

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,
Patent Owner.

IPR2024-00955
Patent 7,668,365 B2

Before KRISTEN L. DROESCH, GEORGE R. HOSKINS, and
BRIAN P. MURPHY, *Administrative Patent Judges*.

MURPHY, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Google LLC (“Petitioner”) filed a Petition pursuant to 35 U.S.C. § 311 requesting institution of *inter partes* review of claims 1–33 of U.S. Patent No. 7,668,365 B2 (Ex. 1001; “the ’365 patent”). Paper 1 (“Pet.”). 138 East LCD Advancements Limited (“Patent Owner”) timely filed a Patent Owner Preliminary Response. Paper 6 (“Prelim. Resp.”).

We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Under § 314, the Board may not institute review on fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). If the Board institutes a review, it will institute “on all of the challenged claims and on all grounds of unpatentability asserted for each claim.” 37 C.F.R. § 42.108(a). Upon consideration of the Petition, the Preliminary Response, and the evidence of record, for the reasons set forth below, we conclude Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one challenged claim in the ’365 patent. Accordingly, we do not institute an *inter partes* review of claims 1–33 of the ’365 patent.

A. Real Parties-in-Interest and Related Matters

Petitioner identifies itself, Google LLC, as the real party-in-interest. Pet. 70. Petitioner further states that “Google LLC is a subsidiary of XXVI Holdings Inc., which is a subsidiary of Alphabet Inc. XXVI Holdings Inc. and Alphabet Inc. are not real parties-in-interest to this proceeding.” *Id.* n.4.

Patent Owner identifies itself, 138 East LCD Advancements Limited, and Longitude Licensing Limited, the exclusive licensee of the '365 patent, as the real parties-in-interest. Paper 3, 1.

Petitioner and Patent Owner identify the following related matters:

Longitude Licensing Ltd. v. Google LLC, 3:23-cv-03046-VC (N.D. Cal.), currently on appeal to the Court of Appeals for the Federal Circuit, No. 24-1202, filed November 28, 2023.

Id.; Pet. 71.

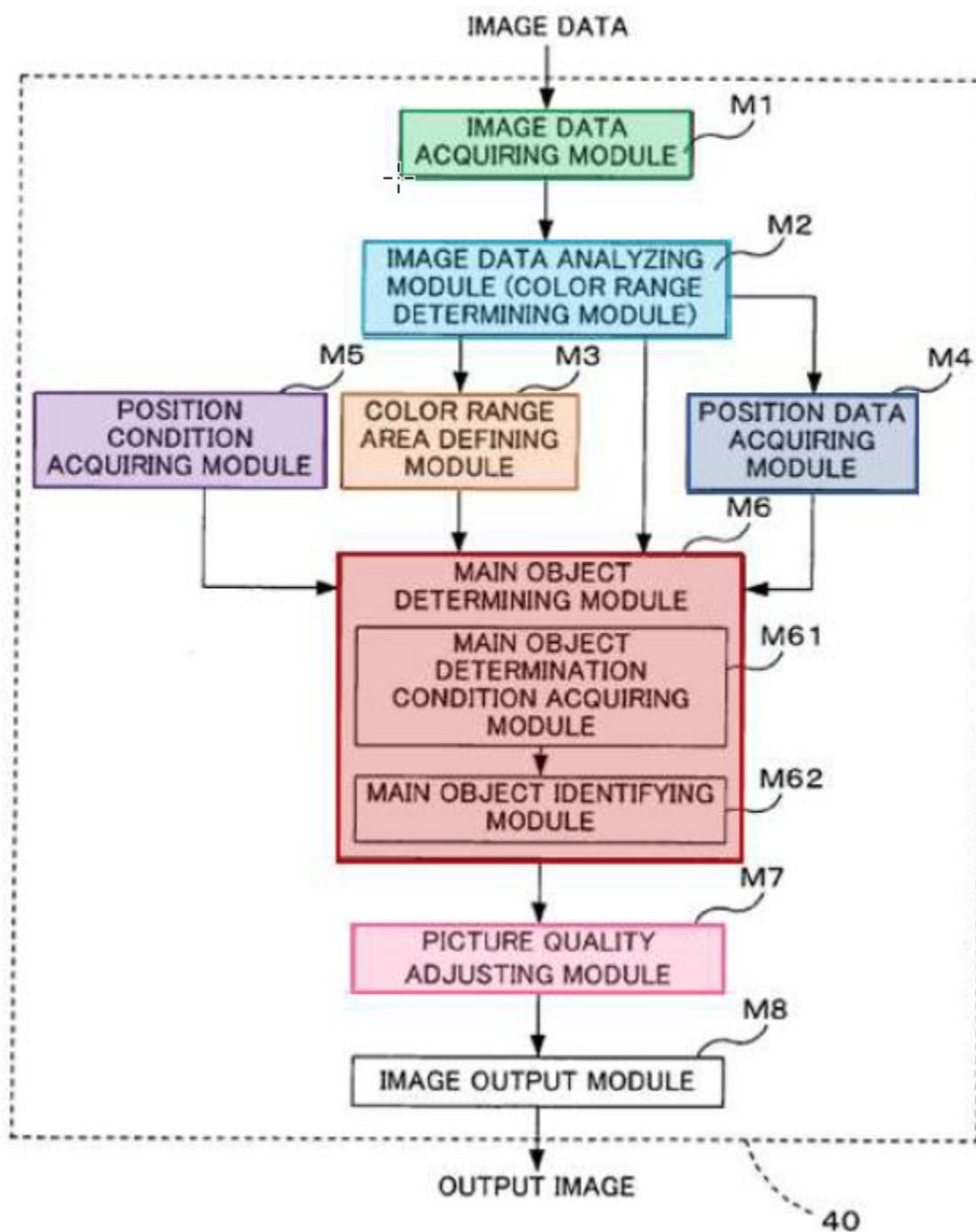
B. The '365 Patent

The '365 patent, titled “Determination of Main Object On Image and Improvement of Image Quality According to Main Object,” is directed to an image processing device and method “that determines the main object characterizing an image,” and “that adjusts the picture quality of the image data.” Ex. 1001, 1:8–10. The '365 patent states that, because existing techniques for adjusting picture quality assume “the main object characterizing the image has been correctly determined,” improperly determining the main object can “result in poor picture quality.” *Id.* at 1:20–24. The '365 patent seeks “to properly identify the main object characterizing an image” and “improve the picture quality of the main object.” *Id.* at 1:44–48.

1. The “First Embodiment”

The “First Embodiment” of the claimed image processing device and method is a color printer that includes a control circuit programmed to determine the main object characterizing an image to be printed. Ex. 1001, 7:21–14:14. “[T]he functional modules realized by the control circuit of the color printer” are depicted in Figure 3, reproduced below in color-annotated form from the Petition:

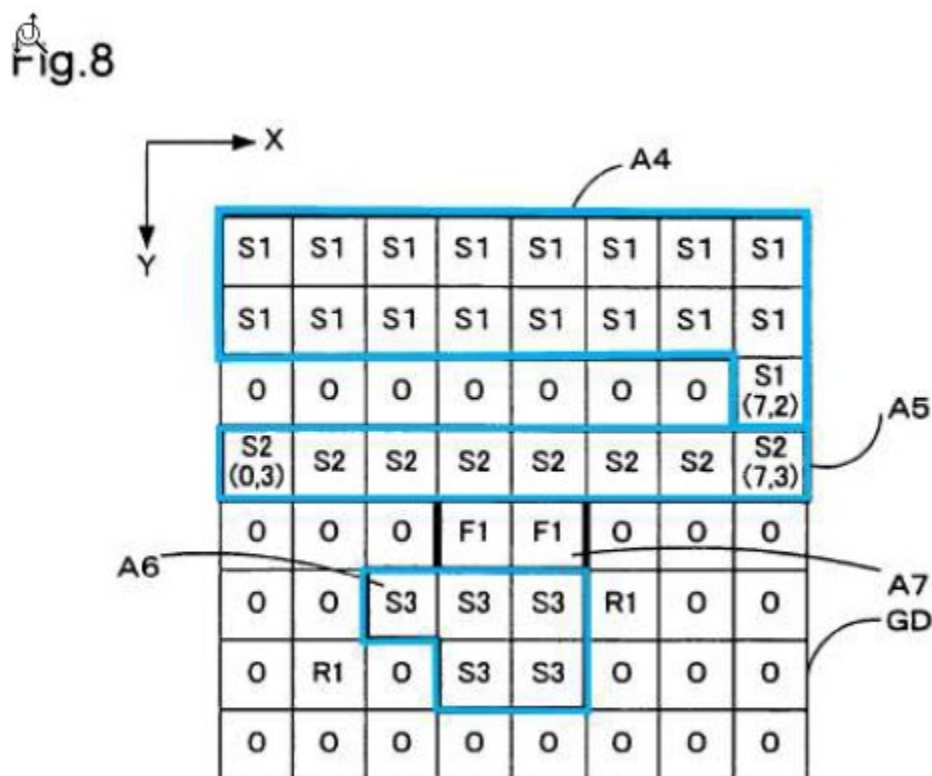
Fig.3



Pet. 3 (Ex. 1001, Fig. 3 (annotated)). In the embodiment of Figure 3, the image data acquiring module M1 acquires image data from the image to be printed and

sends the image data to the image data analyzing module (color range determining module) M2. Ex. 1001, 7:32–35.

