

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,

Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,

Patent Owner.

Case No. IPR2024-00957

U.S. Patent No. 7,454,056

PETITION FOR *INTER PARTES* REVIEW

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LIST OF EXHIBITS

Exhibit	Description
Ex. 1001	U.S. Patent No. 7,454,056 to Hayaishi (“the ’056 patent”)
Ex. 1002	File History of U.S. Patent No. 7,454,056
Ex. 1003	Expert Declaration of Kenneth Parulski (“Parulski”)
Ex. 1004	Curriculum Vitae of Kenneth Parulski
Ex. 1005	U.S. Patent Application Publication No. 2004/0021779 to Yano (“Yano”)
Ex. 1006	U.S. Patent No. 6,898,312 to Schröder (“Schroder”)
Ex. 1007	U.S. Patent No. 7,440,593 to Steinberg et al. (“Steinberg”)
Ex. 1008	U.S. Patent Application Publication No. 2003/0043394 to Kuwata et al. (“Kuwata”)
Ex. 1009	U.S. Patent No. 5,557,688 to Nakamura (“Nakamura”)
Ex. 1010	U.S. Patent No. 6,301,440 to Bolle et al. (“Bolle”)
Ex. 1011	U.S. Patent Application Publication No. 2004/0208363 to Berge et al. (“Berge”)
Ex. 1012	Certified English Translation of Japanese Patent Publication No. JP2003-248825 to Hibi et al. (“Hibi”)
Ex. 1013	Japanese Patent Publication No. JP2003-248825 to Hibi et al.
Ex. 1014	Kenneth A. Parulski et al., <i>A High-Performance Digital Color Video Camera</i> , SPIE Vol. 1448 Camera and Input Scanner Systems, pp. 45-57 (1991) (“Parulski 1991”)
Ex. 1015	Adobe Photoshop version 5.0 User Guide (1998) (“Photoshop 5.0”)

Ex. 1016	Ken Parulski and David Lewis, <i>Digital, Still-Optimized Architecture for Electronic Photography</i> , IS&T’s 47th Annual Conference, pp. 665-67 (1994) (“Parulski 1994”)
Ex. 1017	U.S. Patent No. 2,571,697 to Evans (“Evans”)
Ex. 1018	U.S. Patent No. 6,791,606 to Miyano (“Miyano”)
Ex. 1019	European Patent Application EP1400923A2 to Hayaishi et al. (“Hayaishi”)
Ex. 1020	William K. Pratt, <i>Digital Image Processing</i> , pp. 318-27 (John Wiley & Sons, Inc. 1978) (“Pratt”)
Ex. 1021	European Patent Application EP0152434B1 to Bayer (“Bayer”)
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Ex. 1024	<i>Longitude Licensing Ltd. v. Google LLC</i> , No. 23-cv-03046-VC, Dkt. 50 (N.D. Cal. Nov. 15, 2023).
Ex. 1025	<i>Longitude Licensing Ltd. v. Google LLC</i> , No. 23-cv-03046-VC, Dkt. 51 (N.D. Cal. Nov. 15, 2023).

I. PRECISE RELIEF REQUESTED

Petitioner Google LLC (“Petitioner”) requests review under 35 U.S.C. § 311 of claims 1-18 (“challenged claims”) of U.S. Patent No. 7,454,056 (“the ’056 patent”) (Ex. 1001) and cancellation of the challenged claims under pre-AIA 35 U.S.C. § 103 based on the following prior art references and grounds of unpatentability:

Prior art:

Ex. 1005	U.S. Patent Application Publication No. 2004/0021779 (“Yano”), filed July 16, 2003, published February 5, 2004. Prior art under pre-AIA 35 U.S.C. § 102(a)-(b), (e).
Ex. 1006	U.S. Patent No. 6,898,312 (“Schroder”), filed February 8, 2002, issued May 24, 2005. Prior art under pre-AIA 35 U.S.C. § 102(e).
Ex. 1007	U.S. Patent No. 7,440,593 (“Steinberg”), filed June 26, 2003, issued October 21, 2008. Prior art under pre-AIA 35 U.S.C. § 102(e).
Ex. 1008	U.S. Patent Application Publication No. 2003/0043394 (“Kuwata”), filed October 16, 2002, published March 6, 2003. Prior art under pre-AIA 35 U.S.C. § 102(a)-(b), (e).
Ex. 1009	U.S. Patent No. 5,557,688 (“Nakamura”), filed November 18, 1993, issued September 17, 1996. Prior art under pre-AIA 35 U.S.C. § 102(a)-(b), (e).

Unpatentability Grounds:

Ground 1	Yano and Schroder render obvious claims 1, 3-7, and 11.
Ground 2	Yano, Schroder, and Steinberg render obvious claims 2, 8, 12-16, and 18.

Ground 3	Yano and Kuwata render obvious claims 9 and 17.
Ground 4	Yano, Schroder, and Kuwata render obvious claims 9 and 17.
Ground 5	Yano and Nakamura render obvious claim 10.
Ground 6	Yano, Schroder, and Nakamura render obvious claim 10.

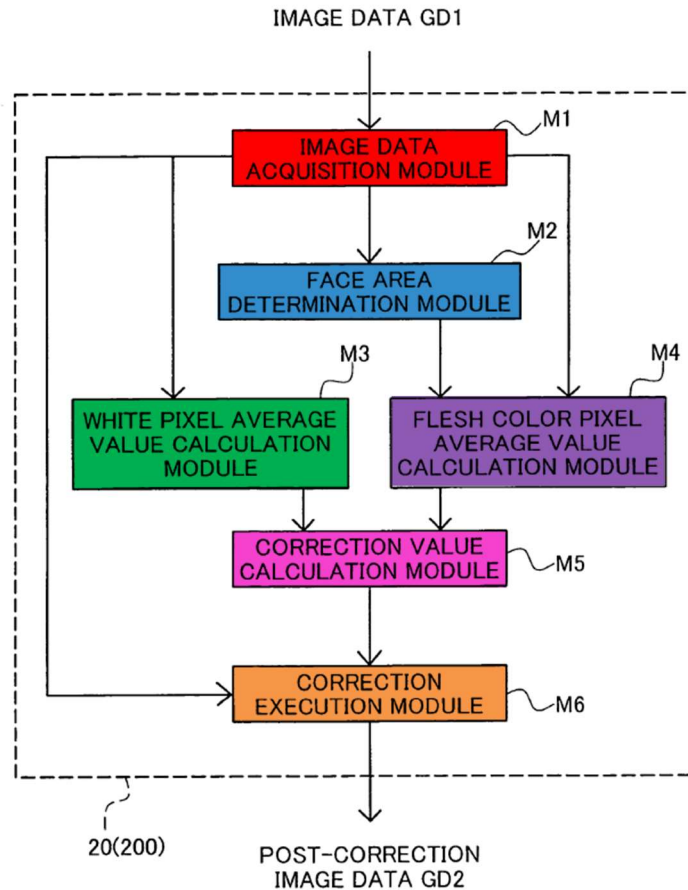
II. BACKGROUND

A. The '056 Patent

The '056 patent relates to “color balance correction on image data.” Ex. 1001, 1:8-10; Parulski ¶¶79-81. The '056 patent states that color balance correction “correct[s] changes in color according to the type of light source during imaging.” *Id.*, 1:12-15. One known color balance correction method “correct[s] each color component so that the average color of the overall image becomes colorless (white or gray).” *Id.*, 1:15-19. According to the '056 patent, performing this known method on a human portrait can risk “making an undesirable change to the color tone of a specific subject.” *Id.*, 1:25-33. The '056 patent aims to “execute color balance correction according to the subject and to improve the appearance of the subject in an image.” *Id.*, 1:38-42.

Figure 2, below, depicts an image processing device, such as a personal computer. *Id.*, 4:3-7, 5:19-23.

Fig.2



Id., FIG. 2 (annotated). An **image data acquisition module M1** acquires image data GD1 for processing and sends the image data to a **face area determination module M2**, a **white pixel average value calculation module M3**, a **flesh color pixel average value calculation module M4**, and a **correction execution module M6**. *Id.*, 5:24-32.¹

¹ In the claims, the specific subject area determination module corresponds to the **face area determination module M2**, and the specific subject characteristic

The face area determination module M2 “determines an area containing the face part of a human subject as the subject” and “sends the face area determination results to the flesh color pixel average value calculation module M4.” *Id.*, 5:33-38.

By analyzing the determined face area, the flesh color pixel average value calculation module M4 “calculates the flesh color pixel average value” and sends this average value to a correction value calculation module M5. *Id.*, 5:44-52.

Similarly, by analyzing image data GD1, the white pixel average value calculation module M3 “calculates the white pixel average value” and sends this average value to the correction value calculating module M5. *Id.*, 5:39-43.

Based on either the white pixel average and “a preset white pixel target value” or the flesh color pixel average and “a preset flesh color pixel average value,” the correction value calculation module M5 calculates “a correction value for color balance correction” and sends this correction value to the correction execution module M6. *Id.*, 5:53-62. Using image data GD1 and this correction value, “the correction execution module M6 executes color balance correction on the overall image data GD1, and generates post-correction image data GD2.” *Id.*, 5:63-6:3.

value calculation module corresponds to the flesh color pixel average value calculation module M4. *Id.*, 6:4-9.

B. Prosecution History

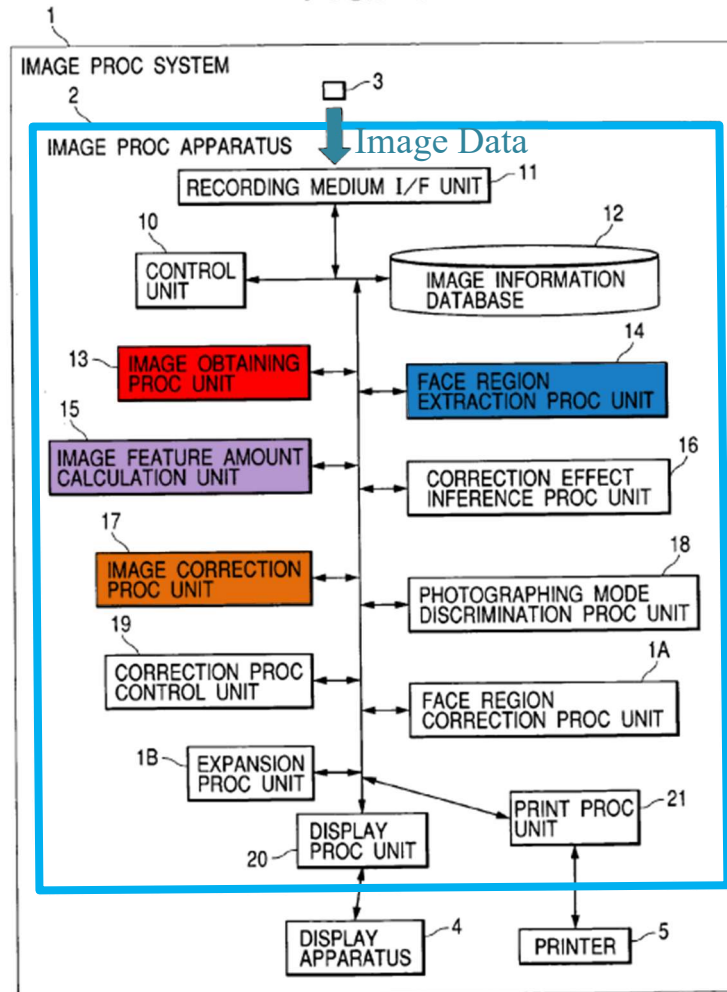
The '056 patent was filed as U.S. Application No. 11/093,941 by Seiko Epson Corporation. Ex. 1001, cover (codes (21), (73)). The Examiner initially rejected certain claims as anticipated by U.S. Patent Application Publication No. 2003/0235333 (“Lin”) and/or U.S. Patent Application Publication No. 2004/0208363 (“Berge”) (Ex. 1011). Ex. 1002, 203-206. The rest were objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form. *Id.*, 206. Applicant then revised the independent claims to include features from one of the objected-to dependent claims. *Id.*, 215-225. The Examiner then issued a notice of allowance. *Id.*, 235.

III. OVERVIEW OF PRIOR ART

A. Yano

Yano, like the '056 patent, discloses “using an image processing apparatus which displays and prints a person image photographed (or shot) by a digital camera” to automatically perform “color correction” to correct “the face region of the person to generate the image of an appropriate flesh color that human beings feel desirable.” Yano, [0007], [0054], [0060]-[0063]; Parulski ¶¶84-87. Figure 1, below, shows “the functional structure” of one such [image processing apparatus](#). Yano, [0017].

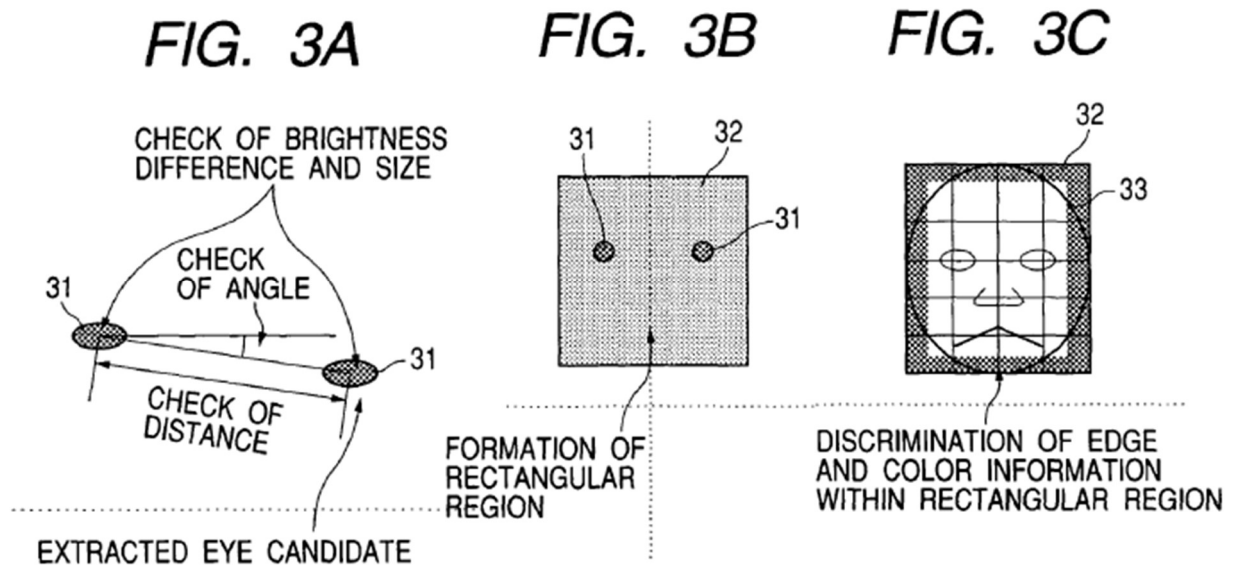
FIG. 1



Yano, FIG. 1 (annotated).

