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Paper 15
Entered: December 19, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CAPTION HEALTH, INC,
Petitioner,

v.

UNIVERSITY OF BRITISH COLUMBIA,
Patent Owner.

IPR2025-01066
Patent 11,129,591 B2

Before KEVIN F. TURNER, CHRISTOPHER L. OGDEN, and MARY C. HOFFMAN, *Administrative Patent Judges*.

HOFFMAN, *Administrative Patent Judge*.

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

I. INTRODUCTION

Caption Health, Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–20 of U.S. Patent No. 11,129,591 B2 (Ex. 1001, "the '591 patent"). University of British Columbia ("Patent Owner") filed a Preliminary Response (Paper 11, "Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." Based on the current record and for the reasons explained below, Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to at least one of the challenged claims of the '591 patent. Thus, we do not institute this *inter partes* review.

A. REAL PARTIES IN INTEREST

Petitioner identifies itself, Caption Health, Inc., as the real party in interest. Pet. 4. Patent Owner identifies itself, University of British Columbia, as the real party in interest. Paper 4, 2.

B. RELATED PROCEEDINGS

The parties identify *University of British Columbia v. Caption Health, Inc.*, No. 5-24-cv-03200 (N.D. Cal.), as challenging the '591 patent in federal district court. Pet. 4; Paper 4, 2.

II. BACKGROUND

A. THE '591 PATENT (EX. 1001)

The '591 patent describes a "computer-implemented system for facilitating echocardiographic image analysis." Ex. 1001, code (57). The system, seen in Figure 1 below, "us[es] a neural network to analyze the echocardiographic images . . . [which] may facilitate better functioning, for example, when there is variability in the echocardiographic image data than may be possible when analysis of the echocardiographic image relies on an average template or atlas with average shape." Ex. 1001, 11:45–51.

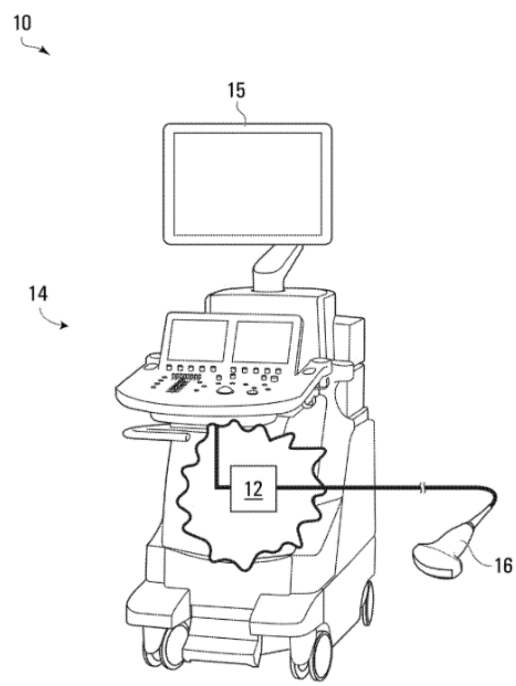

Figure 1 illustrates system 10 for facilitating echocardiographic image analysis. Ex. 1001, 4:61–63. The system includes computer-implemented echocardiographic image analyzer 12 in communication with user interface system 14, display 15, and ultrasonic transducer 16. *Id.* at 4:63–5:3, 7:66.

In operation, an operator manipulates the transducer on or around a patient. Ex. 1001, 5:7–13. From the transducer, the analyzer receives signals representing at least one echocardiographic image of the patient. *Id.* The analyzer then determines a "quality assessment value" representing a quality assessment of the image. *Id.* at 5:15–24. On the display, the analyzer associates the quality assessment value with the image, as seen in Figure 13 below. *Id.*