The color range determining module M2 “splits the image data into a plurality of areas (plurality of pixel data groups) and determines the color range of the split areas.” *Id.* at 7:36–38, 8:47–49.¹ For example, module M2 splits the image of interest into 64 pixel data groups (8 columns x 8 rows) to determine the color range in each pixel data group, as depicted in color-annotated Figure 8, below:



Pet. 4 (citing Ex. 1001, 10:23–28, Fig. 8 (color-annotated)). In color-annotated Figure 8, a “color range” is, e.g., a “color value” or “hue,” such as “flesh tones,”

¹Quotations from patent documents may omit or de-emphasize bold numerals.

“green,” “sky blue,” or “red.” Ex. 1001, 9:4–6, 9:35–38. The color range area defining module M3 “forms color range areas by associating adjacent image data areas exhibiting the same color range using the determined color range data.” *Id.* at 1001, 7:41–44. For example, each pixel data group labelled S1, S2, and S3 exhibits a sky blue color range “S,” but module M3 assigns the plurality of S1 pixel data groups to color range area A4, the plurality of S2 pixel data groups to color range area A5 (later re-assigned to adjacent color range area A4), and the S3 pixel data groups to color range area A6. *Id.* at 10:23–36.

The position data acquiring module M4 “acquires position data ... for [the] color range areas formed using the results of the analysis of the image data.” *Id.* at 7:44–48. The position data acquired in the First Embodiment includes the plurality of pixel data groups (plurality of x-y coordinates) for the image of interest and for each color range area within the image. *Id.* at 8:51–54, 10:39–43. “[T]he position data is used, for example, to specify the boundaries between the color range areas [and] to obtain position data on the color range area,” as shown for color range areas A4–A7 in Figure 8. *Id.* at 10:37–43. Exemplary position data include the x-y coordinates for one pixel data group located in area A4 (e.g., S1 (7,2) specifies sky blue color located at position column 7, row 2) and in area A5 (e.g., S2 (0,3) specifies sky blue color located at position column 0, row 3). Thus, in the First Embodiment, each color range area is defined by position data comprising the x-y coordinates of a plurality of color-associated pixel data groups. *Id.* at 8:47–62, 10:4–43.

The position condition acquiring module M5 “acquires position conditions stipulating where objects exhibiting specific color range to be present.” *Id.* at 7:48–50. The position conditions (also called object-determining-conditions), though different from the acquired position data, are “conditions used to determine

whether or not the color range areas correspond to a certain object by means of the color range and position data for the color range areas.” *Id.* at 10:46–51. The position conditions stipulate a limited range of positions (pixel data group x-y coordinates) where an object that corresponds to a specific color range is validated to be present. The position conditions may be stored in tabular form, as depicted in Figure 11 below:

Fig. 11

OBJECT	HUE	POSITION	
SKY	SKY BLUE/ RED	TOP OF IMAGE AND TOUCHING EDGES OF IMAGE	AREA(x,0), (0,y), (7,y) $0 \leq x \leq 7, 0 \leq Y \leq 2$
VEGETATION	GREEN	BOTTOM OF IMAGE AND TOUCHING EDGES OF IMAGE	AREA(x,7), (0,y), (7,y) $0 \leq x \leq 7, 4 \leq Y \leq 7$
PEOPLE	FLESH TONE	MIDDLE OF IMAGE	AREA(x,y) $2 \leq x \leq 5, 2 \leq Y \leq 5$

Id.

In Figure 11, the position conditions stipulate a limited range of areas where selected image objects, such as the “sky,” “vegetation,” and “people” are validated to be present. For example, the “SKY” object has a hue of “SKY BLUE/RED” at the “TOP OF IMAGE AND TOUCHING EDGES OF IMAGE” such that “the position conditions stipulate that the sky is any of area (x,0): $0 \leq x \leq 7^2$ [**columns 0-7, row 0 at top**], area (0,y): $0 \leq y \leq 2$ [**column 0, rows 0-2 at top**], or area (7,y): $0 \leq 5^3$.”

² Based on Figure 11.

³ We note Figure 11 stipulates SKY position “y” as “ $0 \leq y \leq 2$.”

Id. at 10:65–11:1 (emphases added). The “VEGETATION” object has a “GREEN” hue at the “BOTTOM OF IMAGE AND TOUCHING EDGES OF IMAGE” such that “[g]reen is stipulated as being any of area (x,7): $0 \leq x \leq 7$ [columns 0-7, row 7 at bottom], area (0,y): $4 \leq y \leq 7$ [column 0, rows 4–7 at bottom], or area (7,y): $4 \leq y \leq 7$ ⁴ [column 7, rows 4–7 at bottom].” *Id.* at 11:1–2 (emphases added). “People are stipulated as being (x, y): $2 \leq x \leq 5$ and $2 \leq y \leq 5$.” *Id.* at 11:2–3.

The stored position conditions are used to stipulate or validate a location for an image object by comparing the acquired color range *position data* for the image object to the *stipulated position conditions* for that object:

The CPU then compares the position data of color range areas A1 and A2 [Fig. 6] with the position data corresponding to the sky to determine the main object . . . and the process routine is complete. (Ex. 1001, 10:59–62);

More specifically, position data and color range of areas which are met by pixel data corresponding to a certain main object are stipulated as position conditions (object determining conditions), and the position data and color range of the areas are compared. (*Id.* at 13:52–56).

For example, by comparing acquired position data to stored position conditions, color range areas A4 and A5 in Figure 8, above, are determined to be sky because they meet the stored position conditions for sky depicted in Figure 11; color range area A6 does not. *Id.* at 10:23–36. Similarly in Figure 6, “the corresponding main object can be determined to be the sky because the color range area A1 includes an area, such as area (0,0), which meets the position conditions. The color range area

⁴ Based on Figure 11.

A2, meanwhile, does not include areas meeting the position conditions.” *Id.* at 11:4–10; *see also id.* at 11:10–11 (“A2 corresponds to sky blue clothing”).

By determining the color range areas in an image to be printed, acquiring position data corresponding to those color range areas, and comparing the acquired position data to the stipulated position conditions, the First Embodiment can more accurately differentiate among main objects that exhibit the same color range: “[T]he main object can be determined more accurately from the standpoint of both the color range and positions.” *Id.* at 13:53–59. As a result, “[i]t is thus possible to make more accurate determinations, that is, to reduce determination errors, compared to when the main object is determined using just color range data.” *Id.* at 11:27–30.

Independent claims 1, 5, 10, 15, 16, and 17 recite variations of the First Embodiment. Prelim. Resp. 12–13.

2. *The “Second Embodiment”*

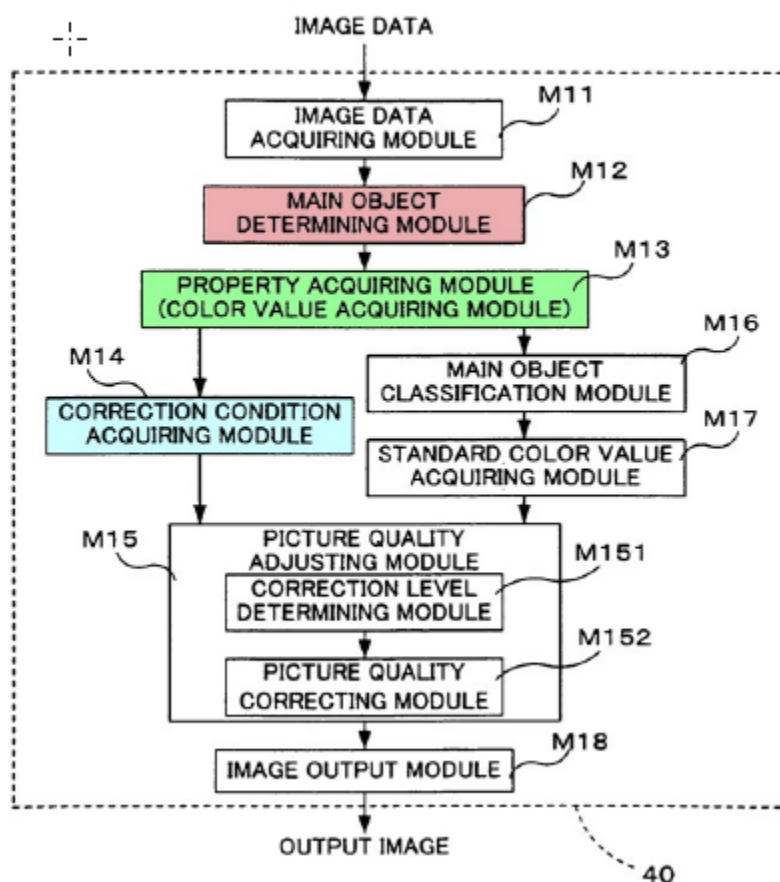
The “Second Embodiment” of the claimed image processing device and method is a color printer that includes a control circuit programmed to provide improved picture quality adjustments to main objects of an image. Ex. 1001, 3:42–61, 4:17–31, 17:54–18:9. The Second Embodiment improves picture quality adjustments by analyzing properties (such as color and statistical values) of the image data for a main object and comparing the analyzed properties to selected “correction conditions.” The correction conditions correspond to the properties that have been acquired, such as acquired color values, and stipulate ideal values corresponding to the acquired properties of the image data. *Id.* at 3:42–61. The claimed device and method are designed “to improve the picture quality of the main object characterizing the image.” *Id.* at 3:60–61. The process works as follows.

The control circuit acquires image data that is split into a plurality of pixel data groups for obtaining color range and position data and determines the main object characterizing the image, as described in the First Embodiment. The control circuit then acquires “properties” of the main object image data, such as “statistical values and color values.” *Id.* at 14:38–54, Fig. 13. “The property values (statistical values) include, for example, maximum and minimum luminance, and histograms of R, G, and B components in the main object image data.” *Id.* at 16:27–33.

