chromaticity color space, but an attempt to do so would bring little or no technical advantage because different mapping strategies are applied to different subsets of color values.

For the above reasons, the board considers that the method of claim 1 is not obvious to a person skilled in

the art. Hence the method of claim 1 involves an inventive step (Article 56 EPC 1973).

The same conclusion applies to the methods of dependent claims 2 to 9.

Conclusions

8. The board is thus satisfied that the amendments made comply with the requirements of Article 123(2) EPC and that the present claims meet the requirements of Article 84 EPC 1973 as well as those of Articles 54(1) and 56 EPC 1973.

Remittal

9. The board considers it appropriate to exercise the power conferred upon it by Article 111(1) EPC 1973 and to remit the case to the department of first instance for adaptation of the description because the description has yet to be adapted to the present claims and the appellant stated during the oral proceedings that it had no objection to this course of action.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent with the following claims and a description to be adapted: claims 1 to 9 according to the sole request filed during the oral proceedings of 30 March 2012.

The Registrar:

The Chair:

K. Boelicke

T. Karamanli