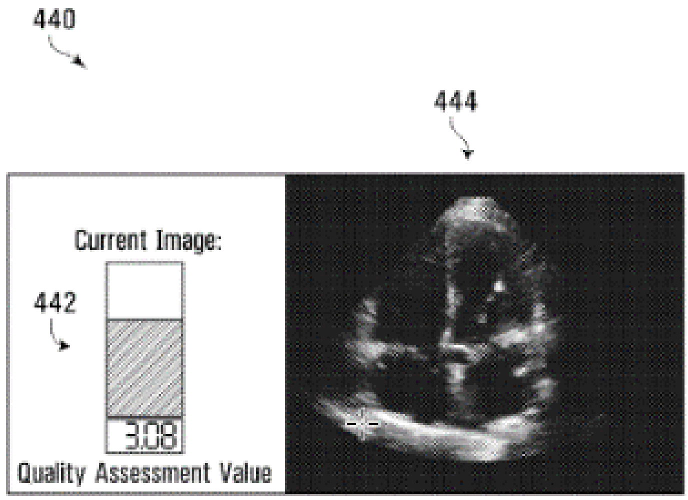

FIG. 13

Figure 13 illustrates display 440 showing representation 442 of the quality assessment value associated with representation 444 of the image. Ex. 1001, 16:45–49. The display provides near real-time feedback to the operator to improve image quality for subsequently captured images. *Id.* at 5:30–45. For example, the operator may, in response to viewing a low quality assessment value, adjust positioning of the transducer and/or adjust image capture parameters (e.g., depth, focus, gain, frequency) until a high quality assessment value is provided on the display. *Id.*

Figure 3, below, illustrates a flowchart depicting blocks of code for directing the analyzer's processor 100 to perform image analysis functions. Ex. 1001, 4:1–4.

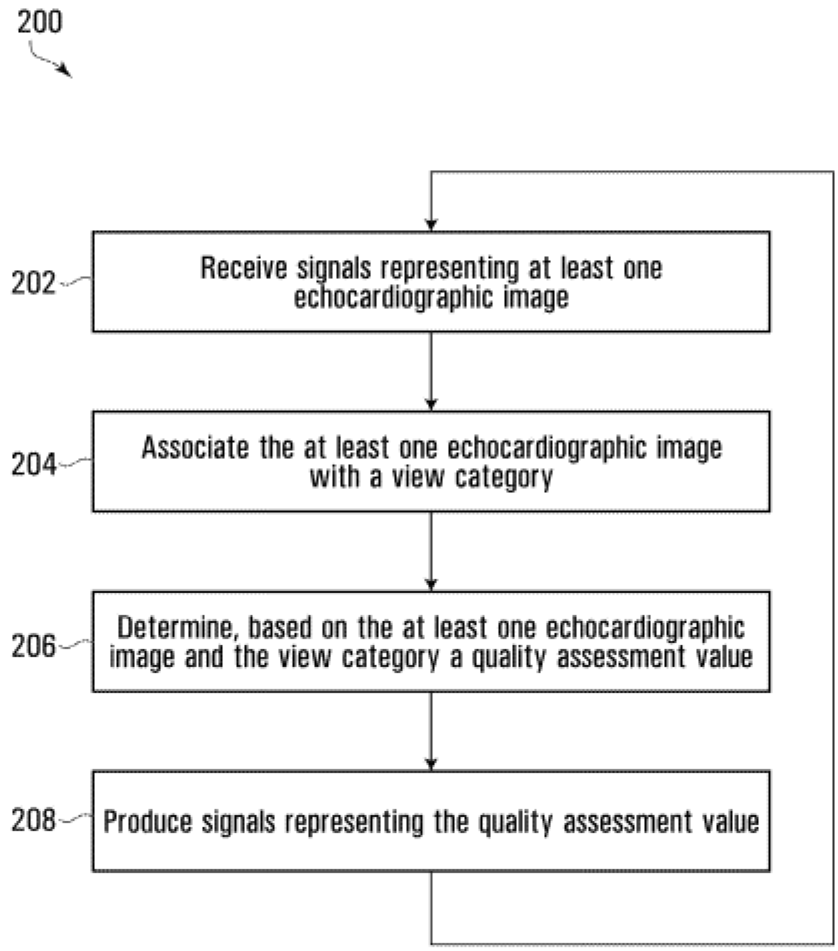

FIG. 3

In Figure 3, flowchart 200 begins at block 202, which directs the processor to receive signals representing at least one image from the transducer. Ex. 1001, 7:52–8:16.

Block 204 then directs the processor to associate the received image with a "view category" (i.e., what 2D echocardiographic view the image is meant to represent). Ex. 1001, 8:43–47; 10:8. An operator or neural network may choose the view category from a plurality of predetermined views, e.g., apical 2-chamber view (AP2), apical 3-chamber view (AP3), apical 4-chamber view (AP4), parasternal short axis at aortic valve level view ($PSAX_A$), and parasternal short axis at papillary muscle level view ($PSAX_{PM}$), etc. *Id.* at 8:66–9:7, 10:9–10, 11:9–10. By associating the image to a particular view category, different analyses may be applied to the image depending on which view category the image falls within. *Id.* at 8:63–65.