The control circuit also “acquires correction conditions *corresponding to the acquired properties.*” *Id.* at 14:55–61 (emphasis added). “Correction conditions” are “correction standard values [that] stipulate the ideal values of the various parameters in relation to detailed main objects,” not unlike “position conditions” in the First Embodiment stipulate limited areas corresponding to acquired position data to validate certain image objects. *Id.* at 16:21–23. Such correction conditions include values for image data parameters related to image quality, such as “shadow, highlight, brightness, contrast, color balance, and memory color correction parameters.” *Id.* at 16:23–26.

Figure 13 is reproduced below in annotated form from Patent Owner’s Preliminary Response:

Fig. 13



Prelim. Resp. 15–16 (citing Ex. 1001, 14:44–15:11, Fig. 13). Figure 13 depicts the process of determining a main object in an image (M12, highlighted in red), acquiring the image data properties representing the main object (M13, highlighted in green), and then acquiring correction conditions corresponding to those acquired properties (M14, highlighted in blue). Module M14 acquires correction conditions based on the acquired properties of a main object’s image data, such as color and statistical values, to enable the main object to be classified in more detail “to implement better picture quality adjustment of the main object image data.” *Id.* at 15:56–67; *see also id.* at 16:1–26 (“more detailed classification of the sky into

clear sky (few clouds), ordinary sky, and dim sky (overcast summer sky)”),
Figs. 14, 15.

Figure 15, reproduced below, depicts an example of detailed Classified Main Objects—different types of “BRIGHT, ORDINARY, and DARK SKY”:

Fig.15

CLASSIFIED MAIN OBJECT	CLASSIFICATION COLOR VALUE	CORRECTION STANDARD LEVEL
BRIGHT SKY	Hcsb, Scsb, Bcsb	CONTRAST b, BRIGHTNESS b, COLOR BALANCE b
ORDINARY SKY	Hcsn, Scsn, Bcsn	CONTRAST n, BRIGHTNESS n, COLOR BALANCE n
DARK SKY	Hcsd, Scsd, Bcsd	CONTRAST d, BRIGHTNESS d, COLOR BALANCE d

Id. In Figure 15, each type of sky has a Classification Color Value based on acquired color value properties, such as Hue, Saturation, and Brightness. *Id.* The control circuit then acquires correction conditions—CORRECTION STANDARD LEVEL—corresponding to the acquired color value properties (Contrast, Brightness, and Color Balance). *Id.* at 16:15–26, Fig. 15. The control circuit “uses the property values of the main object image data and the acquired correction standard values to calculate the correction level so as to reduce or eliminate the difference between the two.” *Id.* at 16:34–37.

The '365 patent describes the process carried out by picture quality adjusting module, M15 in Figure 13 above, as follows:

When there is a plurality of main objects, the picture quality adjusting module M15 carries out a picture quality adjusting process on the image data areas corresponding to each of the main objects. The picture quality adjusting module M15 may access correction standard values as the correction conditions, determine the correction level so as to *eliminate or reduce differences between the correction standard values and the property values of the main object image data*, and

adjust the picture quality of the main object image data by applying the correction level that has been determined.

Id. at 14:65–15:7 (emphasis added). By way of example:

When, for example, the sky is the main object, there would be different standards with more attractive, higher picture quality for bright sky, ordinary sky, dark sky, brilliant sky, overcast sky, clear sky, and red sky, respectively. The main object can thus be made to look more attractive by specifying sky in greater detail in terms of what kind of sky it is, and *carrying out the optimal picture quality adjusting process on the specified sky*.

Id. at 18:2–9 (emphasis added); *see also id.* at 18:65–19:5 (examples of picture quality adjustment for face and vegetation color values).

Independent claims 18, 23, 32, and 33 recite variations of the Second Embodiment. Prelim. Resp. 20, 23.

C. Illustrative Claim

Independent claim 1, reproduced below, illustrates the claimed subject matter of the First Embodiment:

1[p]⁵ An image processing device that determines the main object which characterizes an image, the image processing device comprising:

1[a] image data acquiring module that acquires image data that is data of the target image and that is composed of a plurality of pixel data;

1[b] color range determining module segmenting that segments [sic] the image data into a plurality of pixel data groups according to the plurality of areas into which the image is split, analyzes the image data in terms of pixel data units, and determines the color range exhibited by the pixel data groups;

1[c] color range area defining module that defines color range areas by associating pixel data groups that exhibit the same color range and

⁵ We adopt Petitioner's claim limitation numbering system for convenience.

that are adjacent to each other among pixel data groups exhibiting specific color range;

1[d] position data acquiring module that acquires position data for the color range areas; position condition acquiring module that acquires position conditions stipulating the position where an object that corresponds to the specific color range to be present;

1[e] main object determining module that determines the main object corresponding to the color range areas using the color range and the position data of the color range areas as well as the position conditions; and

1[f] wherein each of the modules of the image processing device is executed by an integrated circuit.

Ex. 1001, 27:54–28:13.

D. Asserted Grounds of Unpatentability

Petitioner asserts claims 1–33 are unpatentable on the following Grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/ Basis
1, 3, 5–19, 21–24, 26, 27, and 30–33 (Ground 1)	103 ⁶	Luo-250 ⁷
2, 20, 23, and 28 (Ground 2)	103	Luo-250 and Hibi ⁸
4 (Ground 3)	103	Luo-250 and Luo-668 ⁹
24, 25, and 29 (Ground 4)	103	Luo-250 and Miyano ¹⁰

⁶ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”) includes revisions to 35 U.S.C. §§ 102, 103 that became effective after the filing date of the application that led to issuance of the challenged patent. Hence, this *inter partes* review is governed by the pre-AIA provisions of 35 U.S.C. §§ 102, 103.

⁷ US 2003/0108250 A1, Pub. June 12, 2003 (Ex. 1005, “Luo-250”).

⁸ Certified English Translation of Japanese Patent Publication No. JP2003-248825 to Hibi, Pub. Sept. 5, 2003 (Ex. 1006, “Hibi”).

⁹ US Patent No. 7,212,668 B1 to Luo, Filed Aug. 18, 2000 (Ex. 1007, “Luo-668”).

¹⁰ US Patent No. 5,659,357 to Miyano, Issued Aug. 19, 1997 (Ex. 1008, “Miyano”).

Pet. 1. Petitioner relies on the declaration of Mr. Kenneth Parulski in support of the Petition. Ex. 1003. Patent Owner relies on the declaration of Dr. Nikolaos Papanikolopoulos in support of the Preliminary Response. Ex. 2001.

II. CLAIM CONSTRUCTION

A. Level of Ordinary Skill in the Art

Petitioner states that a person of ordinary skill in the art (“POSITA”) “would have had a Bachelor’s degree or equivalent in electrical engineering, computer science, or a related field, in addition to three years in research, design, or development in digital image processing.” Pet. 13–14 (citing Ex. 1003 ¶ 68). Patent Owner does not dispute Petitioner’s characterization of a POSITA “[f]or purposes of this Preliminary Response only” and otherwise reserves its rights. Prelim. Resp. 21.

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). “These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art.” *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007). There is uncontested evidence in the record before us that reflects the knowledge and experience of a POSITA.

We determine that no express finding is necessary, on the present record, and that the level of ordinary skill in the art is reflected by the prior art of record.

See Okajima v. Bourdeau, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC*, 57 F.3d at 1579; *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

B. Claim Construction

For purposes of this proceeding, Petitioner and Patent Owner both advocate for the “plain and ordinary meaning” of the claim terms without further analysis. Pet. 14; Prelim. Resp. 21. On the present record, we determine that no explicit construction of claim terms is necessary to determine whether to institute an *inter partes* review in this case. *See, e.g., Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed ‘to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

III. OBVIOUSNESS ANALYSIS

A. Asserted Obviousness of Claims 1, 3, 5–19, 21–24, 26, 27, and 30–33 Over Luo-250 (Ground 1)

Petitioner contends that claims 1, 3, 5–19, 21–24, 26, 27, and 30–33 of the ’365 patent would have been obvious to a POSITA in view of Luo-250 pursuant to 35 U.S.C. § 103 (Ground 1). Pet. 15–53 (citing Ex. 1003 ¶¶ 101–198).

Petitioner’s substantive analysis focuses primarily on the independent claims, particularly claims 1 and 18. Patent Owner’s analysis likewise focuses on the independent claims. Prelim. Resp. 22–52 (citing Ex. 2001 ¶¶ 74–138).

Given the variations of the First Embodiment (claims 1–17) and Second Embodiment (claims 18–33) recited in the ’365 patent claims, we focus our analysis on independent claims 1 and 18 in view of Luo-250.

1. Legal Standards

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (hereafter cited as “*KSR*”). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, if made available in the record, which has not happened here. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

2. Luo-250 (Ex. 1005)

Luo-250 discloses a system that detects “target” and “background” subject matter in an image, then enhances the image “based on the subject matter in the image.” Ex. 1005, code (57), ¶ 1. Luo-250’s image enhancement system is based on calculations that determine probability values to indicate the likelihood that a pixel is part of an image object, such as sky, grass, fabric, or skin. *Id.* ¶¶ 31–38, 45. Each pixel in an image is assigned a probability value for a target area, and the

results of the probability calculations are used to generate “belief maps” for an image. *Id.* ¶¶ 17, 32, 33, 43, 44; Ex. 2001 ¶¶ 74–77. “The result is a subject matter belief map, indicating the belief that particular pixels or regions of pixels belong to a given target subject matter.” *Id.* ¶ 32.