In this image processing apparatus, an image obtaining processing unit 13 “obtains through the recording medium I/F unit 11 the image data” and related photographing information “from the recording medium 3.” Yano, [0024]. A face region extraction processing unit 14 “extracts the face region of the person from the image data obtained by the image obtaining processing unit 13.” *Id.* Portions of

a process for extracting face region 33 from the image data are shown in Figures 3A-3C, below. Yano, [0032]-[0034].



Yano, FIGS. 3A-3C.

An **image feature amount calculation unit 15** calculates a “feature amount” of the extracted face region 33, including, for example, “the lightness and hue histograms in regard to each pixel, the average value, the distribution value, and the total number of pixels included in the face region 33.” Yano, [0025], [0057].

If the **image processing apparatus** determines that face region 33 is of a sufficient size and that a correction effect can be obtained, an “**image correction processing unit 17** obtains the parameters for the color correction from the image feature amount of the face region 33, and then actually performs” an image correction process. Yano, [0060]. This process includes obtaining the “center value

and distribution value” of “a range of hue of the flesh color that human beings feel desirable” that are “stored in the **image correction processing unit 17**” and using them to obtain corrected pixel values for “each pixel” in the image. Yano, [0060]-[0063].

B. Schroder

Schroder, like the '056 patent, discloses “correcting the colors of photographic images represented by image data.” Schroder, Abstract, 1:8-18; Parulski ¶¶88-90. Schroder discloses that various factors, including “the spectrum of the illumination light (e.g., tungsten light, flash light, sun light),” can lead to “deviations in color” that “affect the photographic image data such that the image displayed to the user deviates from the optical appearance of the photographic object to a human being at the time the picture has been taken.” Schroder, 1:34-64. Schroder discloses that “memory colors” like skin color “represent characteristic colors for photographic images and may be used as a reference for color correction.” Schroder, 1:65-2:22.

One or more spatial sections of an image are selected as a “reference part” either manually via a user interface or automatically by analyzing “the color values and/or their spatial distribution in the image in order to detect regions related to reference colors.” Schroder, 3:53-65, 6:36-55. A reference color is then assigned to the selected reference part. Schroder, 4:8-11. For example, Schroder discloses that

“skin regions can be automatically detected using a structural face detector or using other methods and ... a skin color will be assigned to the detected skin regions.” Schroder, 17:30-33.

Schroder discloses manipulating “the image data for correction purposes” such that “the color value or color values present in the one or more selected parts” transform to match a color distribution associated with the reference color. Schroder, 4:12-23. The transformation is determined using a “color value of the reference part” calculated from “the color values of the pixels in the reference part” and the reference color, “which corresponds to the target color value of the reference part.” Schroder, 10:40-11:11. Schroder discloses that “not only the selected parts are transformed in order to achieve a corrected image but also the remaining (unselected) parts of the image are corrected in the same or corresponding way as the selected parts are corrected.” Schroder, 4:36-46.

C. Steinberg

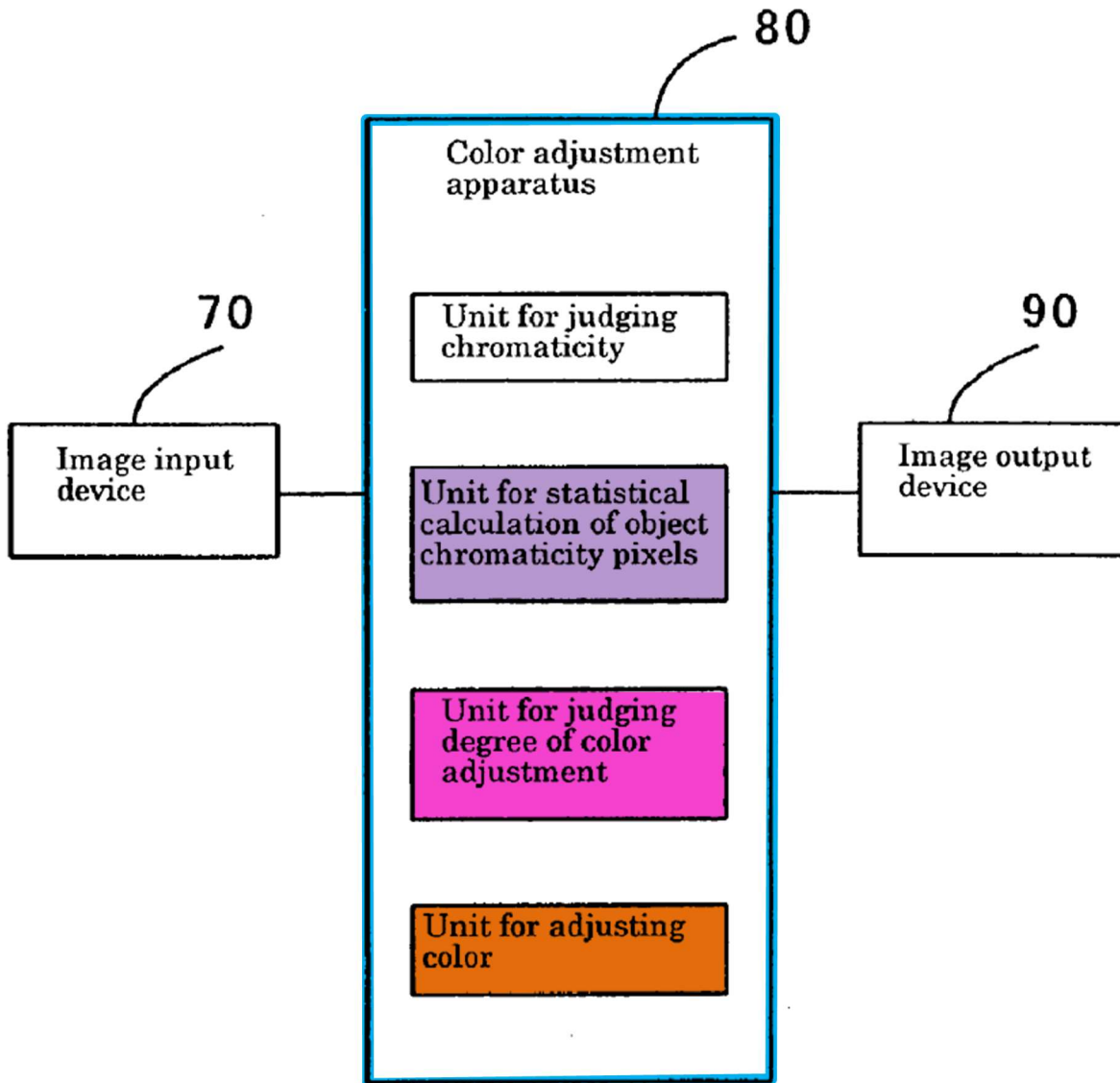
Steinberg discloses a “way to color-correct the image based on the skin tones of the faces” that can be “part of an image enhancement software.” Steinberg, 17:1-6; Parulski ¶¶91-92. These color corrections “may be global, affecting the entire image.” Steinberg, 17:6-13.

A device such as a PC loads a “default set of image attributes” related to “the overall color balance” and downloads an image to the device. Steinberg,

18:42-46. The device then applies “a face detection process” to the downloaded image “to seek faces in the image.” Steinberg, 18:46-49. “When faces are detected, ... they are marked, and labeled.” Steinberg, 18:56-57. Each of the detected faces “is given a weight based on size of the faces” that “define[s] the importance of the face in relation to other faces detected.” Steinberg, 18:58-63, 12:9-19. “After the faces are correctly isolated,” the device compares their attributes to the default set of image attributes and determines “a potential transformation” that will cause the values to match. Steinberg, 19:8-12.

D. Kuwata

Kuwata, a patent publication originally assigned to Seiko Epson (the original assignee of the '056 patent) that was not disclosed during the '056 patent's prosecution, discloses a color adjustment device that “is capable of minimizing an adverse side effect in adjustment of an image data.” Kuwata, [0002], [0006]; Parulski ¶¶93-94. Kuwata's [color adjustment apparatus](#), depicted below in Figure 25, automatically sets “a degree of enhancement” according to “a ratio of the number of flesh color pixels to the total number of pixels.” Kuwata, [0221]-[0235].



Kuwata, FIG. 25 (annotated).

The **unit for statistical calculation of object chromaticity pixels** performs “statistical calculation ... on flesh-color-like pixels according to chromaticity of each pixel” to calculate “an average value” of the flesh-color-like pixels. Kuwata, [0223]-[0228]. The apparatus includes “an ideal value” that is “predefined for preferable flesh color” for use in the color adjustment. Kuwata, [0230]-[0231]. But

Kuwata discloses that, if the apparatus applies a difference between the average value and the ideal value without factoring in the ratio of the flesh color pixels to the total number of pixels in the image, “a flesh color part may become satisfactory but colors of pixels on any parts other than the flesh color part may be affected significantly.” Kuwata, [0231]-[0232]. To address this issue, the **unit for judgment degree of color adjustment** determines “a ratio of the number of flesh color pixels to the total number of pixels (flesh color ratio) ... for regulating a degree of color adjustment.” Kuwata, [0233]. It then determines a degree of adjustment by taking the difference between the average value and the ideal value and multiplying the result by the flesh color ratio. Kuwata, [0233]-[0234], [0238]. The **unit for adjusting color** then carries out color adjustment using the degree of adjustment. Kuwata, [0238].

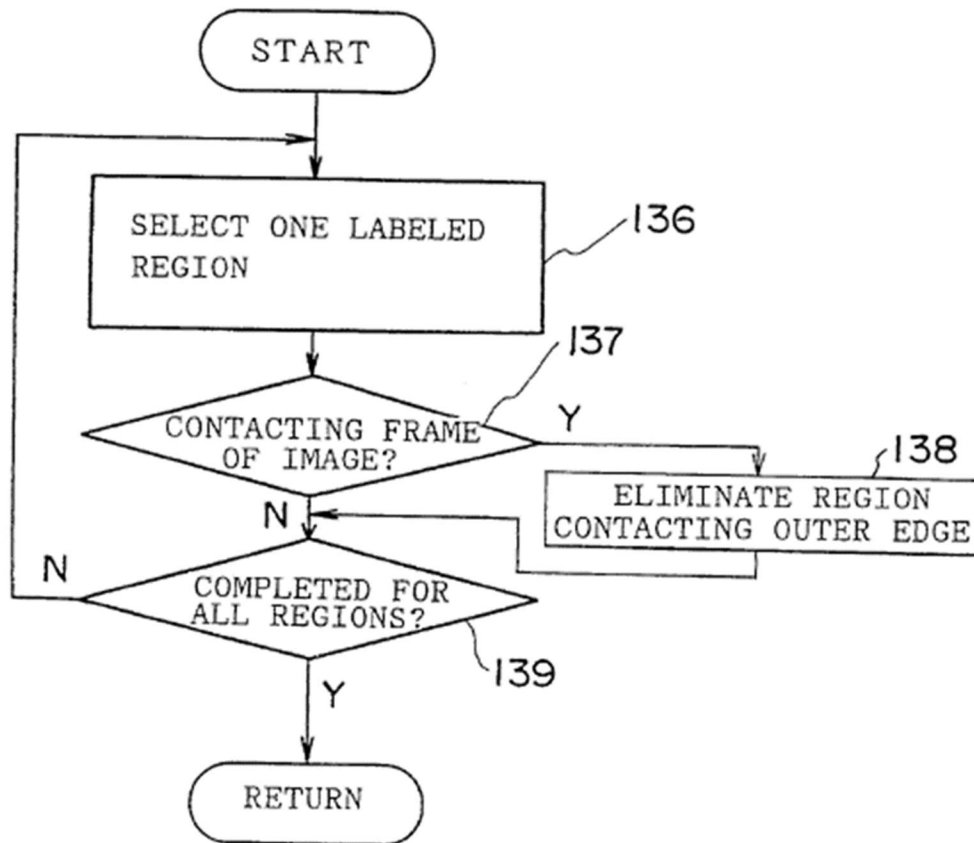
E. Nakamura

Nakamura, similar to Yano’s face-region extraction, discloses “extracting regions likely to be face regions” within an image. Nakamura, Abstract; Parulski ¶¶95-96. “When a photograph of a person is viewed, the area which is most noticed is the person’s face,” making it “necessary to print the color ... of a human face at an appropriate color.” Nakamura, 1:24-28. Nakamura discloses that determining face regions based on color alone may produce errors because objects like “the ground, tree trunks, clothes, and the like” may exhibit “a color which is

similar to a flesh color.” Nakamura, 1:59-64. Additionally, “the color of the light source which illuminates the subject” can affect “the hue of the photographed image.” Nakamura, 2:2-8.

To automatically extract human face data “with high accuracy” from a color image, Nakamura discloses dividing the image into “color regions having the same or similar hue values,” excluding any “color regions which contact an outer edge of the color original image,” determining “whether the divided region is a human face,” and extracting regions determined to be a human face. Nakamura, 3:27-60. Because faces “usually exist[] at a central area of the original image,” any color regions “contacting the outer edge (frame of the image) of the original image are usually not characteristic images and are portions of the background or the like.” Nakamura, 4:2-12, 10:58-64. Nakamura discloses that excluding these color regions allows face regions to be extracted based on the hue value “even from images in which faces, the ground, trees, and the like are included.” Nakamura, 4:2-12, 4:41-58, 9:7-18. Figure 6, below, depicts a flow chart showing Nakamura’s elimination of color regions contacting the outer edge from consideration. Nakamura, 10:54-56, 10:64-11:9, FIG. 6.

FIG. 6



Nakamura, FIG. 6.

F. Yano, Schroder, Steinberg, Kuwata, and Nakamura Are Analogous Art

Yano, Schroder, Steinberg, Kuwata, and Nakamura are analogous art to the '056 patent because they are in the same field of endeavor, namely, image processing. Ex. 1001, 1:8-10 (“The present invention relates to image processing.”); Parulski ¶97. For example, Yano discloses “an image processing apparatus which corrects gradation and color reproduction characteristics of an

image.” Yano, [0002]; Parulski ¶97. Schroder discloses “a photographic image processing device” that performs “a color correction method” on images. Schroder, 1:8-18; Parulski ¶97. Steinberg “relates to digital image processing,” including “processing of enhancements of a digital image using information gained from identifying and analyzing faces appearing within the image.” Steinberg, 1:45-48; Parulski ¶97. Kuwata “relates to an image processing apparatus” and a “color adjustment device ... for carrying out optimum color adjustment.” Kuwata, [0002]; Parulski ¶97. And Nakamura “relates to a method of extracting characteristic image data,” such as extracting a human face from an image. Nakamura, 1:11-16, 3:27-31; Parulski ¶97.