At block 206, the processor determines, based on the received image and associated view category, a quality assessment value. Ex. 1001, 11:24–33. The '591 patent explains, "desirable characteristics for each of the different views may differ and so it may be desirable to determine quality assessment values for the echocardiographic images in different ways." *Id.* at 5:62–65. Accordingly, to generate the quality assessment value, the processor may apply a different function to the received image for each view category. *Id.* at 11:27–44. Applying the function may involve applying a neural network, as seen below in Figure 8. *Id.*

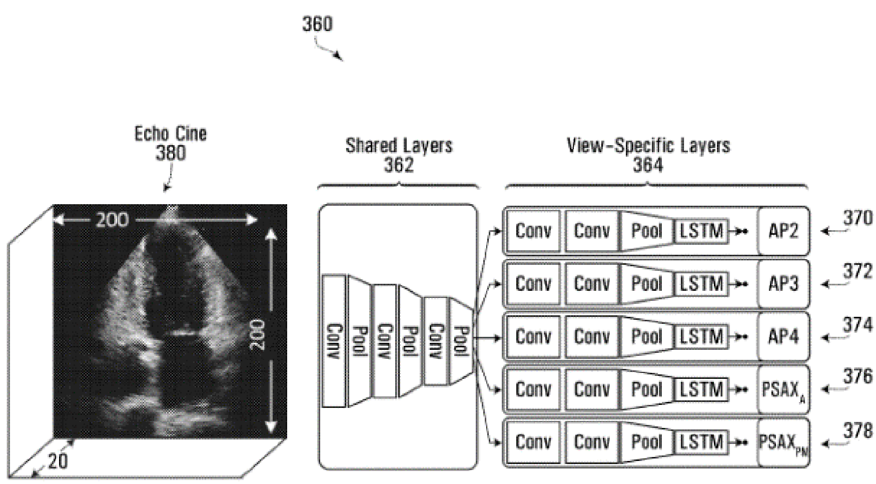

FIG. 8

Figure 8 depicts neural network 360 including five image quality assessment neural networks. Ex. 1001, 12:10–21. In Figure 8, each of the five image quality assessment neural networks takes as input a sequence of twenty images (echo cine 380) and outputs view category specific quality assessment values. *Id.* This is because the five image quality assessment neural networks correspond to view categories (AP2, AP3, AP4, $PSAX_A$, and $PSAX_{PM}$) and include the same shared layers 362 but different sets of assessment parameters, i.e., view category specific layers 370, 372, 374, 376, and 378. *Id.*

B. CHALLENGED CLAIMS

The Petition challenges claims 1–20 of the '591 patent. Pet. 11. Claims 1, 11, and 15 are independent claims. Ex. 1001, 34:43–39:19.

Claim 1 of the '591 patent is illustrative and reads as follows:[1]

1. *[pre]* A computer-implemented system for facilitating echocardiographic image analysis, the system comprising at least one processor configured to:

[1a] receive signals representing a first at least one echocardiographic image;

[1b] associate the first at least one echocardiographic image with a first view category of a plurality of predetermined echocardiographic image view categories;

[1c] determine, based on the first at least one echocardiographic image and the first view category, a first quality assessment value representing a view category specific quality assessment of the first at least one echocardiographic image;

[1d] produce signals representing the first quality assessment value for causing the first quality assessment value to be associated with the first at least one echocardiographic image;

[1e] receive signals representing a second at least one echocardiographic image;

[1f] associate the second at least one echocardiographic image with a second view category of the plurality of predetermined echocardiographic image view categories, said second view category being different from the first view category;

[1] For ease of reference, we include italicized bracketed designations for the preamble recitation and limitations of claim 1.