Luo-250 Figure 5 depicts a belief map where the target subject matter is lawn grass. Figure 5 is reproduced below:

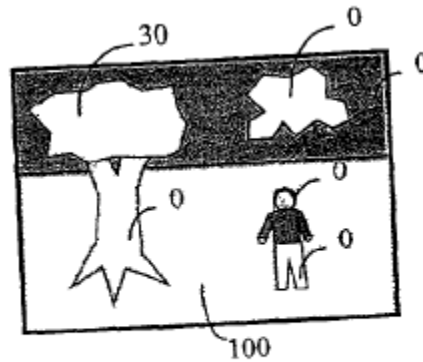


FIG. 5

Id. ¶ 79, Fig. 5. Figure 5 depicts a belief map for “a typical snapshot image containing a person, . . . foliage, cloud sky, clear blue sky, and lawn grass.” *Id.* The belief map shows “the grass having a belief value of 100 and the tree leaves having a belief value of 30.” *Id.* The remaining subject matter targets—cloud sky, clear blue sky, and the person, have belief values of zero. *Id.* ¶¶ 23, 79.

3. Obviousness of claims 1, 3, and 5–17 over Luo-250

Independent claim 1 recites a device that “*determines the main object which characterizes an image.*” Ex. 1001, 27:54–28:13 (claim 1); *see also id.* at 29:47–67 (method claim 15 corresponding to device claim 1).

Independent claims 5, 10, 16, and 17 include similar recitations to those in claim 1 regarding the “*position data acquiring module*” of Limitation 1[d] and

“*main object determining module*” of Limitation 1[e].¹¹ For example, claim 5 recites a “*position data acquiring module that acquires position data of the areas of the image data.*” Given the similarities, Petitioner refers back to its analysis of claim 1 for mapping independent claims 5, 10, 16, and 17 onto Luo-250, including the “*position data acquiring module*” and “*main object determining module.*” Pet. 26 (claim 5), 30–31 (claim 10), 35–36 (claims 16, 17). Petitioner asserts that claims 1, 3, and 5–17 would have been obvious over Luo-250 alone, relying on Mr. Parulski’s Declaration testimony and citations to Luo-250 in support of its argument. Pet. 15–25, 33–34 (citing Ex. 1003 ¶¶ 101–119, 144).

Patent Owner argues that Luo-250 alone would not have rendered obvious claims 1, 3, and 5–17, relying on Dr. Papanikolopoulos’s Declaration testimony and citations to Luo-250 in support of its argument. Prelim. Resp. 24–32, 40 (citing Ex. 2001 ¶¶ 74–93).

We focus our analysis on Petitioner’s mapping of Limitations 1[b]–1[e] (corresponding method Limitations 15[b]–15[f]) onto Luo-250. Our analysis regarding Limitations 1[d] and 1[e] also applies to independent claims 5, 10, 16, and 17, as noted below.

Limitation 1[b]: “*color range determining module [] that . . . determines the color range exhibited by the pixel data groups;*”

Petitioner asserts Luo-250 teaches segmenting the image data into a “*plurality of pixel data groups according to the plurality of areas into which the image is split,*” because the Luo-250 device segments the digital color image pixels into “regions” of pixels. Pet. 17 (citing Ex. 1003 ¶¶ 104–106; Ex. 1005 ¶ 42).

¹¹ Claims 5, 10, 16, and 17 differ from claims 1 and 15 by omitting the “*color range area defining module*” and “*position condition acquiring module.*”

Petitioner argues that a POSITA would have understood from Luo-250 that the plurality of pixels (“*plurality of areas*”) into which the image is split may be single pixels when Luo-250’s image is a high resolution image, or pixel groups when Luo-250’s image is a low resolution image. *Id.* (citing Ex. 1003 ¶ 104 (“in Luo-250’s low resolution image, the image is split into 4x4 groups of pixels”); Ex. 1005 ¶¶ 31, 62, 69, 72). Petitioner further argues that the Luo-250 device “analyzes ‘each pixel in the input color digital image’ to ‘*designate[]*’ certain pixels as certain colors,” and also “determines the *color* exhibited by the regions of pixels.” *Id.* at 18 (citing Ex. 1003 ¶ 105; Ex. 1005 ¶¶ 34, 36, 38) (emphasis added).

Petitioner’s contention, that the Luo-250 device is used “to ‘*designate[]*’ certain pixels as *certain colors*” and “determines the *color* exhibited by the regions of pixels,” is not expressly disclosed in Luo-250, and the Petition does not adequately explain the contention. Prelim. Resp. 26–27 (citing Pet. 18 (emphasis added); Ex. 1005 ¶¶ 32, 34, 36, 38; Ex. 2001 ¶¶ 78–81). The word “*designate[]*” quoted by Petitioner in support is taken from a sentence in Luo-250 paragraph 38, which states: “The skin-tone *probability distribution* is thresholded to create a *binary map* such that each pixel is *designated as either skin-tone or non skin-tone*.” Ex. 1005 ¶ 38 (emphasis added). Luo-250 paragraph 36, also cited by Petitioner and Mr. Parulski (Ex. 1003 ¶ 105), states: “For each pixel in the input color digital image, the *probability* that it is a skin-tone pixel is *computed*.” *Id.* ¶ 36 (emphasis added). Thus, the cited disclosures do not support the Petition’s assertion that the Luo-250 device designates certain pixels as certain colors.

Luo-250 assigns probability values called “belief values” to individual pixels “based on color and texture features” to generate a “belief map” indicating the probability or “belief that particular pixels or regions of pixels belong to a given target subject matter.” Ex. 1005 ¶¶ 32, 42, 43; *see also* Prelim. Resp. 26 (citing

Ex. 1005 ¶¶ 32, 34 (describing “probability values”), 36 (computing “[f]or each pixel, the probability that it is a skin-tone pixel”), 38 (describing forming “a skin-tone probability distribution” for the entire image)). For example, after executing a skin-tone probability calculation, the Luo-250 device can “create a binary map such that each pixel is designated as either skin-tone or non skin-tone.” Ex. 1005 ¶ 38. In such a binary belief map “a pixel value of 1 . . . may represent belief that the pixel represents the target subject matter [skin-tone] with the highest probability and a pixel value of 0 may represent the belief that the pixel does not represent the target subject matter with the highest probability [non skin-tone].” *Id.* ¶ 32.

Luo-250 Figure 3, below right, is an exemplary belief map generated in accordance with Luo-250 and based on a “typical snapshot image” of a person, foliage, cloud sky, clear blue sky, and lawn grass shown in Figure 2, below left:

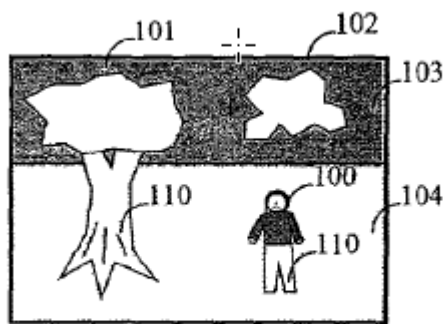


FIG. 2

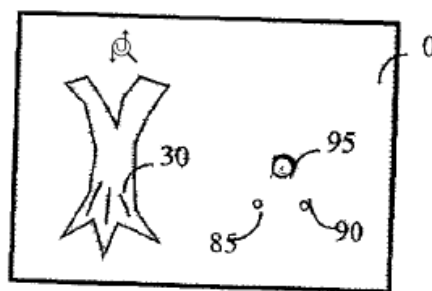


FIG. 3

Id. ¶ 79, Figs. 2, 3. Figure 3, above right, “shows an example of a belief map generated by the subject matter detector when the target subject matter is human flesh [skin tone] with belief values indicated for the different subject matters of the image.” *Id.* ¶ 79. In the belief map of Figure 3, the person’s face, designated “95,”

has a probability or “belief value” of 95 percent of being human flesh skin tone, the person’s hands have designated belief values of 85 and 90 percent, but the tree trunk has a designated belief value of 30 percent and the background is zero. *Id.*

Luo-250 Figure 5 is another exemplary belief map, reproduced below:

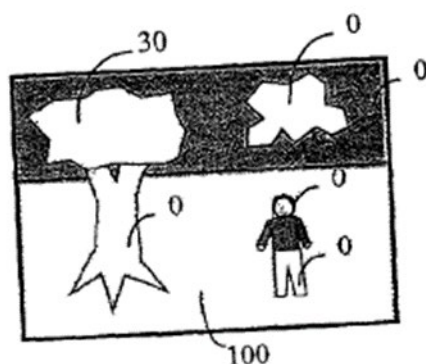


FIG. 5

Id. Fig. 5. Figure 5 “shows an example of a belief map generated by the subject matter detector when the target subject matter is grass with the grass having a belief value of 100 and the tree leaves having a belief value of 30.” *Id.* ¶¶ 23, 79. The person, tree trunk, and both cloud sky and clear blue sky have designated belief values of zero. *Id.*

As shown above in Figures 2, 3, and 5, Luo-250’s belief maps indicate probability values for different target areas in the image; they do not “designate certain pixel as certain colors” as asserted by Petitioner.

To be sure, the pixel belief values used in the Luo-250 device are based on color. The Luo-250 device determines pixel probabilities “by assigning to each pixel a belief value as belonging to the subject matter region based on color and texture features.” *Id.* ¶ 42. However, using probability values or binary 1s and 0s to map the probability or “belief” that a pixel or area of pixels in an image either is,

or is not, a subject matter target, is not the same as designating “certain pixels as certain colors” as asserted by Petitioner. Thus, we are not persuaded that the Petition has adequately supported or explained how the Luo-250 device designates “certain pixels as certain colors.”