Yano, Schroder, Steinberg, Kuwata, and Nakamura are also analogous art to the '056 patent because they are reasonably pertinent to one or more problems that the '056 patent purports to solve. Parulski ¶98. For example, Yano, Schroder, Steinberg, Kuwata, and Nakamura are each reasonably pertinent to the problem the '056 patent identifies regarding the application of “typical color balance correction method[s]” that adjust the image to become “colorless (white or gray)” when a person is “the main subject.” Ex. 1001, 1:12-33; Parulski ¶98. For example, Yano discloses a color balance method that “correct[s] the face region of the person to generate the image of an appropriate flesh color that human beings feel desirable.” Yano, [0054]-[0063]; Parulski ¶98. Schroder similarly discloses using

“memory colors” like “skin tone” “as a reference for color correction” that is applied to “all image data.” Schroder, 1:65-2:22, 4:8-46; Parulski ¶98. Steinberg similarly discloses a “way to color-correct the image based on the skin tones of the faces.” Steinberg, 17:1-2; Parulski ¶98. Kuwata similarly discloses adjusting color image data so that “natural flesh color is given” in “a flesh color image of a person’s face.” Kuwata, [0061], [0221]-[0237]; Parulski ¶98. Nakamura is reasonably pertinent to this problem because it discloses techniques for extracting a face region in an image, which is pertinent to accurately determining the face regions for use in the color correction described in references like Yano, Schroder, Steinberg, and Kuwata, and in the ’056 patent. Nakamura, 3:40-60, 4:41-57, 8:40-9:21, 10:54-11:43; Parulski ¶98.

IV. LEVEL OF ORDINARY SKILL IN THE ART

Based on the relevant factors, *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995), 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. Parulski ¶69.

V. CLAIM CONSTRUCTION

No terms need to be construed under 37 C.F.R. § 42.100(b) to resolve unpatentability. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803

(Fed. Cir. 1999) (“[O]nly those [claim] terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”). The plain meaning of each term should apply for the purpose of this IPR.²

VI. THE CHALLENGED CLAIMS ARE UNPATENTABLE AND SHOULD BE CANCELLED

A. Ground 1: Yano and Schroder Render Obvious Claims 1, 3-7, and 11

1. Independent Claim 1

- a. [1.pre]: “An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:”**

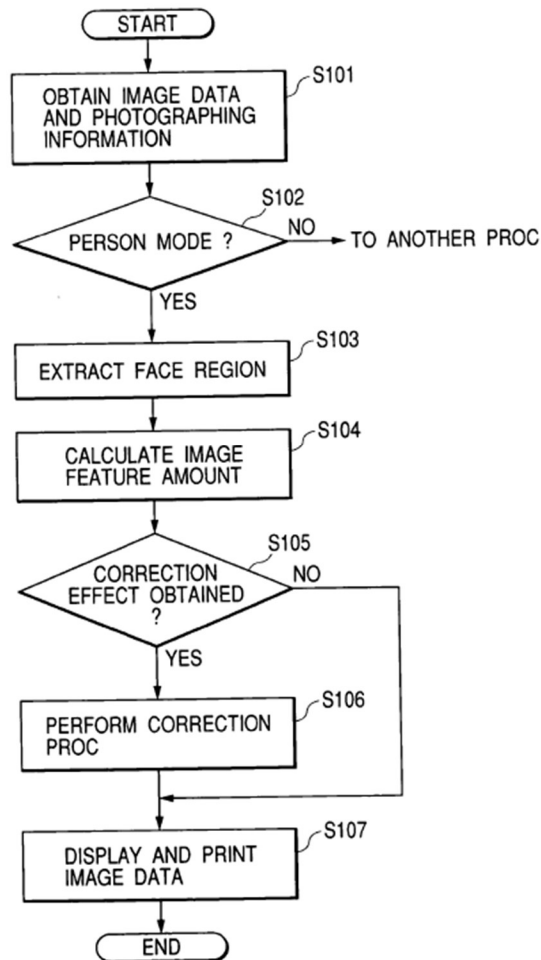
If limiting, Yano discloses or suggests [1.pre]. Parulski ¶¶99-101.

Yano discloses “an image processing apparatus such as a PC” (image processing device) that executes color balance correction by executing “color correction” on “the entire image” so that a “face region” of a person within the image includes “an appropriate flesh color that human beings feel desirable.” Yano, [0015], [0054]-[0063]; Parulski ¶100. The color balance correction is executed on “image data photographed (or shot) by a digital camera and recorded

² Petitioner reserves the right to argue that certain limitations in the challenged claims are indefinite and/or require construction to resolve controversies in other forums.

on a recording medium” (image data of a photographed image). Yano, [0015]; Parulski ¶100. Figure 4, below, depicts steps of the color balance correction. Yano, [0013], [0054], FIG. 4; Parulski ¶100.

FIG. 4



Yano, FIG. 4.

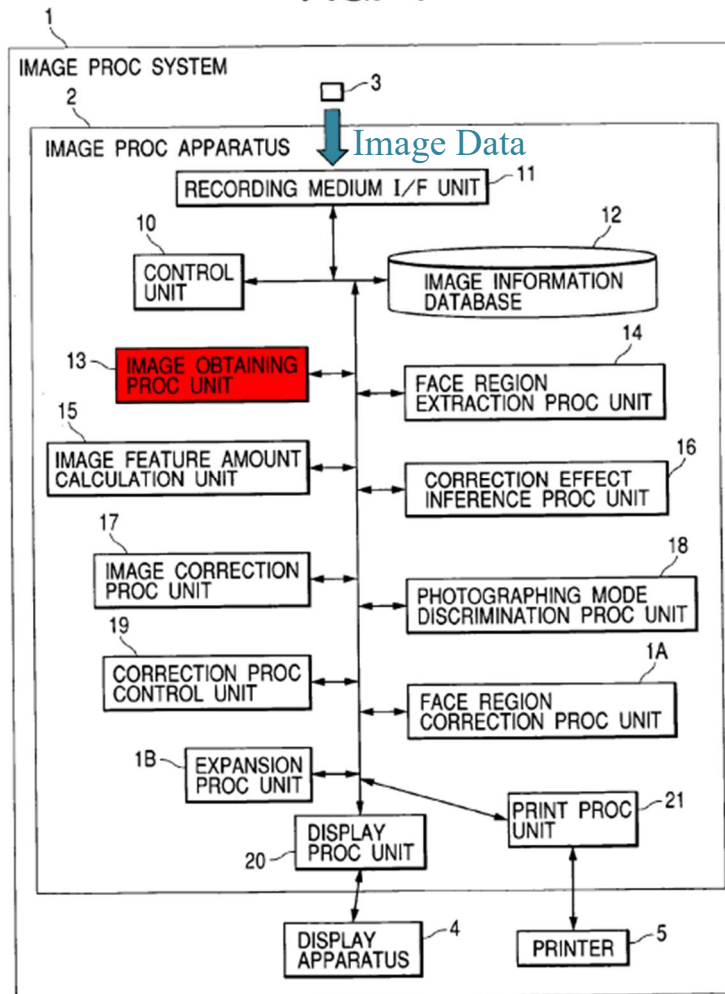
Yano's color balance correction is the same color balance correction disclosed in the '056 patent, as both disclose executing the correction according to

the hue of the specific subject. Ex. 1001, 2:29-33; Yano, [0054]-[0057], [0060]-[0063]; Parulski ¶101.

b. [1.a]: “an image data acquisition module that acquires said image data;”

Yano discloses or suggests [1.a] because it discloses that the image processing apparatus “reads image data from a recording medium 3 on which the image data photographed by a digital camera has been recorded.” Yano, [0017]-[0018]; Parulski ¶102. For example, as depicted below, Yano discloses that the image processing apparatus includes an **image obtaining processing unit 13** (image data acquisition module) that “obtains through the recording medium I/F unit 11 the **image data** ... from the recording medium 3 on which the **image data** indicating the image including the person has been recorded.” Yano, [0021], [0024], [0038]; Parulski ¶102. This **image data** is then stored in image information database 12. Yano, [0024].

FIG. 1



Yano, FIG. 1 (annotated).

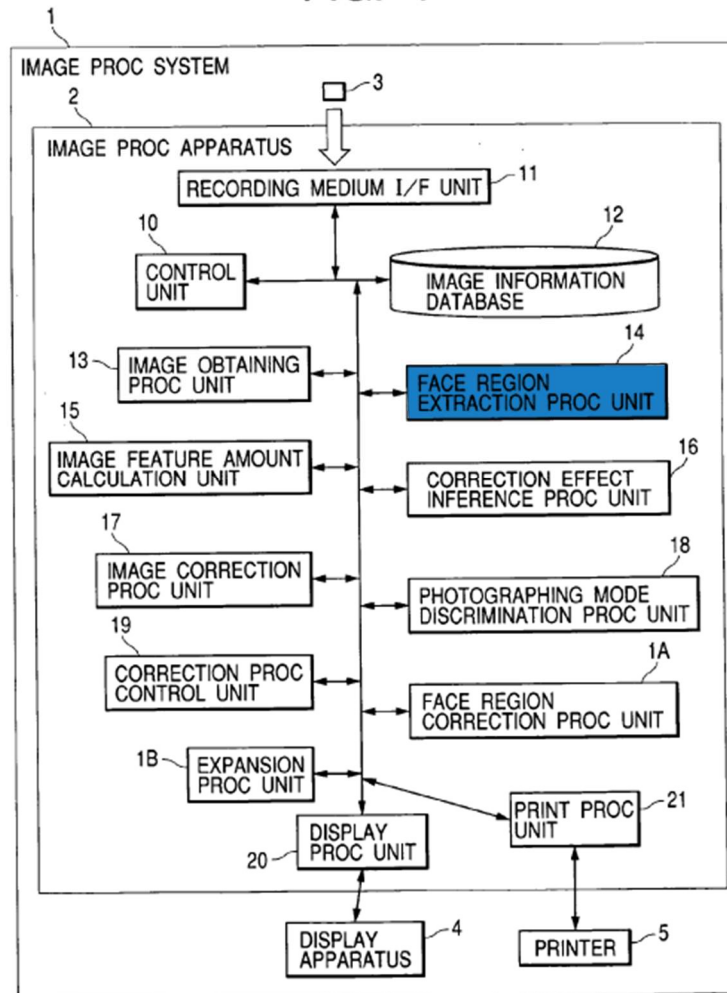
- c. [1.b]: “a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”

Yano discloses or suggests [1.b]. Parulski ¶¶103-106.

Yano discloses that the image processing apparatus includes a [face region extraction processing unit 14](#) (specific subject area determination module) that

“extracts the face region of the person” (determines a specific subject area) “from the image data obtained by the image obtaining processing unit 13” (in said photographed image). Yano, [0024]; Parulski ¶104.

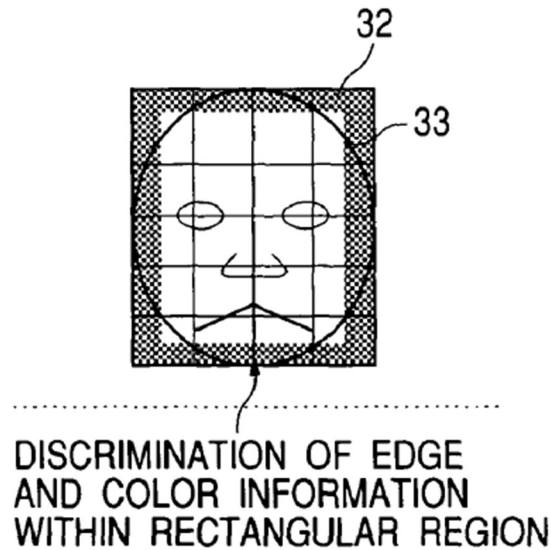
FIG. 1



Yano, FIG. 1 (annotated).

Each face region 33, one of which is depicted in Figure 3C, contains the face (specific subject) of “the person (subject)” in the photographed image. Yano, [0016], [0032]-[0034], FIG. 3C.

FIG. 3C



Yano, FIG. 3C.

Yano describes an exemplary face-region extraction, where the [face region extraction processing unit 14](#) identifies “a pair of eye candidates,” “sets a rectangular region 32” based on the positions of the eye candidates, and “determines a face region 33 based on the edge in the vicinity of the boundary of the rectangular region 32 and color information within the rectangular region.”

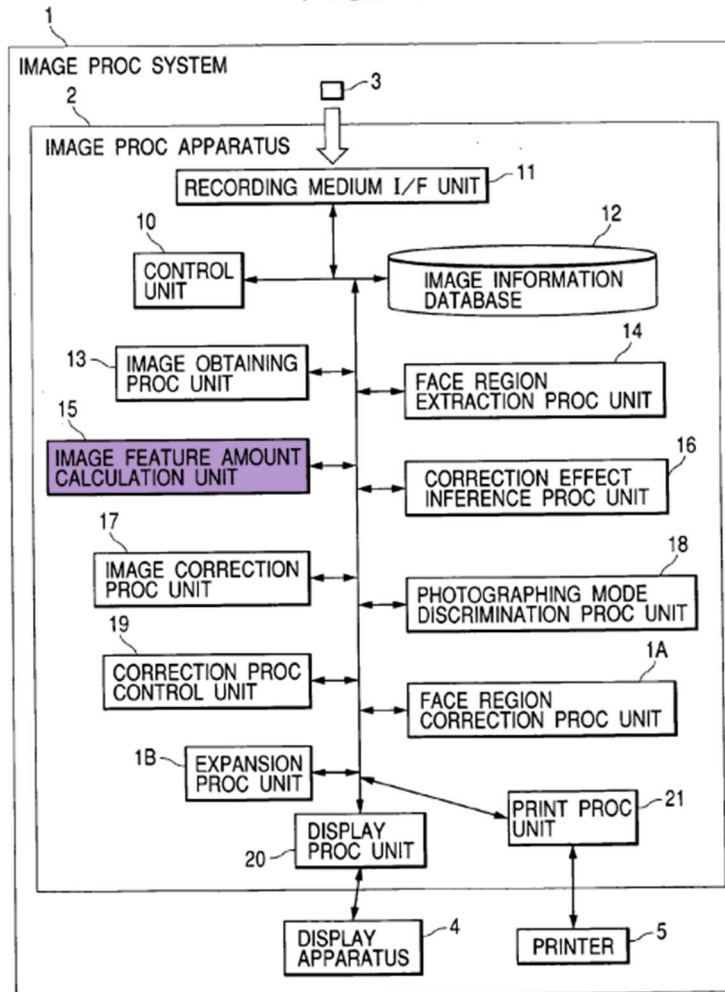
Yano, [0032]-[0034]; Parulski ¶¶105-106.