[1g] determine, based on the second at least one echocardiographic image and the second view category, a second quality assessment value representing a view category specific quality assessment of the second at least one echocardiographic image; and

[1h] produce signals representing the second quality assessment value for causing the second quality assessment value to be associated with the second at least one echocardiographic image;

[1i] wherein each of the plurality of predetermined echocardiographic image view categories is associated with a respective set of assessment parameters, each of the sets of assessment parameters being a set of neural network parameters that define a neural network having a plurality of layers including an input layer configured to receive one or more echocardiographic images and an output layer configured to output one or more quality assessment values, and wherein the at least one processor is configured to determine the first quality assessment value by:

[1j] determining that a first set of assessment parameters of the sets of assessment parameters is associated with the first view category; and

[1k] in response to determining that the first set of assessment parameters is associated with the first view category, inputting the first at least one echocardiographic image into the neural network defined by the first set of assessment parameters; and

[1l] wherein the at least one processor is configured to determine the second quality assessment value by:

[1m] determining that a second set of assessment parameters of the sets of assessment parameters is associated with the second view category; and

[1n] in response to determining that the second set of assessment parameters is associated with the second view category, inputting the second at least one echocardiographic image into the neural network defined by the second set of assessment parameters.

Ex. 1001, 34:9–35:3.

Independent claims 11 and 15 recite similar subject matter. Ex. 1001, 36:36–37:54, 38:22–39:19. Specifically, claim 11 recites "[a] computer-implemented system for training neural networks to facilitate echocardiographic image analysis," and claim 15 recites "[a] computer-implemented method of facilitating echocardiographic image analysis." *Id.*

C. ASSERTED GROUNDS OF UNPATENTABILITY

The Petition advances four grounds, as summarized in the table below:

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
A	1–5, 15–19	103[2]	Krishnan,[3] Lee[4]
B	7–9, 11–13	103	Krishnan, Lee, Pagoulatos[5]
C	6, 20	103	Krishnan, Lee, Chen[6]
D	10, 14	103	Krishnan, Lee, Pagoulatos, Chen

Pet. 11.

[2] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. § 103, effective March 16, 2013. Based on the earliest claimed priority date of the '591 patent, i.e., April 21, 2016, we apply the AIA version of § 103. *See* Ex. 1001, code (60).

[3] Krishnan et al., US 2005/0251013 A1, published November 10, 2005. Ex. 1005 ("Krishnan").

[4] Lee et al., US 2016/0247034 A1, published August 25, 2016. Ex. 1006 ("Lee").

[5] Pagoulatos et al., US 2017/0262982, published September 14, 2017. Ex. 1007 ("Pagoulatos").

[6] Chen, H. et al., *Automatic Fetal Ultrasound Standard Plane Detection Using Knowledge Transferred Recurrent Neural Networks*, Medical Image Computing and Computer-Assisted Intervention 507–514 (NOVEMBER 2015). Ex. 1010 ("Chen").

In support of its arguments, Petitioner relies on a Declaration of Dr. Rahul Chandrakant Deo. Ex. 1002. Patent Owner does not submit declaratory testimony on the merits.

III. ANALYSIS

A. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art at the time of the invention is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Petitioner contends that a person of ordinary skill in the art ("POSITA"), at the filing date of the '591 patent, "would include a person with an advanced degree in Computer Engineering, Computer Science, Physics, or other field related to computer imaging, and at least 1 year of research experience training machine learning models to analyze ultrasound data." Pet. 11 (citing Ex. 1002 ¶¶ 31–33).

Patent Owner provides a slightly different formulation, contending that a POSITA includes "an individual with one of the advanced degrees Petitioner identifies and at least 1 year of research or work experience training machine learning models to analyze medical imaging data (e.g., ultrasound, CT, PET, MRI, etc.)." Prelim. Resp. 16. Patent Owner also asserts that further education could substitute for experience and vice versa. *Id.*

Because Petitioner's formulation is supported by declaratory testimony and appears consistent with the level of skill reflected in the asserted prior art and the '591 patent, and because Patent Owner does not provide any supporting evidence, we adopt Petitioner's formulation of the level of ordinary skill in the art. *See* Ex. 1002 ¶¶ 31–33. Our decision would be the same regardless of the differences between Petitioner's and Patent Owner's formulations.

B. CLAIM CONSTRUCTION

In an *inter partes* review, the Board construes the terms of a patent claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc).