We also are not persuaded the Petition has established that Luo-250 discloses, teaches, or suggests a device or method that “*determines the color range exhibited by the pixel data groups*” as recited in Limitation 1[b]. Pet. 17–18 (citing Ex. 1005 ¶¶ 34–39). First, as indicated above, we are not persuaded the Petition has established that Luo-250 “designates certain pixels as certain colors,” which is foundational to Petitioner’s argument that the Luo-250 method determines a “*color range exhibited by the pixel data groups*.” Second, the evidence cited by Petitioner when attempting to map the quoted claim language regarding “*color range*” to Luo-250, refers to the designation of individual pixels as “either skin-tone or non skin-tone” in a binary belief map, not a range of colors. *Id.* at 18 (citing Ex. 1005 ¶¶ 35–39). Petitioner’s argument—that “[b]y analyzing the pixels to designate each as ‘either skin-tone or non skin-tone,’ Luo-250’s device determines ‘[r]egions of skin-tone colored pixels’ in the image” (*id.*)—is not persuasive evidence of “*determin[ing] a color range exhibited by the pixel data groups*” as recited in Limitation 1[b]. The Petition does not adequately explain how Luo-250 discloses, teaches, suggests, or otherwise renders obvious the determination of color ranges for pixel data groups in an image.

We are further persuaded by Patent Owner’s argument and evidence that the Petition has not adequately explained how the Luo-250 device would “*determine[] a color range*” based on a determination of probability values for each pixel, rather than a range of colors. Prelim. Resp. 26–27 (citing Ex. 1005 ¶¶ 32, 34, 36, and 38). Dr. Papanikolopoulos’s Declaration testimony further supports Patent

Owner’s position. Ex. 2001 ¶¶ 78–81. Dr. Papanikolopoulos testifies, in particular, that Mr. Parulski asserts only “that Luo-250 considers the color of *individual* pixels. He does not assert that Luo-250 anywhere ‘analyzes the image data . . . and determines the color *range*, as claimed.’” *Id.* ¶ 80. We agree.

In short, for the reasons given above, we determine the Petition does not adequately support the assertion that Luo-250 discloses, teaches, suggests, or otherwise renders obvious “*a color range determining module that . . . determines the color range exhibited by the pixel data groups,*” as recited in Limitation 1[b] of the ’365 patent.

Limitation 1[c]: “*color range area defining module that defines color range areas by associating pixel data groups that exhibit the same color range and that are adjacent to each other among pixel data groups exhibiting specific color range;*”

Petitioner asserts Luo-250 teaches Limitation 1[c] because the Luo-250 device defines “candidate subject matter areas” by associating regions of adjacent pixels that exhibit the same color range. Pet. 19 (citing Ex. 1003 ¶¶ 107–109). Petitioner contends that in Luo-250 “regions of pixels that exhibit the same color and are ‘spatially contiguous’ are ‘form[ed]’ into ‘candidate subject matter regions’ and ‘labeled,’” such as the green lawn grass and blue sky shown in the belief map of Figure 5. *Id.* (citing Ex. 1005 ¶¶ 23, 42, 43, 79, Fig. 5). The Petition cites Mr. Parulski’s testimony to assert further that “[i]t would have been obvious to implement this color range area defining step as a color range area defining module in Luo-250’s computer program product, or in a hardware module, for at least the reasons in 1[a].” *Id.* at 20 (citing Ex. 1003 ¶ 109).

Patent Owner persuasively argues that the Petition fails to adequately explain the asserted mapping of Limitation 1[c] onto Luo-250. Prelim. Resp. 27–

28 (citing Ex. 1005 ¶¶ 31, 32, 42–44). Dr. Papanikolopoulos testifies as follows:

[T]he claim recites a “color range area defining module that defines color range areas.” Ex. 1001, 27:60-65. Mr. Parulski opines that Luo-250 discloses this limitation by associating “[s]patially contiguous regions” of pixels with similar probability values. Ex. 1003, ¶ 107-108. I disagree because Luo-250’s description of such “regions” does not satisfy the claimed function of “defin[ing] color range areas.”

[A]s I discuss above, Luo-250 does not determine “color range areas.” Instead, *Luo-250 associates individual pixels that have similar probability—not color—values into “spatially contiguous candidate subject matter regions.”* Ex. 1005, [0042] (describing “thresholding the belief values” to form “spatially contiguous regions”). Luo-250 does not even inform a POSITA of how to select this threshold for the belief values.

Ex. 2001 ¶¶ 83–84 (emphasis added). Dr. Papanikolopoulos correctly notes that the cited disclosures in Luo-250 on which the Petition relies associate pixels having similar probability values, not color values, into the target subject matter regions of an image. Our reasoning and analysis for Limitation 1[b], above, also applies equally to Limitation 1[c]. We will address the “*acquires position data*” aspects of Petitioner’s and Patent Owner’s arguments in connection with the “*position data acquiring module*” of Limitation 1[d] below.

For the reasons given above, we determine the Petition does not adequately support the assertion that Luo-250 discloses, teaches, suggests, or otherwise renders obvious a “*color range area defining module that defines color range areas by associating pixel data groups that exhibit the same color range and that are adjacent to each other among pixel data groups exhibiting specific color range,*” as recited in Limitation 1[c] of the ’365 patent.

Limitation 1[d]: *“position data acquiring module that acquires position data for the color range areas; position condition acquiring module that acquires position conditions stipulating the position where an object that corresponds to the specific color range to be present;”*

Even if we were to accept Petitioner’s argument that Luo-250 discloses, teaches, or suggests Limitations 1[b] and 1[c], we are not persuaded the Petition adequately explains and supports its assertion that “Luo-250 teaches 1[d] because Luo-250’s device acquires a ‘pixel position (x,y)’ for the candidate subject matter areas and acquires a ‘specific location’ where an object that corresponds to the specific colors is to be present.” Pet. 20 (citing Ex. 1003 ¶¶ 110–113).

i. *“acquires position data for the color range areas”*¹²

With regard to a device that *“acquires position data for the color range areas”* in an image, Petitioner asserts “Luo-250 teaches that its device acquires a ‘pixel position (x,y)’ for the candidate subject matter areas [*“color range areas”*] because Luo-250’s image is ‘an image $i(x,y)$ having x_0 rows and y_0 columns’ of pixels.” Pet. 20 (citing Ex. 1005 ¶ 31). Petitioner notes that each pixel has a “pixel position (x,y)” where “(x,y) denotes the xth row and the yth column of an image.” *Id.* (citing Ex. 1005 ¶¶ 62, 69, 72). Relying on Mr. Parulski’s Declaration testimony, Petitioner argues a POSITA would have recognized that the candidate subject matter areas in Luo-250 “are formed by associating spatially contiguous regions of pixels” and “would have pixel positions for each pixel in the candidate subject matter area.” *Id.* (citing Ex. 1003 ¶ 111).

Patent Owner challenges Petitioner’s argument that the Luo-250 device

¹² This sub-section of our analysis applies to the *“position data acquiring module that acquires position data”* or *“acquiring position data”* recited in independent claims 5, 10, 16, and 17.

“*acquires*” position data for the spatially contiguous regions of pixels in the image. Prelim. Resp. 28–30 (citing Ex. 1005 ¶¶ 31, 32, 42–44, 62, 69, 72; Ex. 2001 ¶¶ 82–89). Patent Owner notes that Luo-250 “describes only coordinate data ‘(x,y)’ for individual pixels,” and that “nowhere does Luo-250 describe ‘position data’ for any ‘area,’ including the ‘spatially contiguous regions’ upon which the Petition relies.” *Id.* at 28–29 (citing Ex. 1005 ¶¶ 31, 32, 42–44, 62, 69, 72). Patent Owner further emphasizes that the “Petition thus contends only that individual pixels within ‘spatially contiguous regions’ in Luo-250’s system ‘would *have*’ individual pixel positions, not that the system performs any operation that ‘*acquires*’ any position data *for* the ‘spatially contiguous regions’ that Luo-250 identifies based on probability ‘belief values.’” *Id.* at 29–30 (citing Pet. 20–21).

Patent Owner raises a valid point. First, as discussed above in Limitations 1[b] and 1[c], the Petition has not established adequately how the Luo-250 device would determine and define “*color range areas*.” Second, Luo-250 discloses and teaches that each pixel in an image *has* x,y position coordinates in contiguous subject matter regions within the image. The Petition, however, does not explain whether or how Luo-250 discloses, teaches, suggests, or otherwise infers a device or method that “*acquires*” position data, such as the x,y position coordinates of the pixels for a given color range area such as blue sky or lawn grass, for further analysis and processing. Even Mr. Parulski testifies only that “Luo-250’s candidate subject matter areas, which are formed by associating spatially contiguous regions of pixels, *would have pixel positions* for each pixel in the candidate subject matter area.” Ex. 1003 ¶ 111 (emphasis added). Mr. Parulski does not testify that Luo-250 “*acquires*” x,y coordinate “*position data*” for blue sky or lawn grass color regions in the image, in order to analyze the position data to “*determine*” the blue sky or lawn grass as “*main objects*” “*corresponding to the*

color range areas,” as recited in Limitation 1[e].