- d. **[1.c]: “a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area,”**

Yano discloses or suggests [1.c]. Parulski ¶¶107-108.

Yano discloses that the image processing apparatus includes an **image feature amount calculation unit 15** (specific subject characteristic value calculation module) that “calculates an image feature amount” (calculates a specific subject characteristic value that represents a characteristic of image data) “of the face region extracted from the image data by the face region extraction processing unit 14” (corresponding to said determined specific subject area). Yano, [0025]; Parulski ¶108. For example, the **image feature amount calculation unit 15** calculates a “statistics value” (e.g., average hue value) of pixels within the face region. Yano, [0055]-[0057], [0061]; Parulski ¶108.

FIG. 1



Yano, FIG. 1 (annotated).

- e. [1.d]: “wherein said specific subject characteristic value calculation is executed using weighted distribution, and wherein said weighted distribution is set so as to be a weight in a center area of said specific subject area larger than a weight in an area outside said center area;”

Yano and Schroder render obvious [1.d]. Parulski ¶¶109-115.

Yano discloses several examples of a “statistics value” of the pixels within the face region, including their average hue value. Yano, [0055]-[0057], [0061];

Parulski ¶110. A POSITA would have found it obvious to calculate the average hue value using a weighted distribution that weights pixel values in a center area of the face region larger than pixel values in an area outside the center area, as disclosed in Schroder. Parulski ¶110.

Schroder, like Yano, discloses an “automatic color correction” process that automatically detects, for example, “skin regions ... using a structural face detector.” Schroder, 17:11-33; Parulski ¶111. Schroder usually refers to these regions as “reference parts” but in several instances uses the term “relevance parts” and states that a “relevance part” “is herein also called [a] ‘reference part.’”³ Schroder, 3:53-65, 6:46-55, 9:30-36, 10:40-60, 17:17-22, 17:27-33; Parulski ¶111. Based on a “characteristic color value” of the reference part and a “reference color” (e.g., “the color of skin”), Schroder’s process then determines a “transformation” that “represents a manipulation of the image data for correction purposes” and transforms “the color values of the image data” “[b]ased on the determined transformation.” Schroder, 4:12-49, 7:9-13, 10:35-11:11; Parulski ¶111.

³ For consistency, Petitioner will use “reference part” moving forward and will modify any quotes using the term “relevance part” accordingly.

Similar to Yano's "average hue of the flesh color in the face region," Schroder discloses determining the color value of the reference part using "a function of the color values of the pixels in the [reference] part." Yano, [0061]; Schroder, 10:47-60; Parulski ¶112. This function may calculate a characteristic color value (specific subject characteristic value) of the reference part using a weighted distribution by calculating a weighted average value that weights "the color values in the center of the [reference] part ... more ... than the color values of the pixels in the periphery of the reference part" (said weighted distribution is set so as to be a weight in a center area of said specific subject area larger than a weight in an area outside said center area). Schroder, 10:47-60, 10:63-11:6; Parulski ¶112.

A POSITA would have been motivated to use Schroder's function that weights color pixel values in the center of a reference part more than in its periphery to determine Yano's average hue value of the flesh color in the face region because doing so would have placed greater emphasis on the hue values of pixels in the center of the face region, where viewers of the image are more likely to focus. Parulski ¶113. Indeed, it was well known to calculate a weighted average value of an image region "using a weight distribution that assigns greater weight to areas intended to have" the proper value. European Patent Application EP1400923A2 ("Hayaishi") (Ex. 1019), [0110]; Parulski ¶113. A POSITA would

have seen the use of Schroder's function to calculate Yano's average hue value as the use of a known technique to improve Yano's color balance correction in the same way as Schroder because it would have ensured that, when carrying out Yano's color balance correction, the hue values in the center of the face region are the closest to the "appropriate flesh color that human beings feel desirable." Yano, [0054], [0060]-[0063]; Parulski ¶113.

Moreover, it was well known that determining a skin color of a face region for use in a color balance process "may be implemented in a wide variety of ways" and that ways of reducing the impact of "the transitions between the edge of the face region(s)" and adjacent features in the image were advantageous. Berge, [0021], [0034]-[0037]; Parulski ¶114. A POSITA would have seen Schroder's function as advantageous because it would have reduced the impact of pixels at the "periphery" of Yano's face region, where head hair, facial hair, head coverings, scarfs, and other clothing were known to potentially impact the hue of pixels at the edge. Schroder, 10:51-56; Parulski ¶114.

A POSITA would have had a reasonable expectation of success in using Schroder's function to determine Yano's average hue value because it would have required a POSITA to apply only conventional techniques (well-known mathematical calculations) on the hue values of pixels within Yano's face region to predictably yield a weighted average hue value that weights hue values in the

center of Yano's face region more than hue values in its periphery. Parulski ¶115. Yano already discloses that "the image feature amount calculation unit 15 calculates a hue" for each pixel within the face region and calculates "the average value," so implementing this calculation using Schroder's weighted distribution would have been a simple substitution of one known mathematical formula for another to predictably obtain a center-weighted average hue value for Yano's face region. Yano, [0055]-[0057]; Parulski ¶115. Since both Yano and Schroder disclose color balance correction that uses a reference skin color to correct the color of a face region, a POSITA would have reasonably expected Schroder's function to successfully calculate a center-weighted average hue value that predictably leads to Yano's color-balance-corrected face region including a desirable flesh color. Yano, [0054]-[0063]; Schroder, 4:12-46, 17:11-33; Parulski ¶115.

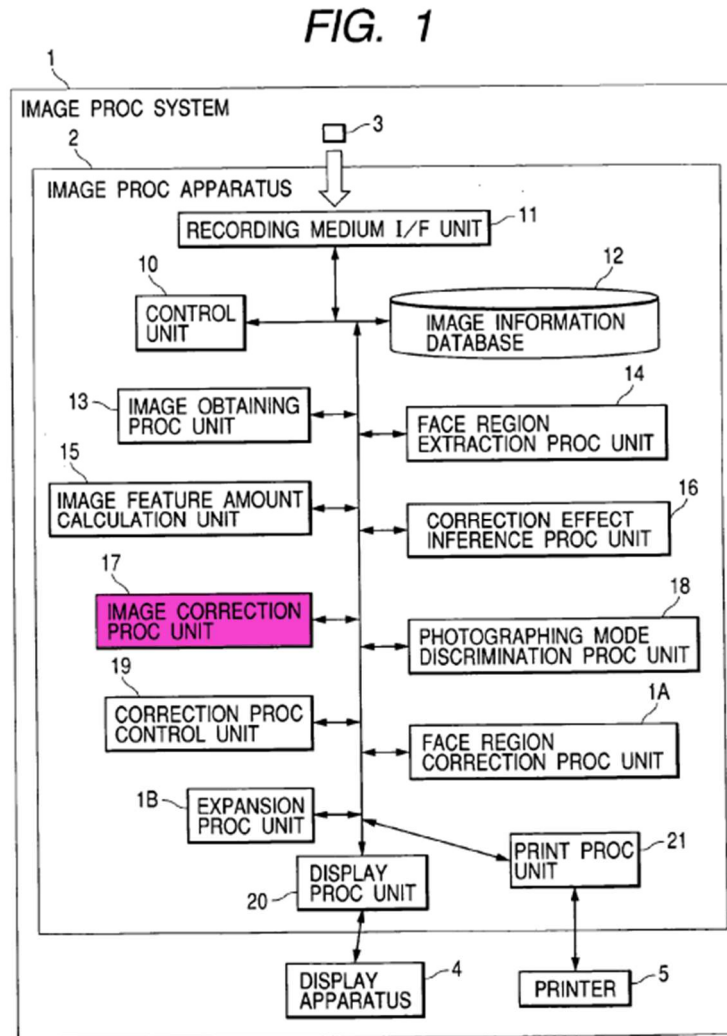
- f. **[1.e]: "a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and"**

Yano discloses or Yano and Schroder render obvious [1.e]. Parulski ¶¶116-123.

Yano discloses that the image processing apparatus includes an **image correction processing unit 17** (correction value calculation module) that "corrects

the characteristic of the image data on the basis of the image feature amount.”

Yano, [0027]; Parulski ¶117.



Yano, FIG. 1 (annotated).

As part of this correction process, Yano discloses that “the **image correction processing unit 17** obtains the parameters for the color correction from the image feature amount of the face region 33” (said calculated specific subject characteristic value). Yano, [0060]; Parulski ¶118. Yano also discloses that, “in

advance, a range of hue of the flesh color that human beings feel desirable is checked in regard to each of various face images, and its center value and distribution value are parameterized as a target value of the hue and stored in the **image correction processing unit 17**.” Yano, [0060]; Parulski ¶118. The center value of the range of hue of desirable flesh color that is stored in advance discloses a preset characteristic target value. Parulski ¶118.

Yano then discloses that the **image correction processing unit 17** applies a formula to correct the hue of “each pixel” that includes subtracting the “average hue of the flesh color in the face region” (said calculated specific subject characteristic value) from “the center value of the target value of the hue” (a preset characteristic target value). Yano, [0061]-[0063]; Parulski ¶119. Yano’s calculation of this difference between the center value of the target hue range and the average hue value of the flesh color in the face region discloses calculating a correction value for color balance using said calculated specific subject characteristic value and a preset characteristic target value because Yano applies this difference (correction value) to “each pixel” in the image. Yano, [0061]-[0063]; Parulski ¶119.

To the extent Patent Owner contends or the Board finds that this does not disclose [1.e], Yano and Schroder render [1.e] obvious. Parulski ¶120. As discussed above, Yano discloses that the image correction processing unit 17

applies a formula that uses the difference between the center value of the target hue range and the average hue value of the flesh color in the face region to every pixel in the image. Yano, [0061]-[0063]; Parulski ¶120. A POSITA would have found it obvious to include a correction value calculation module within the image processing apparatus that calculates this difference once and passes it to the image correction processing unit 17, as taught by Schroder, for use in the formula. Parulski ¶120.

Schroder discloses a similar color balance correction to Yano, where a photographic image processing device includes a “determination unit 500” that determines a “transformation T for the color correction” and passes the transformation to a “transforming unit 600” that “receives the image data from the receiving unit and transforms the image data in accordance with the transformation in order to obtain the corrected image data.” Schroder, 19:32-58, 11:7-58; Parulski ¶121. And similar to Yano, Schroder’s color correction is performed based on “color hue,” as well as saturation. Schroder, 7:20-30; Parulski ¶121.

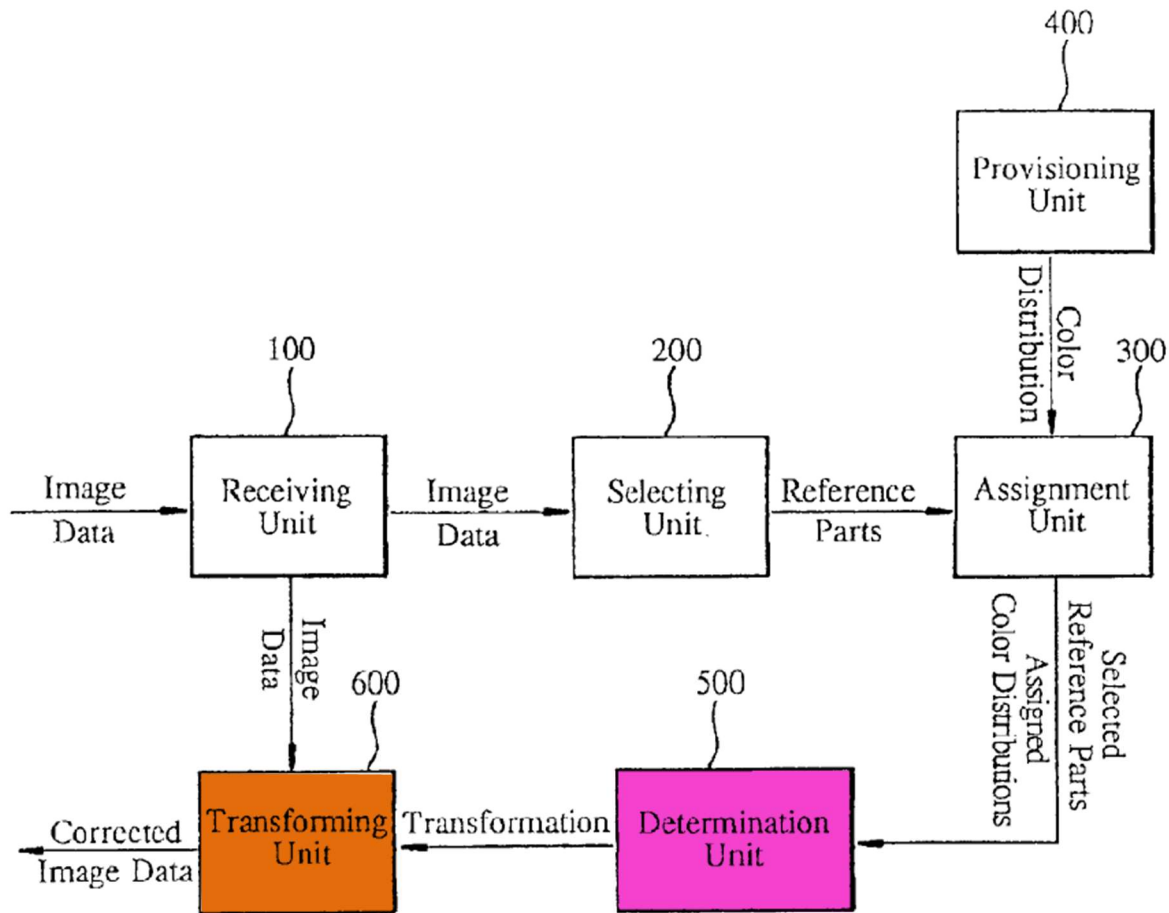


Figure 7

Schroder, FIG. 7 (annotated).