The parties do not propose any express claim construction. Pet. 11–12; Prelim Resp. 17. We also determine that no express claim construction is necessary for our Decision, apart from that discussed in our below analysis. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (holding that only terms in controversy must be construed "and only to the extent necessary to resolve the controversy") (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

C. OVERVIEW OF RELEVANT ASSERTED PRIOR ART

1. Krishnan (Ex. 1005)

Krishan describes "processing a medical image to automatically identify the anatomy and view (or pose) from the medical image and automatically assess the diagnostic quality of the medical image." Ex. 1005, code (57). The method "includes obtaining image data, extracting feature data from the image data, and automatically performing anatomy identification, view identification and/or determining a diagnostic quality of the image data, using the extracted feature data," as seen in Figure 1 below. *Id.*

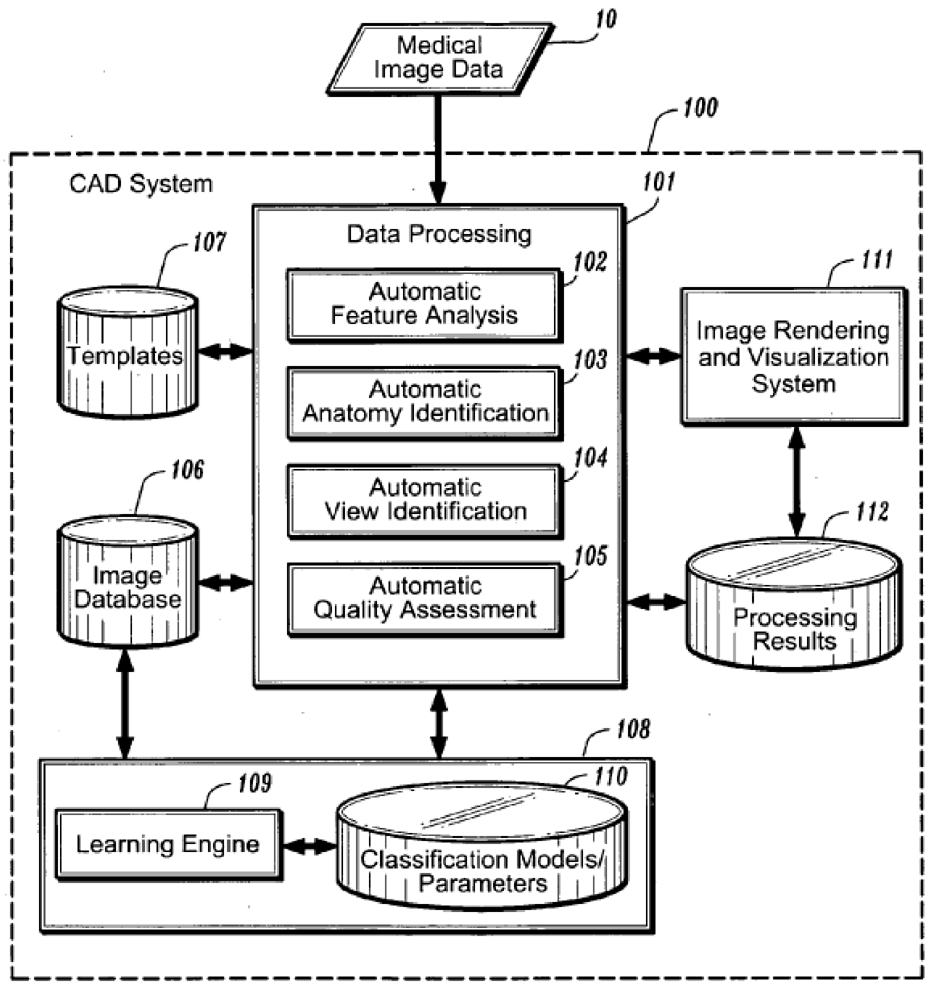

FIG. 1

Figure 1 depicts a block diagram of system 100 for analyzing medical ultrasound image data 10. Ex. 1005 ¶ 16. The system's data processing module 101 comprises four automated decision support modules 102–105: 1) feature analysis module 102 to extract features/parameters (e.g., edges, identifiable structures, boundaries, changes in colors, etc.), 2) anatomy identification module 103 to label images with the appropriate anatomy identification, 3) view identification module 104 to identify the view of the image, and 4) image quality assessment module 105 to assess the image's diagnostic quality. *Id.* ¶¶ 16–20, 34.

Figure 1 also depicts classification system 108, which can be used singularly or in combination by one or more of the various automated decision support modules to perform their respective functions. Ex. 1005 ¶ 21. The classification system comprises learning engine 109 and knowledge base 110 and may incorporate neural networks. *Id.* ¶¶ 23, 44. The classification system processes the extracted feature data to determine the most likely anatomy or view, or to assess image quality in real time. *Id.* ¶¶ 20, 23, 42.