Dr. Papanikolopoulos confirms that “[n]owhere does Luo-250 describe ‘position data’ for any ‘area,’ including the ‘spatially contiguous regions’ upon which the Petition relies.” Ex. 2001 ¶ 85. Dr. Papanikolopoulos further testifies that

Luo-250’s limited reference to “specific location (near bottom of the images and in contact with image borders),” Ex. 1005, [0043], does not disclose, expressly or by necessary implication, that Luo-250 “acquires position data for the color range areas.” Luo-250’s reference to “specific location” merely describes, in my opinion, where “a light and isotropic texture” may typically be found (for example, “near bottom of the images and in contact with image borders”). Luo-250 does not disclose (and Mr. Parulski thus does not describe) how, if at all, the system in Luo-250 determines the position data of the “candidate subject matter region.”

Ex. 2001 ¶ 88. The Declaration testimony of Dr. Papanikolopoulos is consistent with the disclosures in Luo-250 and with Mr. Parulski’s testimony.

- ii. *“acquires position conditions stipulating the position where an object that corresponds to the specific color range to be present”*

The Petition blurs the distinction between the “*acquires position data*” and “*acquires position conditions*” elements recited in Limitation 1[d]. Petitioner’s claim mapping for the “*acquires position conditions*” element is not clear, but it relies heavily, if not exclusively, on the disclosure in paragraph 43 of Luo-250. Pet. 21 (citing Ex. 1003 ¶ 112; Ex. 1005 ¶ 43). The relevant portions of Luo-250 paragraph 43 are reproduced below:

Fig. 10 shows a method . . . for detecting subject matter such as clear blue sky or lawn grass. First, an input color digital image is obtained. Next, *each pixel is assigned a subject matter belief value* in a color and texture pixel classification step based on color and texture

features by a suitably trained multi-layer neural network. Next, a region extraction step is used to generate a number of candidate subject matter regions. . . . [S]elected candidate regions are *analyzed for unique characteristics*. . . . In the case of *lawn grass*, the *unique characteristics are a light and isotropic texture, specific location (near bottom of the images and in contact with image borders)*. Only those candidate regions that exhibit these unique characteristics are labeled as smooth lawn grass regions. *A subject matter belief map indicating the location and extent, as well as the associated belief values of detected subject matter regions is generated as a result of the analysis.*

Ex. 1005 ¶ 43 (emphasis added).

First, Petitioner limits its mapping of “*acquires position conditions*” to the “unique characteristics” of “lawn grass.”

Second, Mr. Parulski opines in one conclusory sentence that the “specific location” characteristic for lawn grass “stipulates the position where subject matter regions of a particular color are to be present in the image.” Ex. 1003 ¶ 112. Mr. Parulski, however, does not explain how the Luo-250 device “*acquires*” position conditions or “*stipulates*” the position of lawn grass in order to validate the “*position data*” that Petitioner asserts is “*acquire[d]*” for lawn grass in the image. As Patent Owner notes, the “specific location (near bottom of the images and in contact with image borders)” in Luo-250 paragraph 43, on which the Petition relies, is not a disclosure that Luo-250 “*acquires*” both position data and position conditions for lawn grass to “*determine*” lawn grass as a main object in an image, for example by comparative analysis. Prelim. Resp. 30–31 (citing Ex. 2001 ¶ 88); *cf.* Ex. 1001, 10:37–51 (“position data is obtained for the color range areas;” “CPU obtains position conditions (object-determining-conditions) . . . stored in the form of a table such as the one in Fig. 11, for example, in the ROM/HDD”), 59–62 (“CPU then compares the position data of color range areas . . . with the position

data corresponding to the sky [position conditions] to determine the main object”).

We further agree with Dr. Papanikolopoulos that “Mr. Parulski does not show that Luo-250 uses ‘position conditions’ to ‘determine a main object.’” Ex. 2001 ¶ 92. Mr. Parulski also reaches the unexplained conclusion that “[i]t would have been obvious to implement these position data acquiring and position condition acquiring steps as a position data acquiring module and position condition acquiring module.” Ex. 1003 ¶ 113. Mr. Parulski’s conclusory opinions are not persuasive.

Third, the Petition does not explain persuasively how Luo-250’s subject matter “belief values” in the “belief maps” disclose, teach, suggest, or otherwise infer a device or method that “*acquires position data*” and “*acquires position conditions stipulating the position*” where an object corresponding to a color range is specified to be present. Pet. 21–23 (citing Ex. 1003 ¶¶ 112–116; Ex. 1005, ¶¶ 42–43, Figs. 2, 5). Both elements—the “*acquires position data*” and “*acquires position conditions*”—are necessary because they are used to validate and determine the main object that corresponds to the specified color range in an image. The “belief values” in Luo-250’s belief maps are probability values (percentages) that indicate “the degree of belief that pixels in the image belong to target subject matter.” Ex. 1005, (code 57). It is unclear from the Petition how Luo-250’s belief maps or belief values would teach a POSITA to “*acquire[]*” “*position conditions*” for “*stipulating*” (validating) the “*position*” of the lawn grass color range area in an image, for use with unspecified “*acquire[d] position data*” (and color range) to determine the corresponding lawn grass “*object*” in the image.

The Petition largely repeats Mr. Parulski’s Declaration testimony, which does not clarify Petitioner’s argument or further explain how Luo-250’s belief maps and belief values would satisfy the elements of Limitation 1[d]. Ex. 1003

¶¶ 112–116.

For the reasons given above, we determine the Petition does not adequately support the assertion that Luo-250 discloses, teaches, suggests, or otherwise renders obvious a “*position data acquiring module that acquires position data for the color range areas; position condition acquiring module that acquires position conditions stipulating the position where an object that corresponds to the specific color range to be present,*” as recited in Limitation 1[d] of the ’365 patent.

Limitation 1[e]: “*main object determining module that determines the main object corresponding to the color range areas using the color range and the position data of the color range areas as well as the position conditions;*”¹³

Petitioner asserts Luo-250 teaches limitation 1[e] “because Luo-250’s device determines the target subject matter corresponding to the candidate subject matter areas using the colors and the pixel position of the candidate subject matter areas as well as the specific location.” Pet. 22 (citing Ex. 1003 ¶¶ 114–116). As discussed above in Limitation 1[d], Petitioner again asserts the Luo-250 device “analyz[es] the spatially contiguous regions based on ... unique characteristics,” including “specific location,” to “determine the probability that a region belongs to the subject matter” and “generat[es] a map of detected subject matter regions and associated probability that the regions belong to the subject matter.” *Id.* (citing Ex. 1005 ¶¶ 42–43). Petitioner further asserts that “[o]nly those” of the green candidate subject matter regions “that exhibit th[is] unique characteristic”—the specific location—“are labeled as ... lawn grass regions.” *Id.* Petitioner again appears to equate Luo-250’s disclosure of a “specific position” for lawn grass with

¹³ This sub-section of our analysis also applies to the “*main object determining module*” or “*determining the main object*” recited in independent claims 5, 10, 16, and 17.

the “*acquires position conditions*” element recited in Limitation 1[d].

Our analysis for limitation 1[d] applies equally to limitation 1[e]. Petitioner has not supported adequately its assertion that Luo-250 teaches a device that “*acquires position data*” and “*acquires position conditions stipulating the position*” of an object as recited in limitation 1[d]. Those recitations provide antecedent basis for “*the*” position data and “*the*” position conditions that are “*us[ed]*,” along with the “*color range*,” to “*determin[e] the main object corresponding to the color range areas*,” as recited in Limitation 1[e].

We are further persuaded by Patent Owner’s argument that the Petition does not adequately show how Luo-250 uses “*position conditions*” to “*determine[] the main object*.” Prelim. Resp. 31. As Dr. Papanikolopoulos testifies:

Luo-250 does not acquire “position data” for any areas, so it does not disclose comparing any “position data” to “position conditions” that stipulate valid position ranges where objects exhibiting a specific color range may appear. In addition, Luo-250’s brief mention of “*specific location*” does not describe how—or if—Luo-250 defines any “location” or determines whether pixels reside in a “*specific location*.” Ex. 1005, [0043].

Ex. 2001 ¶ 92 (emphasis added). Dr. Papanikolopoulos’s testimony is persuasive and not inconsistent with Luo-250 paragraph 43.

For the reasons given above, we determine the Petition does not adequately support the assertion that Luo-250 discloses, teaches, suggests, or otherwise renders obvious a “*main object determining module that determines the main object corresponding to the color range areas using the color range and the position data of the color range areas as well as the position conditions*,” as recited in Limitation 1[e] of the ’365 patent.

Conclusion

For the reasons given above, we are not persuaded that Petitioner’s argument and evidence demonstrate a reasonable likelihood Petitioner would prevail in showing the unpatentability of claims 1, 3, and 5–17 as obvious over Luo-250. *See KSR*, 550 U.S. at 418 (obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

4. Obviousness of claims 18, 19, 21–24, 26, 27, 30–33 Over Luo-250

The independent claims directed to the Second Embodiment (claims 18, 23, 32, and 33) recite image processing devices and methods that use particular properties, such as color and statistical values, to adjust the picture quality of an image. *E.g.*, Ex. 1001, 30:32–37 (claim 18); *see also id.* at 32:23–33 (method claim 32 corresponding to device claim 18).

Petitioner analyzes independent claims 18 and 23 in detail. Claim 23 largely tracks claim 18, except claim 23 specifies “*color value*” as the acquired property of the main object image data and “*standard color values*” as the acquired correction conditions corresponding to the acquired properties. Petitioner maps independent claims 32 and 33 onto Luo-250 by referring back to its mapping of claims 18 and 23. Pet. 36–38 (claim 18), 40–44 (claim 23), 51–53 (claims 32, 33). Petitioner asserts that claims 18, 19, 21–24, 26, 27, and 30–33 would have been obvious to a POSITA over Luo-250 alone, relying on Mr. Parulski’s Declaration testimony and citations to Luo-250 to support its argument. Pet. 36–53 (citing Ex. 1003 ¶¶ 165–184).