A POSITA would have been motivated to implement a correction value calculation module, as taught by Schroder, that calculates the transformation and passes it to Yano's image correction processing unit 17 to reduce the number of calculations performed by Yano's image processing apparatus. Parulski ¶122. For example, Yano discloses that "each unit" in the image processing apparatus "may

be structured by a memory and a CPU so that the function of the unit is achieved by reading a program for achieving the function of each unit into the memory and then executing the read program by the CPU,” and that the program “may be a part of an application program for the entire image process.” Yano, [0035]. Yano also discloses that an image obtained by the image obtaining processing unit 13 may include “1280x960 pixels,” i.e., over 1 million pixels. Yano, [0032]; Parulski ¶122. A POSITA would have recognized that including a correction value calculation module within the image processing apparatus that calculates the difference between the center value of the target hue range and the average hue value of the flesh color in the face region once and passes it to the image correction processing unit 17 for use in the formula would have improved the efficiency of Yano’s image processing apparatus by significantly reducing the number of calculations necessary to correct the hue values of the pixels. Parulski ¶122.

A POSITA would have had a reasonable expectation of success in such a modification because it would have required a POSITA to apply only conventional software techniques for creating modules within a program that perform a calculation and pass the result to another module, which was well known at the time, as evidenced by Schroder’s disclosure of a similar image processing apparatus including determination unit 500 that determines a transformation and passes it to a transforming unit 600. Schroder, 19:50-58, Parulski ¶123. Indeed, it

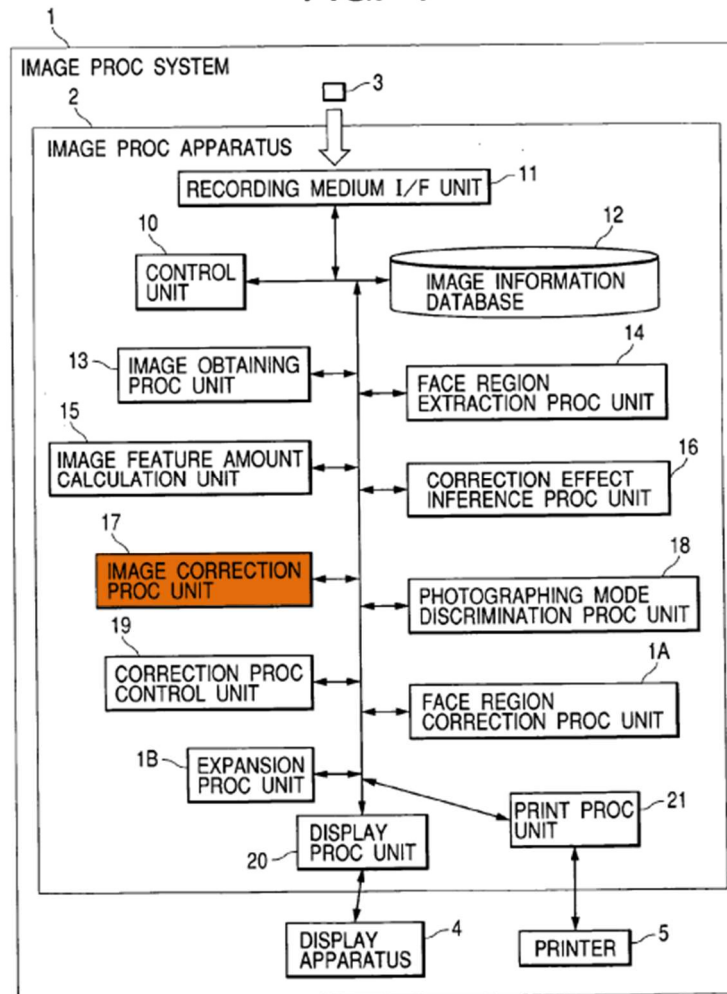
was routine to design programs that include a module for calculating a difference between two values and another module for correcting the color balance of an image using the result of the difference calculation. *E.g.*, Berge, [0024]-[0025], [0036]-[0037]; Schroder, 11:55-58, 19:50-58; Parulski ¶123. Accordingly, this modification would have required merely the use of a known technique for defining a module that reduces the number of calculations in a program to improve Yano's color correction technique in the same manner as Schroder's, by making it more efficient. Parulski ¶123.

- g. [1.f]: “a correction execution module that executes said color balance correction on said image data using said calculated correction value.”**

Yano discloses or Yano and Schroder render obvious [1.f]. Parulski ¶¶124-126.

Yano discloses that the image processing apparatus includes an **image correction processing unit 17** (correction execution module) that obtains a corrected hue value for “each pixel” in the image and then “obtains the R, G and B component values in regard to each pixel so that the lightness and saturation values before the correction are maintained and the hue component is set to have the” corrected hue value (executes said color balance correction on said image data). Yano, [0027], [0060]-[0063]; Parulski ¶125.

FIG. 1



Yano, FIG. 1 (annotated).

Yano discloses or Yano and Schroder render obvious this color balance correction using the calculated correction value for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶126. For example, Yano's formula for obtaining the corrected hue value for each pixel includes determining the difference between the center value of the target hue range and the average hue value of the flesh color in the face region (calculated correction value). Yano, [0061]-[0063]; Parulski ¶126.

To the extent Patent Owner contends or the Board finds that this formula does not disclose using the calculated correction value, a POSITA would have found it obvious for the correction value calculation module to provide this difference value to the **image correction processing unit 17** for use in the color balance correction for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶126.

2. Dependent Claims

- a. **Claim 3: “An image processing device according to claim 1, wherein said specific subject characteristic value includes a characteristic value relating to a hue of said specific subject.”**

Yano discloses or Yano and Schroder render obvious the additional limitations of claim 3 because, as discussed for [1.c], Yano discloses that the specific subject characteristic value includes the average hue value of the flesh color in the face region (said specific subject characteristic value includes a characteristic value relating to a hue of said specific subject) and, as discussed for [1.d], Yano and Schroder render obvious calculating the characteristic hue value using a function that weights hue values in the center of the face region more than hue values in its periphery. Yano, [0055]-[0057], [0061]; Schroder, 10:47-11:4; *supra* §§ VI.A.1.d-VI.A.1.e; Parulski ¶127.

- b. Claim 4: “An image processing device according to claim 1, wherein said specific subject characteristic value includes a specific color characteristic value for representing a characteristic of pixel data included within said specific subject area, said pixel data belonging to a specific color range.”**

Yano discloses or Yano and Schroder render obvious the additional limitations of claim 4 because, as discussed for [1.c], Yano discloses that the specific subject characteristic value includes the average hue value of the flesh color in the face region (a specific color characteristic value for representing a characteristic of pixel data included within said specific subject area, said pixel data belonging to a specific color range), and, as discussed for [1.d], Yano and Schroder render obvious calculating the hue value using center-weighting. Yano, [0055]-[0057], [0061]; Schroder, 10:47-11:4; *supra* §§ VI.A.1.d-VI.A.1.e; Parulski ¶128. For example, Yano discloses that “the image feature amount calculation unit 15 discriminates whether or not each pixel value within the extracted face region 33 belongs to the predetermined flesh color region,” a specific color range for flesh. Yano, [0055], [0034]; Parulski ¶128. The image feature amount calculation unit 15 then uses the pixel data that belongs to the specific color range for flesh to “calculate[] the statistics value,” which includes calculating the “average hue of the flesh color in the face region 33,” a specific color characteristic value for

representing a characteristic of the flesh color pixel data. Yano, [0055]-[0057], [0061]; Parulski ¶128.

c. Claim 5

- i. [5.a]: “An image processing device according to claim 4, wherein said specific color characteristic value includes a statistical value of pixel values of said pixel data belonging to said specific color range,”**

Yano discloses or Yano and Schroder render obvious the additional limitations of [5.a] because, as discussed for claim 4, Yano discloses that the specific subject characteristic value includes the average hue value of the pixel data belonging to “the predetermined flesh color region” of the flesh region (said specific color characteristic value includes a statistical value of pixel values of said pixel data belonging to said specific color range), and Yano and Schroder render obvious calculating the hue value of pixels belonging to the flesh color region using center-weighting. Yano, [0055]-[0057], [0061], [0034]; Schroder, 10:47-11:4; *supra* § VI.A.2.b; Parulski ¶129. For example, Yano discloses that the average hue value is a “statistics value” (statistical value) of “the flesh color in the face region” (pixel values of said pixel data belonging to said specific color range). Yano, [0055]-[0057], [0061], [0034]; Parulski ¶129.

- ii. [5.b]: “wherein said characteristic target value includes a preset pixel target value, and”**

Yano discloses or suggests [5.b]. Parulski ¶¶130-131.

As discussed for [1.e], Yano also discloses that the “center value” of “a range of hue of the flesh color that human beings feel desirable” is a characteristic target value. Yano, [0060]-[0061]; *supra* § VI.A.1.f; Parulski ¶131. This center value is a preset pixel target value because Yano discloses that it is determined “in advance” and “stored in the image correction processing unit 17” and is a target hue value for the flesh color pixels. Yano, [0060]-[0063]; Parulski ¶131. Indeed, the '056 patent states that a target hue, like Yano's center value of a range of hues, is one example of a pixel target value. Ex. 1001, 9:11-15 (stating that “flesh color pixel target hue F (H)_target” is one “flesh color pixel target value[]”).

iii. [5.c]: “wherein said calculated correction value includes a correction value for eliminating or reducing a difference between said statistical value of pixel values and said pixel target value.”

Yano discloses or Yano and Schroder render obvious [5.c]. Parulski ¶¶132-133.

As discussed for [1.e], Yano discloses or Yano and Schroder render obvious calculating a correction value that is the difference between the center value of the target hue range and the center-weighted average hue value of the flesh color in the face region. Yano, [0061]-[0063]; *supra* § VI.A.1.f; Parulski ¶133. This correction value is for eliminating or reducing a difference between the center-weighted average hue value of the flesh color in the face region (statistical value of pixel

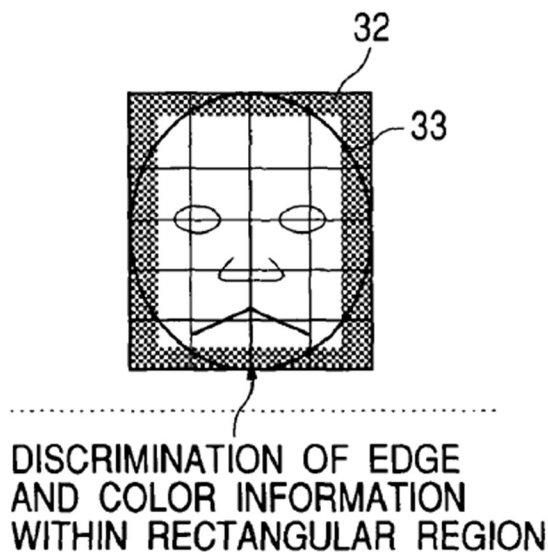
values) and the center value of the target hue range (pixel target value) because Yano's formula for determining the corrected hue values adds the difference between these two values—the correction value—to the “hue of the pixel before the correction” multiplied by a factor determined from the standard deviations of the desirable range of hues and the range of hues in the face region. Yano, [0056]-[0057], [0060]-[0061]; Parulski ¶133. Accordingly, the difference between these two values is reduced or eliminated through using Yano's formula for correcting the hue values. Parulski ¶133.

d. Claim 6

i. [6.a]: “An image processing device according to claim 4, wherein said specific subject includes a face part of a human subject, and”

Yano discloses or suggests the additional limitations of [6.a] because, as discussed for [1.b], the specific subject area is a face region 33, depicted below, that contains the face (specific subject) of “the person (subject)” in the photographed image. Yano, [0016], [0032]-[0034], FIG. 3C; *supra* § VI.A.1.c; Parulski ¶134. Accordingly, the face (specific subject) includes a face part of “the person (subject)” (a human subject) in the image. Yano, [0016], [0032]-[0034], FIG. 3C; Parulski ¶134.

FIG. 3C



Yano, FIG. 3C.

- ii. **[6.b]: “wherein said pixel data belonging to said specific color range includes flesh colored pixel data belonging to a color range corresponding to a flesh color of said human subject.”**

Yano discloses or suggests [6.b] because, as discussed for claim 4, the pixel data belonging to the specific color range that is used to calculate the “average hue of the flesh color in the face region” includes the hue values of pixels within the extracted face region 33 that belong to a “predetermined flesh color region” (flesh colored pixel data belonging to a color range corresponding to a flesh color of said human subject). Yano, [0055]-[0057], [0061], [0034]; *supra* § VI.A.2.b; Parulski ¶135.

- e. **Claim 7: “An image processing device according to claim 1, wherein said correction execution module executes said color balance correction using said calculated correction value when an area ratio of said specific subject area to a whole area of said photographed image is greater than a reference value.”**

Yano renders obvious the additional limitations of claim 7. Parulski ¶¶136-139.

Yano discloses that its image correction processing unit 17 executes the color balance using the calculated correction value, *supra* § VI.A.1.g ([1.f]), only when the image processing apparatus infers that “the correction effect can be obtained” by comparing “the area (the total number of pixels) of the face region 33 calculated by the image feature amount calculation unit 15” to “a predetermined threshold.” Yano, [0041]-[0043], [0058], FIG. 4 (S105); Parulski ¶137. “[W]hen the area of the face region is larger than a predetermined value” (greater than a reference value), the image processing apparatus infers “that the correction effect can be obtained.” Yano, [0026], [0042], [0058]. Instead of comparing the area of the face region, as represented by the number of pixels in the face region, to a reference value, a POSITA would have found it obvious to compare the area of the face region, as represented by a ratio of the number of pixels in the face region to the total number of pixels in the image (an area ratio of said specific subject area to

a whole area of said photographed image), to a reference value to allow the use of the same reference value regardless of the image resolution. Parulski ¶137.

A POSITA would have been motivated to implement Yano's area comparison in this way because, as Yano recognizes, photographed images were known to include different resolutions having different numbers of total pixels. Yano, [0023], [0032]; Parulski ¶138. Accordingly, if Yano's comparison of the area of the face region to a predetermined value is carried out using absolute numbers of pixels, a POSITA would have recognized that Yano's image processing apparatus would have had to store different predetermined values for each resolution of image. Parulski ¶138. Implementing Yano's comparison using ratios would have advantageously simplified this comparison by requiring the storage of only a single predetermined value applicable to all image resolutions that is compared to an area ratio calculated from the number of pixels within the face region and the total number of pixels in the image. Parulski ¶138.

A POSITA would have had a reasonable expectation of success in implementing this comparison of an area ratio to a predetermined value because Yano already discloses that the image processing apparatus acquires "the number of pixels (or resolution)" from information specified in the image file and determines "the total number of pixels included in the face region." Yano, [0023], [0057]; Parulski ¶139. Accordingly, determining the area ratio and comparing it to

the predetermined value would have required a POSITA to apply only conventional calculations from readily available information and predictably compare the result to a value in the same manner as its comparison of “the area of the face region” to “a predetermined value.” Yano, [0026], [0041]-[0043], [0058]; Parulski ¶139.