Patent Owner argues that Luo-250 alone would not have rendered obvious claims 18, 19, 21–24, 26, 27, and 30–33, relying on Dr. Papanikolopoulos’s

Declaration testimony and citations to Luo-250 to support its argument. Prelim. Resp. 41–52 (citing Ex. 2001 ¶¶ 114–138).

We focus our analysis on Limitations 18[b], 18[c], and 18[d], which also applies to the corresponding “*color value*” limitations of claim 23.

Limitation 18[b]: “*property acquiring module that acquires the properties of the determined main object image data;*”

Petitioner asserts that “Luo-250 teaches 18[b] because Luo-250’s device acquires the property of color of the pixels (which together form the candidate subject matter area) in the image determined to be the target subject matter.” Pet. 36 (citing Ex. 1003 ¶ 166). Petitioner argues the Luo-250 “device identifies ‘skin-tone colored pixels’ that make up ‘regions of skin tone colors.’” *Id.* (citing Ex. 1005 ¶¶ 34, 36, 39, 79, Fig. 3). Petitioner concludes it “would have been obvious to implement this property acquiring step as a property acquiring module in Luo-250’s computer program product, or in a hardware module, for at least the reasons in 1[a].” *Id.* at 37 (citing Ex. 1003 ¶ 167).

First, Petitioner’s argument for Limitation 18[b] repackages the arguments discussed above in connection with Limitations 1[b] and 1[c]. Petitioner’s argument for why and how Luo-250 would teach a POSITA to acquire “*properties*” of the main object image data, such as color value, is based on the assertion that the Luo-250 device ““*designate[s]*’ certain pixels as certain colors” and determines color range areas in an image. Pet. 18–19. For the reasons given above with regard to Limitations 1[b] and 1[c], we find those arguments unpersuasive.

Second, Patent Owner presents the following persuasive arguments:

The Petition does not provide any evidence that Luo-250 performs the claimed limitations of determining a main object and then acquiring

properties of the main object image data (such as color and statistical values). The Petition does not assert that Luo-250 teaches or suggest[s] acquiring properties of any image data other than the individual pixel data ingested before constructing the belief map, much less acquiring properties of the aggregated main object image data, such as color and statistical values, *after the main object has been determined*.

Prelim. Resp. 41–42 (citing Ex. 1005 ¶¶ 32, 34–36, Figs. 1, 9) (emphasis added);

As noted above, Luo-250 obtains color values only once—at the very outset of its process—and applies [] a “subject matter detector” to the digital image to produce a “subject matter belief map,” which assigns to each pixel a probability (“belief value”) that it might belong to a “target subject matter.” Luo-250 does not “acquire[] the properties of *the determined main object image data*,” as claimed—it merely ingests color values at the outset before assigning any probability values.

Id. at 42 (citing Ex. 1005 ¶¶ 32, 36, 44); and

Further, despite the claim language requiring that the system “acquire[] properties *of the determined main object image data*,” the Petition identifies, for “properties,” only the probabilities computed during the same step that it also contends “determines the main object image data.” The Petition does not identify any separate step of “acquir[ing] properties *of the determined main object image data*,” because Luo-250 does not teach any such step.

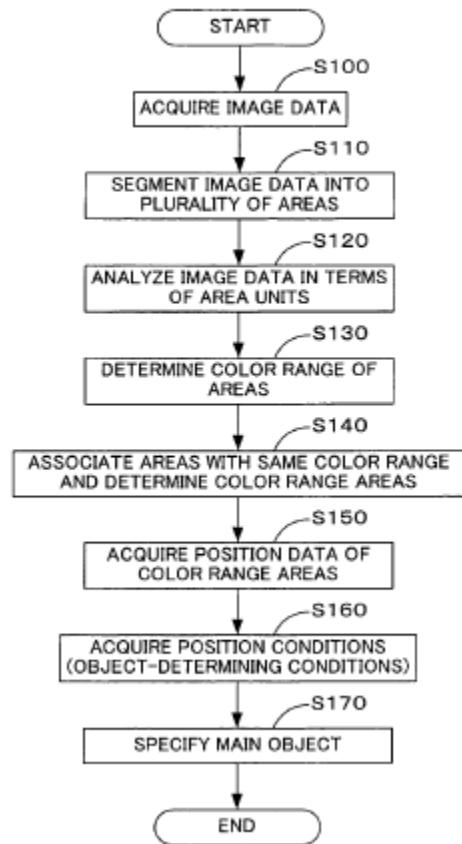
Id. at 43 (citing Pet. 36).

Patent Owner’s arguments are illustrated by comparing the First and Second Embodiments of the ’365 patent.

The First Embodiment defines color range areas, acquires position data and position conditions for the color range areas, and analyzes the acquired data to

determine the main object in an image. The functional steps (modules) for the First Embodiment are depicted in Figure 5 of the '365 patent, reproduced below:

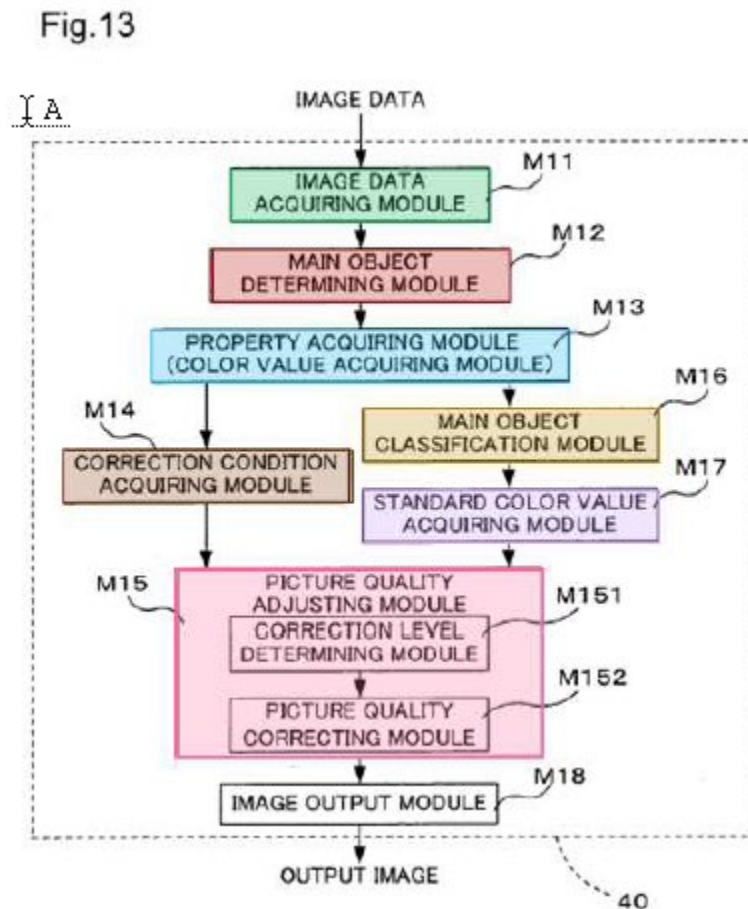
Fig.5



The First Embodiment, shown in Figure 5, begins with step S100 acquiring image data. Steps S120–S140 analyze the image data to define color range areas, steps S150 and S160 acquire position data and position conditions, and step S170 “determine[s] the main object (Step S170) and the process routine is complete.” Ex. 1001, 10:59–62. Thus, the First Embodiment ends by “*determining the main object which characterizes an image,*” as recited in claims 1, 5, 10, and 15–17.

The Second Embodiment begins where the First Embodiment leaves off, with the “*main object determining module that determines the main object image data corresponding to the main object characterizing the image.*” See *id.*

at 14:44–48 (“module M12 determines the image data areas corresponding to the main [sic] object characterizing the image”). Figure 13 of the ’365 patent depicts the Second Embodiment and is reproduced below in color-annotated form from the Petition:



Pet. 7. In Figure 13, the Second Embodiment takes the determined “*main object characterizing an image*” output from the First Embodiment (M12, red), and acquires properties—such as color and statistical values—of the determined main object (M13, blue). Module M14 (brown) acquires correction conditions based on the acquired properties of the main object to enable the main object to be classified in more detail “to implement better picture quality adjustment of the main object image data.” Ex. 1001, 15:56–67. Module M15 (pink) then “*adjusts the picture*

quality of the main object image data using the acquired correction conditions,” as recited in independent claims 18, 23, 32, and 33. Ex. 1001, 3:51–53.

Thus, the Second Embodiment described in the ’365 patent specification and recited in independent claim 18 (and independent claims 23, 32, and 33), requires additional steps—acquiring properties of “*the determined main object image data*” and correction conditions for those acquired properties—based on the determined main object image data, for example as outputted by the First Embodiment. The Second Embodiment then applies the acquired correction conditions to the acquired properties to adjust the picture quality of the main object “so as to eliminate or reduce differences between the correction standard values and the property values of the main object image data.” *Id.* at 15:1–7. The additional processing steps are a central feature of independent claims 18, 23, 32, and 33, but the Petition does not adequately establish that Luo-250 discloses, teaches, suggests, or otherwise infers a device that performs such steps.