3. Independent Claim 11

- a. **[11.pre]: “An image processing method for executing color balance correction on image data of a photographed image, said image processing method comprising:”**

If limiting, Yano discloses or suggests [11.pre] for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶140.

- b. **[11.a]: “acquiring said image data;”**

Yano discloses or suggests [11.a] for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶141.

- c. **[11.b]: “determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”**

Yano discloses or suggests [11.b] for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶142.

- d. **[11.c]: “calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area,”**

Yano discloses or suggests [11.c] for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶143.

- e. **[11.d]: “wherein said calculating said specific subject characteristic value is executed using weighted distribution, and wherein said weighted distribution is set so as to be a weight in a center area of said specific subject area larger than a weight in an area outside said center area;”**

Yano and Schroder render obvious [11.d] for the reasons discussed for [1.d]. *Supra* § VI.A.1.e; Parulski ¶144.

- f. **[11.e]: “calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and”**

Yano discloses or Yano and Schroder render obvious [11.e] for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶145.

- g. **[11.f]: “executing said color balance correction on said image data using said calculated correction value.”**

Yano discloses or Yano and Schroder render obvious [11.f] for the reasons discussed for [1.f]. *Supra* § VI.A.1.g; Parulski ¶146.

**B. Ground 2: Yano, Schroder, and Steinberg Render Obvious
Claims 2, 8, 12-16, and 18**

1. Independent Claim 8

- a. [8.pre]: “An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:”**

If limiting, Yano discloses or suggests [8.pre] for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶147.

- b. [8.a]: “an image data acquisition module that acquires said image data;”**

Yano discloses or suggests [8.a] for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶148.

- c. [8.b]: “a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”**

Yano discloses or suggests [8.b] for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶149.

- d. [8.c]: “a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;”**

Yano discloses or suggests [8.c] for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶150.

- e. **[8.d]: “a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and”**

Yano discloses or Yano and Schroder render obvious [8.d] for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶151.

- f. **[8.e]: “a correction execution module that executes said color balance correction on said image data using said calculated correction value,”**

Yano discloses or Yano and Schroder render obvious [8.e] for the reasons discussed for [1.f]. *Supra* § VI.A.1.g; Parulski ¶152.

- g. **[8.f]: “wherein when a plurality of said specific subject areas are determined, said specific subject characteristic value calculation is executed using weighted distribution, wherein said weighted distribution is set according to a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas.”**

Yano and Steinberg or, alternatively, Yano, Schroder, and Steinberg render obvious [8.f]. Parulski ¶¶153-159.

Yano discloses that a plurality of face regions (specific subject areas) may be determined. Yano, [0034], [0046], [0050], [0059], [0063]; Parulski ¶154. For example, Yano discloses that the steps for extracting a face region discussed for [1.b] may be used to extract “plural face regions 33” from an image. Yano, [0034]; *supra* § VI.A.1.c. When the face region extraction processing unit 14 extracts

“plural face regions 33” (when a plurality of said specific subject areas are determined), the “average hue of the flesh color” (said specific subject characteristic value) used to calculate a correction factor for correcting the hue of each pixel in the image, *supra* § VI.A.1.f ([1.e]), is calculated “using the average value of the image feature amounts in the respective face regions 33” (each specific subject characteristic value of said plurality of specific subject areas). Yano, [0061], [0063]; Parulski ¶154.

When calculating Yano’s “average hue of the flesh color” based on “the image feature amounts in the respective face regions 33” of plural face regions, a POSITA would have found it obvious to implement Steinberg’s teaching of weighting the face regions based on their size to set a weighted distribution according to the size of each face region on each average hue value of the face regions (said specific subject characteristic value calculation is executed using weighted distribution, wherein said weighted distribution is set according to a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas), to emphasize the hue of larger face regions more than smaller face regions in Yano’s calculation of the overall average hue of the flesh color. Yano, [0061], [0063]; Steinberg, 17:1-13, 18:32-63; Parulski ¶155.

Steinberg, similar to Yano and Schroder, discloses a “way to color-correct the image based on the skin tones of the faces” that can be “part of an image

enhancement software.” Steinberg, 17:1-6; Parulski ¶156. These color corrections disclose color balance correction, for example, because they “may be global, affecting the entire image.” Steinberg, 17:6-13; Parulski ¶156. Steinberg’s device loads “a default set of image attributes” related to “the overall color balance” and applies “a face detection process” to an image “to seek faces in the image.” Steinberg, 18:42-49; Parulski ¶156. The device labels each of the detected faces and assigns each face “a weight based on size of the faces” that “define[s] the importance of the face in relation to other faces detected.” Steinberg, 18:56-63, 12:9-19; Parulski ¶156. Once identified, the attributes of the faces are compared to the default set of image attributes to determine “a potential transformation” that will cause the values to match. Steinberg, 19:8-12; Parulski ¶156.

A POSITA would have been motivated to implement Steinberg’s assignment of a “weight based on size of the faces” to improve Yano’s calculation of an average hue of the flesh color in the plural face regions by placing greater importance on larger face regions and thus ensuring that, when an image includes two faces having different hues, the largest (and most important) face regions are corrected closest to the target hue value that “human beings feel [is] desirable.” Yano, [0060]-[0063]; Steinberg, 18:58-63, 12:9-19; Parulski ¶157. This would have been advantageous, for example, because Yano discloses applying the same correction value “to each pixel” in the image, motivating a POSITA to place

greater emphasis on the larger and more important face regions when calculating the correction value. Yano, [0060]-[0063]; Parulski ¶157. It was well known to determine the size of different objects in an image and place a greater weight on larger objects when determining how the image should be processed. Schroder, 3:15-20 (“Usually the color values are the more important the higher the abundance.”); Japanese Patent Publication No. JP2003-248825 (“Hibi”) (Ex. 1012 (certified English translation)), [0024] (“The larger the size score, the greater the weight.”); Parulski ¶157. To account for the relatively larger importance of larger detected faces, a POSITA would have been motivated to combine Yano and Steinberg to incorporate Steinberg’s disclosure of assigning a weight to each face based on its relative size to ensure that, if the average hues of the individual face regions differ, the more important face region, determined by its relative size, factors more into the overall average hue value than the less important face region. Parulski ¶157.

A POSITA would have reasonably expected success in implementing Steinberg’s teaching of weighting face regions based on their size to set the weighted distribution according to the relative size of each face region on each average hue value of the plural face regions. Parulski ¶158. Yano already discloses that, for each face region, the image processing apparatus determines “the area of the face region” relative to a “predetermined threshold value.” Yano, [0041]-

[0043], [0058]-[0059]; Parulski ¶158. Setting the weighted distribution for each average hue of the face regions would have required a POSITA to apply only conventional data processing techniques to compare the known areas of each face region and set the relative weights accordingly, which was well known at the time. Steinberg, 18:58-63, 12:9-19; Hibi, [0025]-[0027]; Parulski ¶158. Accordingly, a POSITA would have found it obvious to use the known technique of a weighted distribution that sets the weights based on the relative sizes of the face regions to predictably improve Yano's calculation of an overall average hue of the flesh color of the face regions by factoring the "importance of the face in relation to other faces detected" into the overall average hue. Steinberg, 18:58-63; Parulski ¶158.

To the extent Patent Owner contends or the Board finds that each specific subject characteristic value of said plurality of specific subject areas must be calculated using a weighted distribution, a POSITA would have also found it obvious to calculate the average hue value in each of the respective face regions 33 (each specific subject characteristic value of said plurality of specific subject areas) using a weighted distribution, as taught by Schroder, for the reasons discussed for [1.d]. Schroder, 10:40-11:4 (disclosing that multiple reference parts may be identified, where "a characteristic color value" of each reference part is an average value calculated using a function that weights "the color values in the center of the

[reference] part ... more ... than the color values of the pixels in the periphery of the reference part”); *supra* § VI.A.1.e; Parulski ¶159.

2. Independent Claim 12

- a. **[12.pre]: “An image processing method for executing color balance correction on image data of a photographed image, said image processing method comprising:”**

If limiting, Yano discloses or suggests [12.pre] for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶160.

- b. **[12.a]: “acquiring said image data;”**

Yano discloses or suggests [12.a] for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶161.

- c. **[12.b]: “determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”**

Yano discloses or suggests [12.b] for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶162.

- d. **[12.c]: “calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;”**

Yano discloses or suggests [12.c] for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶163.

- e. **[12.d]: “calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and”**

Yano discloses or Yano and Schroder render obvious [12.d] for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶164.

- f. **[12.e]: “executing said color balance correction on said image data using said calculated correction value,”**

Yano discloses or Yano and Schroder render obvious [12.e] for the reasons discussed for [1.f]. *Supra* § VI.A.1.g; Parulski ¶165.

- g. **[12.f]: “wherein when a plurality of said specific subject areas are determined, said calculating said specific subject characteristic value is executed using weighted distribution, wherein said weighted distribution is set according to a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas.”**

Yano and Schroder, or Yano, Schroder, and Steinberg, render obvious [12.f] for the reasons discussed for [8.f]. *Supra* § VI.B.2.g; Parulski ¶166.

3. Dependent Claims

- a. **Claim 13: “An image processing method according to claim 12, wherein said specific subject characteristic value includes a specific color characteristic value for representing a characteristic of pixel data included within said specific subject area, said pixel data belonging to a specific color range.”**

Yano discloses or Yano and Schroder render obvious the additional limitations of claim 13 for the reasons discussed for claim 4. *Supra* § VI.A.2.b; Parulski ¶167.

- b. **Claim 14**

- i. **[14.a]: “An image processing method according to claim 13, wherein said specific color characteristic value includes a statistical value of pixel values of said pixel data belonging to said specific color range,”**

Yano discloses or Yano and Schroder render obvious the additional limitations of [14.a] for the reasons discussed for [5.a]. *Supra* § VI.A.2.c.i; Parulski ¶168.

- ii. **[14.b]: “wherein said characteristic target value includes a preset pixel target value, and”**

Yano discloses or suggests [14.b] for the reasons discussed for [5.b]. *Supra* § VI.A.2.c.ii; Parulski ¶169.

- iii. **[14.c]: “wherein said calculated correction value includes a correction value for eliminating or reducing a difference between said statistical value of pixel values and said pixel target value.”**

Yano discloses or Yano and Schroder render obvious [14.c] for the reasons discussed for [5.c]. *Supra* § VI.A.2.c.iii; Parulski ¶170.

c. Claim 15:

- i. **[15.a]: “An image processing method according to claim 13, wherein said specific subject includes a face part of a human subject, and”**

Yano discloses or suggests the additional limitations of [15.a] for the reasons discussed for [6.a]. *Supra* § VI.A.2.d.i; Parulski ¶171.

- ii. **[15.b]: “wherein said pixel data belonging to said specific color range includes flesh colored pixel data belonging to a color range corresponding to a flesh color of said human subject.”**

Yano discloses or suggests [15.b] for the reasons discussed for [6.b]. *Supra* § VI.A.2.d.ii; Parulski ¶172.

- d. **Claim 16: “An image processing method according to claim 12, wherein said executing said color balance correction on said image data using said calculated correction value is carried out when an area ratio of said specific subject area to a whole area of said photographed image is greater than a reference value.”**

Yano discloses or renders obvious the additional limitations of claim 16 for the reasons discussed for claim 7. *Supra* § VI.A.2.e; Parulski ¶173.

4. Independent Claim 18

- a. **[18.pre]: “A computer program product for executing color balance correction on image data of a photographed image, said computer program product comprising:”**

If limiting, Yano discloses or suggests [18.pre]. Parulski ¶¶174-175.

Yano discloses a “program product such as a computer-readable recording medium on which” a “program to achieve the functions of the processing units shown in FIG. 1 is recorded” (computer program product). Yano, [0035], [0068]-[0071]; Parulski ¶175. Yano’s image processing apparatus processes “image data photographed (or shot) by a digital camera” (image data of a photographed image) based on this program. Yano, [0015], [0035], [0068]-[0071]; Parulski ¶175. Accordingly, this computer program product is for executing color balance correction for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶175.

- b. **[18.a]: “a computer readable medium; and”**

Yano discloses or suggests [18.a]. Parulski ¶¶176-177.

Yano discloses “a computer-readable recording medium” (computer readable medium), such as a “portable medium” (e.g., CD-ROM), “a storage such as a hard disk ... built in the computer system,” or RAM. Yano, [0035], [0068]-[0071]; Parulski ¶177.

c. [18.b]: “a computer program stored on said computer readable medium, said computer program comprising:”

Yano discloses or suggests [18.b]. Parulski ¶¶178-179.

Yano discloses that a “program to achieve the functions of the processing units shown in FIG. 1” (computer program) is stored on the computer-readable recording medium, where “the processing units may be operated by reading the program from the recording medium, and writing the read program into a computer system so as to operate the processing units.” Yano, [0068]-[0071]; Parulski ¶179. Because the program “achieve[s] the functions of the processing units” that perform Yano’s color balance correction, *supra* § VI.B.1 (claim 8), a POSITA would have understood that the computer program comprises program instructions for performing each of the steps discussed below for [18.c]-[18.f]. Yano, [0035], [0068]-[0071], claims 10, 12; Parulski ¶179.

d. [18.c]: “a program instruction for acquiring said image data;”

Yano discloses or suggests acquiring said image data for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶180. Yano discloses a program instruction for performing this step for the reasons discussed for [18.b]. *Supra* § VI.B.4.c; Parulski ¶180.

e. [18.d]: “a program instruction for determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”

Yano discloses or suggests determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶181. Yano discloses a program instruction for performing this step for the reasons discussed for [18.b]. *Supra* § VI.B.4.c; Parulski ¶181.

f. [18.e]: “a program instruction for calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;”

Yano discloses or suggests calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶182. Yano discloses a program

instruction for performing this step for the reasons discussed for [18.b]. *Supra* § VI.B.4.c; Parulski ¶182.

- g. [18.f]: “a program instruction for calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and”**

Yano discloses or Yano and Schroder render obvious calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶183. Yano discloses a program instruction for performing this step for the reasons discussed for [18.b]. *Supra* § VI.B.4.c; Parulski ¶183.

- h. [18.g]: “a program instruction for executing said color balance correction on said image data using said calculated correction value,”**

Yano discloses or Yano and Schroder render obvious executing said color balance correction on said image data using said calculated correction value for the reasons discussed for [1f]. *Supra* § VI.A.1.g; Parulski ¶184. Yano discloses a program instruction for performing this step for the reasons discussed for [18.b]. *Supra* § VI.B.4.c; Parulski ¶184.

- i. **[18.h]: “wherein when a plurality of said specific subject areas are determined, said specific subject characteristic value calculation is executed using weighted distribution, wherein said weighted distribution is set according to a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas.”**

Yano and Steinberg, or Yano, Schroder, and Steinberg, render obvious

[18.h] for the reasons discussed for [8.f]. *Supra* § VI.B.1.g; Parulski ¶185.

- 5. **Claim 2: “An image processing device according to claim 1 wherein said specific subject characteristic value calculation is executed by obtaining a weighted average value of each specific subject characteristic value of a plurality of specific subject areas.”**

As discussed in Section VI.A.1, Yano and Schroder render obvious claim 1.

Parulski ¶186. Yano and Steinberg or Yano, Schroder, and Steinberg render

obvious the additional limitations of claim 2 for the reasons discussed for [8.f].

Supra § VI.B.1.g; Parulski ¶186.

C. Grounds 3-4: Yano and Kuwata (Ground 3) or Yano, Schroder, and Kuwata (Ground 4) Render Obvious Claims 9 and 17

1. Independent Claim 9

- a. **[9.pre]: “An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:”**

If limiting, Yano discloses or suggests [9.pre] for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶187.

- b. **[9.a]: “an image data acquisition module that acquires said image data;”**

Yano discloses or suggests [9.a] for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶188.

- c. **[9.b]: “a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”**

Yano discloses or suggests [9.b] for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶189.

- d. **[9.c]: “a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;”**

Yano discloses or suggests [9.c] for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶190.

- e. **[9.d]: “a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value,”**

Yano discloses or Yano and Schroder render obvious [9.d] for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶191.

- f. **[9.e]: “wherein said calculated correction value includes a correction value weighted according to an area ratio of said specific subject area to a whole area of said photographed image; and”**

Yano and Kuwata render obvious [9.e]. Parulski ¶¶192-197.

Yano discloses that the image correction processing unit 17 obtains corrected hue values for “each pixel” in the image based on a formula that uses the difference between the “average hue of the flesh color in the face region” and “the center value of the target value of the hue.” Yano, [0061]-[0063]; *supra* § VI.A.1.f ([1.e]); Parulski ¶193. Before applying this difference value to correct the hue values in the image, a POSITA would have found it obvious in view of Kuwata to multiply the difference by a ratio of “the area (the total number of pixels) of the face region 33 calculated by the image feature amount calculation unit 15” “to the total number of pixels” in the image (an area ratio of said specific subject area to a whole area of said photographed image) because Kuwata teaches that “regulating a degree of color adjustment” according to such a ratio beneficially allows color adjustment without significantly affecting “parts other than the flesh color part.” Yano, [0057]-[0058]; Kuwata, [0067]-[0068], [0231]-[0238]; Parulski ¶193. By multiplying the difference by the area ratio, a POSITA would have understood that the correction value calculation module, *supra* § VI.C.1.e ([9.d]), calculates a correction value for color balance correction that includes a correction value

weighted according to a ratio of the area of the face region to the area of the image (an area ratio of said specific subject area to a whole area of said photographed image). Parulski ¶193.

Kuwata, like Yano, discloses a color adjustment process that identifies flesh-color-like pixels in an image, calculates a statistical value (e.g., an average value) representative of those pixels, and compares the statistical value to a predefined ideal flesh color. Kuwata, [0223]-[0231]; Parulski ¶194. For example, Kuwata, like Yano, discloses using “a difference between an average value ... and an ideal value” to “provide clear flesh color.” Kuwata, [0224], [0231]-[0238]; Parulski ¶194. To avoid potential adverse effects on areas other than the flesh color part, Kuwata multiplies this difference value by “a ratio of the number of object pixels to the total number of pixels.” Kuwata, Abstract, [0232]-[0234], [0238]; Parulski ¶194. Because digital images are made up of equally spaced rows and columns of pixels, this ratio discloses the ratio of the object area to the whole area of the photographed image. Kuwata, [0223] (“photographic color image data containing dot-matrix pixels”); Parulski ¶194. The result of the difference between the average value and the ideal value multiplied by the area ratio discloses a correction value weighted according to an area ratio of said specific subject area to a whole area of said photographed image. Parulski ¶194. Kuwata uses this correction value

to prepare “a tone curve” that represents how pixels in the image are “converted with a degree of enhancement regulated.” Kuwata, [0235]-[0238]; Parulski ¶194.

A POSITA would have been motivated to implement an area ratio based on the number of pixels in the face region and the total number of pixels in the image in the calculation of the correction value discussed for [9.d] to avoid adversely affecting colors outside the face region(s). Parulski ¶195; *supra* § VI.C.1.e. For example, Kuwata discloses that “it is not preferred to apply the difference as a degree of color adjustment intactly” because “if the same degree of color adjustment is applied to all the pixels, ... colors of pixels on any parts other than the flesh color part may be affected significantly,” resulting in “non-allowable color deviation.” Kuwata, [0068], [0231]-[0232]; Parulski ¶195. A POSITA would have recognized that Yano’s formula for calculating corrected hues of the image data applies the difference between the average hue of the flesh color in the face region and the center value of the target value of the hue as a degree of color adjustment intactly and would have been motivated to incorporate an area ratio into its formula for calculating corrected hues to avoid the potential negative effects described in Kuwata. Parulski ¶195. Given Yano already calculates “the area ... of the face region 33,” a POSITA would have been motivated to use this area in the calculation of its area ratio. Yano, [0057]-[0058]; Parulski ¶195.

A POSITA would have recognized that weighting the correction value based on the area of the face region in addition to or in lieu of Yano's correction effect inference that determines not to correct the hue of the image pixels if "the area of the face region 33 is smaller than a predetermined threshold value" would have been beneficial. Yano, [0041]-[0043], [0058]; Parulski ¶196. For example, Yano discloses that correcting the face region "does not necessarily bring[] about a desirable image" "when the face of the person in the image is small." Yano, [0042], [0058]. One reason is that, when the face region is small, the image feature amount "is easily influenced by noises in the image," creating "a fear that the image feature amount becomes an inaccurate value" and that "a side effect due to the image correction occurs." Yano, [0042]. A POSITA would have recognized that implementing weighting the correction value based on the area ratio, as Kuwata teaches, even without Yano's correction inference, mitigates these fears because Yano's image processing apparatus would apply a relatively small degree of color adjustment due to the small area ratio. Parulski ¶196. As such, implementing weighting the correction value based on the area ratio would have been a simple substitution of one known technique for another to obtain the predictable result of a color balance correction that avoids adversely affecting non-flesh areas when the face region is small. *Id.* Moreover, even if the area of the face region exceeds Yano's predetermined threshold value, a POSITA would have seen

the benefits of performing both Yano's inference processing and Kuwata's weighting together, for example, to avoid adversely affecting the color of other non-flesh regions in the image. *Id.*

A POSITA would have had a reasonable expectation of success in implementing weighting the correction value based on the area ratio because Yano already discloses that the image processing apparatus acquires “the total number of pixels included in the face region 33” and “the number of pixels (or resolution)” from information specified in the image file. Yano, [0023], [0057], [0061]; Parulski ¶197. Accordingly, determining an area ratio based on number of pixels in the face region and the number of pixels in the image, multiplying it by the difference between the average hue value and the center value of the target value of the hue determined for [1.e], and passing the result to the correction execution module for use in correcting the hue values of each pixel would have required a POSITA to apply only conventional calculations from readily available information in the same manner as Kuwata's determination of the degree of color adjustment. Yano, [0026], [0041]-[0043], [0058]; Kuwata, [0231]-[0235]; *supra* § VI.A.1.f; Parulski ¶197.

- g. [9.f]: “a correction execution module that executes said color balance correction on said image data using said calculated correction value.”**

Yano discloses or Yano and Schroder render obvious [9.f] for the reasons discussed for [1.f]. *Supra* § VI.A.1.g; Parulski ¶198.

2. Independent Claim 17

- a. [17.pre]: “An image processing method for executing color balance correction on image data of a photographed image, said image processing method comprising:”**

If limiting, Yano discloses or suggests [17.pre] for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶199.

- b. [17.a]: “acquiring said image data;”**

Yano discloses or suggests [17.a] for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶200.

- c. [17.b]: “determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;”**

Yano discloses or suggests [17.b] for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶201.

- d. **[17.c]: “calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;”**

Yano discloses or suggests [17.c] for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶202.

- e. **[17.d]: “calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value,”**

Yano discloses or Yano and Schroder render obvious [17.d] for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶203.

- f. **[17.e]: “wherein said calculated correction value includes a correction value weighted according to an area ratio of said specific subject area to a whole area of said photographed image; and”**

Yano and Kuwata render obvious [17.e] for the reasons discussed for [9.e]. *Supra* § VI.C.1.f; Parulski ¶204.

- g. **[17.f]: “executing said color balance correction on said image data using said calculated correction value.”**

Yano discloses or Yano and Schroder render obvious [17.f] for the reasons discussed for [1.f]. *Supra* § VI.A.1.g; Parulski ¶205.

D. Grounds 5-6: Yano and Nakamura (Ground 5) or Yano, Schroder, and Nakamura (Ground 6) Render Obvious Claim 10

1. Independent Claim 10

- a. [10.pre]: “An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:”**

If limiting, Yano discloses or suggests [10.pre] for the reasons discussed for [1.pre]. *Supra* § VI.A.1.a; Parulski ¶206.

- b. [10.a]: “an image data acquisition module that acquires said image data[;]”**

Yano discloses or suggests [10.a] for the reasons discussed for [1.a]. *Supra* § VI.A.1.b; Parulski ¶207.

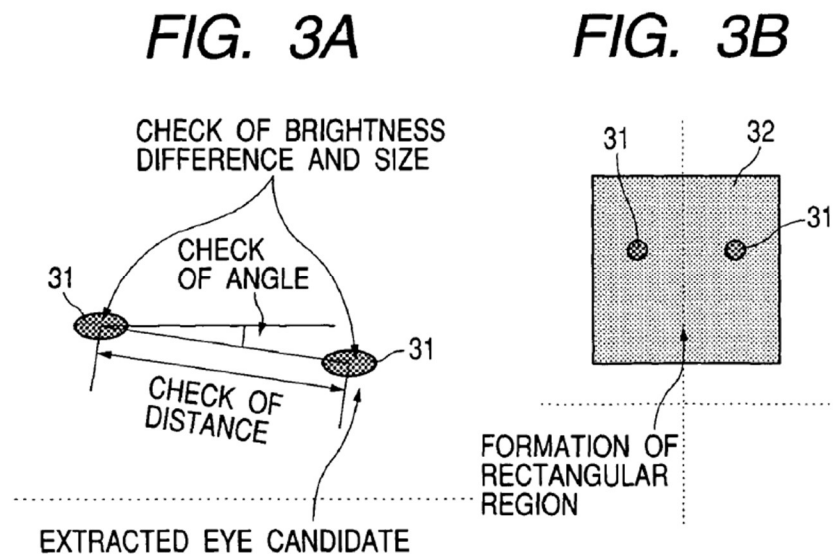
- c. [10.b]: “a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image, and”**

Yano discloses or suggests [10.b] for the reasons discussed for [1.b]. *Supra* § VI.A.1.c; Parulski ¶208.

- d. [10.c]: “wherein said specific subject area determination module determines said specific subject area using pixel values of pixel data included in a target area for determination, and a position of said target area in said photographed image;”**

Yano and Nakamura render obvious [10.c]. Parulski ¶¶209-214.

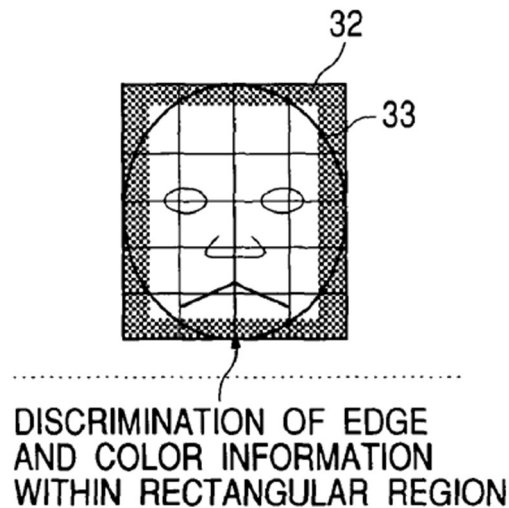
Yano discloses a face region extraction processing unit (specific subject area determination module) that “extracts the face region of the person” (determines said specific subject area) based on the steps described as follows. Yano, [0024]; Parulski ¶210. The face region extraction processing unit identifies candidates “of an eye image region” and determines whether a “pair of eye candidates actually indicates the eyes of the person.” Yano, [0032]-[0033]; Parulski ¶210. If so, it extracts the pair of eye candidates. Yano, [0033]. Based on the relationship between “the two positions of the pair of eye candidates,” the face region extraction processing unit “sets a rectangular region 32.” Yano, [0034]; Parulski ¶210. These two steps are depicted below in Figures 3A-3B. The rectangular region 32 discloses a target area for determination of the face region. Parulski ¶210.



Yano, FIGS. 3A-3B.

The face region extraction processing unit then “determines a face region 33 based on the edge in the vicinity of the boundary of the rectangular region 32 and color information within the rectangular region 32.” Yano, [0034]; Parulski ¶211. For example, the face region extraction processing unit 14 determines whether “an edge component exceeding predetermined intensity occupies the region of a predetermined width in the vicinity of the boundary of the rectangular region 32 by a predetermined ratio or more” and determines whether “an average value of the pixel values within the rectangular region 32” are “within a previously set flesh color region.” Yano, [0034]; Parulski ¶211. If both conditions are met, “the face region extraction processing unit 14 extracts the region in question as the face region 33.” Yano, [0034]; Parulski ¶211. Accordingly, Yano’s face region extraction processing unit 14 determines the face region 33 (specific subject area) using pixel values of pixel data included in the rectangular region 32 (target area for determination) by identifying pixels that exceed a “predetermined intensity” and calculating “an average value of the pixel values within the rectangular region 32.” Yano, [0034]; Parulski ¶211. Figure 3C, below, depicts the face region 33 within the rectangular region 32. Yano, [0034], FIG. 3C; Parulski ¶211.

FIG. 3C



Yano, FIG. 3C.

A POSITA would have found it obvious to implement Nakamura's exclusion of potential face regions that contact the outer edge of the image based on the position of Yano's rectangular region 32 in the photographed image (a position of said target area in said photographed image) to improve the identification of face regions. Parulski ¶212. Nakamura, like Yano, discloses extracting face regions in an image. Nakamura, 8:40-9:18, FIG. 2; Parulski ¶212. Nakamura discloses that objects that are not faces, like "the ground, tree trunks, clothes, and the like," often include hue values in the range of flesh color. Nakamura, 1:59-64, 2:21-25, 4:46-48; Parulski ¶212. Because human faces "usually exist[] at a central area of the original image," Nakamura teaches that the extraction of face regions can be improved by excluding "regions of the image

contacting the outer edge (frame of the image) of the original image” because these regions “are usually not characteristic images and are portions of the background or the like.” Nakamura, 10:58-64; Parulski ¶212.