Third, neither the Petition nor Mr. Parulski adequately explains why a POSITA would have understood Luo-250 to teach or suggest a device that acquires the color value (or other property) of the determined main object image data. The testimony of Dr. Papanikolopoulos supports Patent Owner’s argument that the Petition does not adequately identify a device or method that “*acquires the properties of the determined main object image data.*” Prelim. Resp. 41–44 (citing Ex. 2001 ¶¶ 114–120). Dr. Papanikolopoulos testifies, in particular, as follows:

Mr. Parulski does not . . . address the plain claim language that the acquired “properties” are “properties *of the* determined main object image data” and not merely properties of individual pixels within the main object image data. Mr. Parulski also does not assert that Luo-250 teaches or suggest acquiring properties of any image data other than the individual pixel data ingested before constructing the belief map, much less acquiring properties of the aggregated main object image

data, such as color and statistical values, after the main object has been determined.

Ex. 2001 ¶ 115 (citing Ex. 1003 ¶¶ 166–167);

Individual pixel color values are not color values “of the determined main object image *data*,” as claimed. Individual pixel color values represent only individual pixels and not properties of a set of pixels corresponding to any determined object within the image.

Id. ¶ 116 (citing Ex. 1005 ¶¶ 32, 34, 43); and

Luo-250 explains that it computes “*probability values* for skin-tone colored pixels” before constructing the “belief map” that Mr. Parulski contends constitutes the “determining the main object.” Luo-250 further explains that “regions of skin-tone colors” correspond to “a skin-tone *probability* distribution for the input image.” Luo-250 does not teach or suggest that the probability values and distribution contain any color values.

Id. ¶ 118 (citing Ex. 1003 ¶ 166; Ex. 1005 ¶¶ 34, 38).

Dr. Papanikolopoulos’s testimony is consistent with Luo-250, and his reasoning is persuasive.

For the reasons given above, the Petition does not adequately support the assertion that Luo-250 discloses, teaches, suggests, or otherwise renders obvious a “*property acquiring module that acquires the properties of the determined main object image data*,” as recited in Limitation 18[b] of the ’365 patent.

Limitation 18[c]: “*correction condition acquiring module that acquires correction conditions corresponding to the properties that have been acquired;*”

Petitioner asserts that Luo-250 teaches Limitation 18[c] because the Luo-250 device acquires “preferred” or “memory” colors that correspond to the colors of

the pixels that have been acquired. Pet. 37 (citing Ex. 1005 ¶¶ 49, 51). Petitioner explains that Luo-250 describes a “pre-determined ‘preferred’ or ‘memory’ color of the sky; ... of the lawn grass (e.g., that of a golf course); ... [and] of the skin (e.g., tanned skin).” *Id.* (citing Ex. 1005 ¶ 49). Luo-250 discloses that preferred colors are used for “color re-mapping,” where the pixel colors of target subject matter are adjusted “in the direction of” a “preferred” or “memory” colors. *Id.*

First, as stated previously in our analysis of Limitations 1[b] and 1[c], the Petition has not explained adequately how Luo-250 discloses, teaches, or suggests a device that is used “to ‘designate[]’ certain pixels as certain colors” and “determine[] the color exhibited by the regions of pixels.”

Second, because the Petition has not explained adequately how Luo-250 discloses, teaches, or suggests a method or device that acquires pixel colors of the “*determined main object image data*,” as explained above in Limitation 18[b], the Petition also has not explained adequately how Luo-250 discloses, teaches, or suggests a method or device that uses pixel color values to “*acquire[] correction conditions corresponding to*” those pixel color values (“*the properties that have been acquired*”). Prelim. Resp. 44 (citing Ex. 1005 ¶¶ 45, 64–66).

Third, the Petition does not explain adequately how the Luo-250 device would select and execute a “color re-mapping” operation—or other image enhancement operation—based on the color value properties of the determined main object image data. *Id.* (citing Ex. 1005 ¶ 49). As Dr. Papanikolopoulos testifies:

Luo-250 explicitly states that these operations are based, at most, on a predetermined function for broad categories of target subject matter, not on the properties of any determined main object image data.

Ex. 2001 ¶ 122;

Luo-250 discloses only that the image enhancement operation is selected “from a collection of predetermined image enhancement operations” relating to general types of target subject matter.

Id. ¶ 123 (citing Ex. 1005 ¶ 45); and

Mr. Parulski, consistent with Luo-250’s lack of disclosure linking any image properties to selecting an “image enhancement operation,” offers no opinion as to how Luo-250 teaches that any alleged memory color “correction conditions” “*correspond[] to*” acquired color values or other properties of the image, as required by the claim. No portion of Luo-250 discloses how Luo-250 selects a “color re-mapping” operation to apply.

Id. ¶ 126 (citing Ex. 1003 ¶¶ 168–169; Ex. 1005 ¶¶ 49, 51).

In short, Patent Owner persuasively argues, based on Dr. Papanikolopoulos’s Declaration testimony, that the Petition does not explain adequately or support how the asserted memory color correction conditions “*correspond[] to*” the “*acquired*” color values of “*the determined main object image data*,” as recited in claim Limitation 18[c].

Limitation 18[d]: “*picture quality adjusting module that adjusts the picture quality of the main object image data using the acquired correction conditions;*”

Petitioner asserts Luo-250 teaches Limitation 18[d] because the Luo-250 device “‘improve[s] the image quality’ by ‘color re-mapping’ the pixels of the target subject matter in the image using the ‘preferred’ colors.” Pet. 37–38 (citing Ex. 1003 ¶¶ 170–171; Ex. 1005 ¶¶ 2, 16, 49, 51). Our analysis of Limitations 18[b] and 18[c], above, apply equally to Limitation 18[d]. Therefore, the Petition does not explain adequately or support the assertion that Luo-250 discloses, teaches, suggests, or otherwise renders obvious a color re-mapping operation that “*adjusts the picture quality of the main object image data using the acquired correction conditions*,” as recited in claim Limitation 18[d].

Conclusion

For the reasons given above, we are not persuaded that Petitioner’s argument and evidence demonstrate a reasonable likelihood Petitioner would prevail in showing the unpatentability of claims 18, 19, 21–24, 26, 27, and 30–33 as obvious over Luo-250.

B. Asserted Obviousness of Claims 2, 4, 20, 23–25, 28 and 29 over Luo-250 and Other Secondary References (Grounds 2–4)

Petitioner argues dependent claims 2, 20, and 28, and independent claim 23, are obvious over Luo-250 and Hibi under 35 U.S.C. § 103 (Ground 2).¹⁴ Pet. 53–62 (citing Ex. 1003 ¶¶ 213–230). Patent Owner argues the Petition does not assert that Hibi discloses or renders obvious any of the independent claim elements absent from Luo-250, discussed above in Ground 1. Prelim. Resp. 52. Our review of the Petition indicates Petitioner relies on Luo-250 for the independent claim limitations addressed in section A, above.¹⁵ Petitioner’s reliance on Hibi does not alter our analysis of the limitations in independent claims 1, 5, 10, 15–18, 23, 32, and 33 that we have addressed in section A.

Therefore, based on our analysis of independent claims 1 and 18, we are not persuaded Petitioner’s argument and evidence demonstrate a reasonable likelihood Petitioner would prevail in showing the unpatentability of claims 2, 20, 23, and 28 as obvious over Luo-250 and Hibi.

Petitioner argues that claim 4, which depends from claim 1, is obvious over Luo-250 and Luo-668 under 35 U.S.C. § 103 (Ground 3). Pet. 62–64 (citing

¹⁴ Claim 2 depends from independent claim 1, claim 20 from claims 19/18, and claim 28 from independent claim 23.

¹⁵ Petitioner maps Hibi onto Limitation 23[c] (“*main object classifying module that classifies the main object using the acquired color values*”). Pet. 60–61.

Ex. 1003 ¶¶ 231–235). Patent Owner argues the Petition does not assert that Luo-668 discloses or renders obvious any of the independent claim elements absent from Luo-250, discussed above for Ground 1. Prelim. Resp. 52. Our review of the Petition indicates Petitioner relies on Luo-250 for the independent claim limitations addressed in section A., above. Petitioner’s reliance on Luo-668 does not alter our analysis of the limitations in independent claim 1 that we have addressed in section A.

Therefore, based on our analysis of independent claim 1, we are not persuaded Petitioner’s argument and evidence demonstrate a reasonable likelihood Petitioner would prevail in showing the unpatentability of claim 4 as obvious over Luo-250 and Luo-668.

Petitioner argues claims 24, 25, and 29 are obvious over Luo-250 in view of Miyano under 35 U.S.C. § 103 (Ground 4).¹⁶ Pet. 64–68 (citing Ex. 1003 ¶¶ 236–243). Patent Owner argues the Petition does not assert that Miyano discloses or renders obvious any of the independent claim elements absent from Luo-250, discussed above for Ground 1. Prelim. Resp. 52–53. Our review of the Petition indicates Petitioner relies on Luo-250 for the independent claim limitations addressed in section A., above. Petitioner’s reliance on Miyano does not alter our analysis of the limitations that we have addressed in section A.

Therefore, based on our analysis of independent claims 18 and 23, we are not persuaded Petitioner’s argument and evidence demonstrate a reasonable likelihood Petitioner would prevail in showing the unpatentability of claims 24, 25, and 29 as obvious over Luo-250 and Miyano.

¹⁶ Claim 24 depends from independent claim 23, claim 25 from claims 24/23, and claim 29 from claims 28/23.

IV. CONCLUSION

For the foregoing reasons, we determine Petitioner has not established a reasonable likelihood of prevailing in its challenge to the patentability of any of claims 1–33 of the '365 patent. Therefore, we deny institution of *inter partes* review of the challenged claims.

V. ORDER

In consideration of the foregoing, it is hereby
ORDERED that the Petition is denied and *inter partes* review is not
instituted.

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