A POSITA would have been motivated to implement Nakamura’s step of excluding color regions contacting the outer edge of the image by configuring its face region extraction processing unit 14 to consider the position of any rectangular regions 32 and extract a face region 33 only from rectangular regions 32 that do not contact the outer edge of the image. Parulski ¶213. A POSITA would have understood that doing so would have improved Yano’s color balance correction because Nakamura discloses that the important regions of images “usually exist[] at a central area of the original image” and that color regions contacting the edge of the image are frequently not the important part of the image and are instead usually “portions of the background or the like.” Nakamura, 10:58-64; Parulski ¶213. Because “the image correction processing unit 17 corrects the characteristic of the image data on the basis of the image feature amount” to “generate the image of an appropriate flesh color that human beings feel desirable,” as Yano discloses, a POSITA would have been motivated to avoid including any faces that are not an important part of the image when calculating the feature amount. Yano, [0027], [0054], [0060]-[0063]; *supra* § VI.A.1.f ([1.e]); Parulski ¶213. Implementing Nakamura’s exclusion of color regions that contact

the edge would have lessened the likelihood that Yano's image processing apparatus incorporates image data from background or unimportant regions into its average hue value used for image correction. Parulski ¶213. A POSITA would have understood that excluding image data from background or unimportant regions when calculating the average hue value would have improved the likelihood that the flesh color of important faces in the corrected image would have a flesh color that human beings feel desirable. *Id.*

A POSITA would have had a reasonable expectation of success because it would have required a POSITA to apply only well-known data processing techniques for locating boundaries of an image region and comparing them to the boundaries of the overall image, which was well known, as evidenced by Nakamura's disclosure of applying a similar technique more than a decade before the '056 patent's earliest priority date. Nakamura, 10:54-11:19, FIG. 6; Parulski ¶214. And Yano also discloses other criteria for determining whether to extract a face region, leading a POSITA to reasonably expect that Nakamura's exclusion of color regions contacting the edge of the image could likewise be successfully implemented. Parulski ¶214. Doing so would have merely required the combination of prior art elements according to known methods to predictably yield the result of a face region extraction processing unit 14 that performs the analysis of image data within a defined rectangular region 32, as described in [0034] of

Yano, only if the rectangular region 32 is not contacting the edge of the image.

Parulski ¶214.

- e. **[10.d]: “a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;”**

Yano discloses or suggests [10.d] for the reasons discussed for [1.c]. *Supra* § VI.A.1.d; Parulski ¶215.

- f. **[10.e]: “a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and”**

Yano discloses or Yano and Schroder render obvious [10.e] for the reasons discussed for [1.e]. *Supra* § VI.A.1.f; Parulski ¶216.

- g. **[10.f]: “a correction execution module that executes said color balance correction on said image data using said calculated correction value.”**

Yano discloses or Yano and Schroder render obvious [10.f] for the reasons discussed for [1.f]. *Supra* § VI.A.1.g; Parulski ¶217.

VII. DISCRETIONARY DENIAL IS NOT WARRANTED

A. 35 U.S.C. § 314(a) Does Not Warrant Discretionary Denial

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11, at 5-6 (Mar. 20, 2020) (precedential), and the Office’s interim guidelines dated June 21, 2022 (“Guidance

Memo”), do not warrant discretionarily denying institution. There is no active parallel district court litigation. Ex. 1025. The court in *Longitude Licensing Ltd.*⁴ v. *Google LLC*, No. 3:23-cv-03046 (N.D. Cal.) dismissed the proceeding under Rule 12(b)(6) upon determining that the claims of the ’056 patent (among others) are directed to patent ineligible subject matter under 35 U.S.C. § 101. Ex. 1022. The plaintiff voluntarily dismissed the remaining claims, and the Court entered final judgment and closed the file. Exs. 1024, 1025. No claim construction proceedings were underway, fact discovery had only begun, and the parties had not exchanged any infringement or invalidity contentions (and therefore no § 102/§ 103 issues had been raised or addressed). Although Longitude has appealed the § 101 order, institution is nevertheless appropriate. *See Google LLC v. Geoscope Techs. Pte. Ltd.*, IPR2023-01209, Paper 14, at 10-21 (Feb. 20, 2024) (instituting review where district court determined that the challenged claims were ineligible under § 101 and appeal was pending); *id.*, Paper 22 (denying director review).

Thus, the *Fintiv* factors favor institution because there is no case to stay or trial date (factors 1 and 2); minimal investment by the parties (factor 3); no

⁴ Longitude Licensing Ltd. “is the exclusive worldwide licensee” of the ’056 patent. Ex. 1023, ¶13.

overlapping issues (factor 4); and the evidence of obviousness is strong (factor 6).

Factor 5 is at worst neutral.

B. 35 U.S.C. § 325(d) Does Not Warrant Discretionary Denial

Noninstitution under § 325(d) would also be improper based on the factors set forth in *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (Dec. 15, 2017) (precedential). Yano, Schroder, Steinberg, Kuwata, and Nakamura were not considered during examination. *See* Ex. 1001, cover (code (56) (References Cited)).

Additionally, Yano, Schroder, Steinberg, Kuwata, and Nakamura differ from the prior art involved during examination. As discussed in the obviousness analysis above, the prior art teaches the features that led the Examiner to allow the claims that ultimately issued. *Supra* § II.B; *see supra* §§ VI.A.1.e ([1.d]), VI.B.1.g ([8.f]), VI.C.1.f ([9.e]), VI.D.1.d ([10.c]).

Had the Examiner known of Yano, Schroder, Steinberg, Kuwata, and Nakamura, it would not have allowed the claims of the '056 patent to issue. Accordingly, the Board should decline to exercise its discretion to deny institution under § 325(d).

VIII. MANDATORY NOTICES

A. Real Parties-in-Interest Under 37 C.F.R. § 42.8(b)(1)

Google LLC is the real party-in-interest for this Petition.⁵

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

To the best knowledge of Petitioner, the '056 patent is or has been involved in the following district court litigations:

Name	Number	Court	Filed
<i>Longitude Licensing Ltd. v. Google LLC</i>	3:23-cv-03046-VC	N.D. Cal.	June 21, 2023

The above district court litigation is currently on appeal to the Court of Appeals for the Federal Circuit, No. 24-1202, filed November 28, 2023.

⁵ 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.

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Lead Counsel	Back-Up Counsel
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D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Please address all correspondence to lead and back-up counsel at the addresses shown above and Google-Longitude-IPRs@finnegan.com. Petitioner also consents to electronic service by e-mail.

IX. GROUNDS FOR STANDING

Petitioner certifies that the '056 patent is available for *inter partes* review and Petitioner is not barred or estopped from requesting *inter partes* review to challenge the claims on the grounds above. Petitioner filed this Petition within one year of service of the original complaint against Petitioner in the district court litigation.

X. CONCLUSION

Petitioner has established a reasonable likelihood of prevailing with respect to the challenged claims and requests that the Board institute *inter partes* review and cancel each challenged claim as unpatentable.

Date: June 21, 2024

Respectfully submitted,

/Erika H. Arner/

Erika H. Arner, Lead Counsel
Reg. No. 57,540

CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing **Petition for *Inter Partes* Review** contains 13,979 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

/Erika H. Arner/
Erika H. Arner, Lead Counsel
Reg. No. 57,540

CLAIMS APPENDIX

1. **[1.pre]** An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:
 - [1.a]** an image data acquisition module that acquires said image data;
 - [1.b]** a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;
 - [1.c]** a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area,
 - [1.d]** wherein said specific subject characteristic value calculation is executed using weighted distribution, and wherein said weighted distribution is set so as to be a weight in a center area of said specific subject area larger than a weight in an area outside said center area;
 - [1.e]** a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and

[1.f] a correction execution module that executes said color balance correction on said image data using said calculated correction value.

2. An image processing device according to claim 1 wherein said specific subject characteristic value calculation is executed by obtaining a weighted average value of each specific subject characteristic value of a plurality of specific subject areas.

3. An image processing device according to claim 1, wherein said specific subject characteristic value includes a characteristic value relating to a hue of said specific subject.

4. An image processing device according to claim 1, wherein said specific subject characteristic value includes a specific color characteristic value for representing a characteristic of pixel data included within said specific subject area, said pixel data belonging to a specific color range.

5. **[5.a]** An image processing device according to claim 4, wherein said specific color characteristic value includes a statistical value of pixel values of said pixel data belonging to said specific color range,

[5.b] wherein said characteristic target value includes a preset pixel target value, and

[5.c] wherein said calculated correction value includes a correction value for eliminating or reducing a difference between said statistical value of pixel values and said pixel target value.

6. **[6.a]** An image processing device according to claim 4, wherein said specific subject includes a face part of a human subject, and

[6.b] wherein said pixel data belonging to said specific color range includes flesh colored pixel data belonging to a color range corresponding to a flesh color of said human subject.

7. An image processing device according to claim 1, wherein said correction execution module executes said color balance correction using said calculated correction value when an area ratio of said specific subject area to a whole area of said photographed image is greater than a reference value.

8. **[8.pre]** An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:

- [8.a]** an image data acquisition module that acquires said image data;
- [8.b]** a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;
- [8.c]** a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;
- [8.d]** a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and
- [8.e]** a correction execution module that executes said color balance correction on said image data using said calculated correction value,
- [8.f]** wherein when a plurality of said specific subject areas are determined, said specific subject characteristic value calculation is executed using weighted distribution, wherein said weighted distribution is set according to a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas.

9. **[9.pre]** An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:
- [9.a]** an image data acquisition module that acquires said image data;
- [9.b]** a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;
- [9.c]** a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;
- [9.d]** a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value,
- [9.e]** wherein said calculated correction value includes a correction value weighted according to an area ratio of said specific subject area to a whole area of said photographed image; and
- [9.f]** a correction execution module that executes said color balance correction on said image data using said calculated correction value.

10. **[10.pre]** An image processing device for executing color balance correction on image data of a photographed image, said image processing device comprising:
- [10.a]** an image data acquisition module that acquires said image data[;]
- [10.b]** a specific subject area determination module that determines a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image, and
- [10.c]** wherein said specific subject area determination module determines said specific subject area using pixel values of pixel data included in a target area for determination, and a position of said target area in said photographed image;
- [10.d]** a specific subject characteristic value calculation module that calculates a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;
- [10.e]** a correction value calculation module that calculates a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and
- [10.f]** a correction execution module that executes said color balance correction on said image data using said calculated correction value.

11. **[11.pre]** An image processing method for executing color balance correction on image data of a photographed image, said image processing method comprising:
- [11.a]** acquiring said image data;
- [11.b]** determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;
- [11.c]** calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area,
- [11.d]** wherein said calculating said specific subject characteristic value is executed using weighted distribution, and wherein said weighted distribution is set so as to be a weight in a center area of said specific subject area larger than a weight in an area outside said center area;
- [11.e]** calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and
- [11.f]** executing said color balance correction on said image data using said calculated correction value.

12. **[12.pre]** An image processing method for executing color balance correction on image data of a photographed image, said image processing method comprising:
- [12.a]** acquiring said image data;
- [12.b]** determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;
- [12.c]** calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;
- [12.d]** calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and
- [12.e]** executing said color balance correction on said image data using said calculated correction value,
- [12.f]** wherein when a plurality of said specific subject areas are determined, said calculating said specific subject characteristic value is executed using weighted distribution, wherein said weighted distribution is set according to

a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas.

13. An image processing method according to claim 12, wherein said specific subject characteristic value includes a specific color characteristic value for representing a characteristic of pixel data included within said specific subject area, said pixel data belonging to a specific color range.

14. **[14.a]** An image processing method according to claim 13, wherein said specific color characteristic value includes a statistical value of pixel values of said pixel data belonging to said specific color range,

[14.b] wherein said characteristic target value includes a preset pixel target value, and

[14.c] wherein said calculated correction value includes a correction value for eliminating or reducing a difference between said statistical value of pixel values and said pixel target value.

15. **[15.a]** An image processing method according to claim 13, wherein said specific subject includes a face part of a human subject, and

[15.b] wherein said pixel data belonging to said specific color range includes flesh colored pixel data belonging to a color range corresponding to a flesh color of said human subject.

16. An image processing method according to claim 12, wherein said executing said color balance correction on said image data using said calculated correction value is carried out when an area ratio of said specific subject area to a whole area of said photographed image is greater than a reference value.

17. [17.pre] An image processing method for executing color balance correction on image data of a photographed image, said image processing method comprising:

[17.a] acquiring said image data;

[17.b] determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;

[17.c] calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;

[17.d] calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value,

[17.e] wherein said calculated correction value includes a correction value weighted according to an area ratio of said specific subject area to a whole area of said photographed image; and

[17.f] executing said color balance correction on said image data using said calculated correction value.

18. [18.pre] A computer program product for executing color balance correction on image data of a photographed image, said computer program product comprising:

[18.a] a computer readable medium; and

[18.b] a computer program stored on said computer readable medium, said computer program comprising:

[18.c] a program instruction for acquiring said image data;

[18.d] a program instruction for determining a specific subject area in said photographed image, wherein said specific subject area contains a specific subject in said photographed image;

[18.e] a program instruction for calculating a specific subject characteristic value, wherein said specific subject characteristic value represents a characteristic of image data corresponding to said determined specific subject area;

[18.f] a program instruction for calculating a correction value for color balance correction using said calculated specific subject characteristic value and a preset characteristic target value; and

[18.g] a program instruction for executing said color balance correction on said image data using said calculated correction value,

[18.h] wherein when a plurality of said specific subject areas are determined, said specific subject characteristic value calculation is executed using weighted distribution, wherein said weighted distribution is set according to a size of each specific subject area on each specific subject characteristic value of said plurality of specific subject areas.

CERTIFICATE OF SERVICE

The undersigned certifies that, in accordance with 37 C.F.R. §§ 42.6(e) and 42.105, the **Petition for *Inter Partes* Review of U.S. Patent No. 7,454,056, the associated Power of Attorney, and Exhibits 1001-1025** were served via FedEx Priority Overnight on the correspondence address of record with the USPTO as follows:

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A courtesy copy has also been mailed to litigation counsel for Patent Owner at:

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Dated: June 21, 2024

By: /Lisa C. Hines/
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