Figure 1 further depicts database 106 and template database 107, repository 112 (for storing processing results) and image rendering and visualization system 111 (for generating and displaying images on a computer monitor). Ex. 1005 ¶¶ 21, 24–25.

2. Lee (Ex. 1006)

Lee describes a method of measuring the quality of an image. Ex. 1006, code (54). The method includes "obtaining an image; classifying an image scene category of the image; determining a classifier corresponding to the classified image scene category; determining image quality factor scores with respect to the image; and evaluating image quality with respect to the image by using the determined image quality factor scores and the determined classifier." Ex. 1006, code (57). Figure 5 below illustrates an example configuration for measuring the quality of an image.

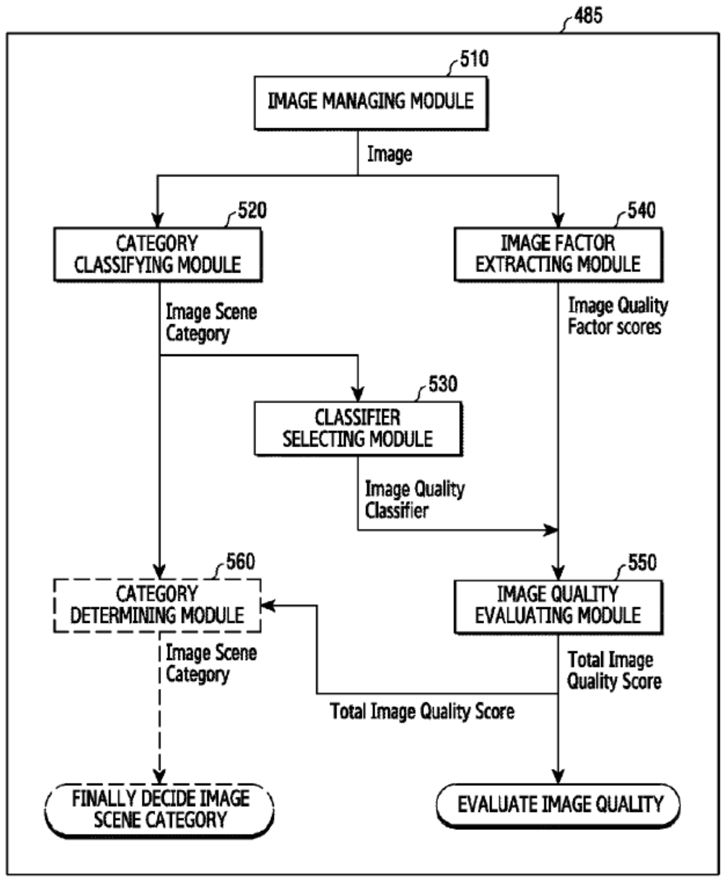

FIG.5

Figure 5 schematically illustrates quality measuring module 485, which includes image managing module 510 (e.g., a camera manager or an image manager), image factor extracting module 540, category classifying module 520, classifier selecting module 530, and image quality evaluating module 550.[7] Ex. 1006 ¶ 149.

In operation, the image managing module obtains and transfers the image to both the image factor extracting module and the category classifying module. Ex. 1006 ¶ 150.

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[7] Figure 5 also illustrates that the quality measuring module may optionally include "category determining module" 560, which finally decides the image scene category. Ex. 1006 ¶ 149.

The image factor extracting module extracts image quality factor scores with respect to the image. Ex. 1006 ¶ 154. Specifically, it extracts an image quality factor (such as sharpness, noise, contrast, color accuracy, distortion, blur, etc.), measures the extracted factor, and determines a score for each factor. *Id.* The image factor extracting module transfers the factor scores to the image quality evaluating module. *Id.*

In addition, the category classifying module classifies an image scene category of the image. Ex. 1006 ¶ 151. The category classifying module may classify an image's category using deep learning. *Id.* The category classifying module transfers the classified image scene category to the classifier selecting module. The classifier selecting module then selects an image quality classifier corresponding to the image scene category and transfers the classifier to the image quality evaluating module. *Id.* ¶ 153.

The image quality evaluating module uses the factor scores and the classifier to extract a total image quality score. Ex. 1006 ¶ 160.

D. GROUND A: OBVIOUS OVER KRISHNAN AND LEE

Under Ground 1, Petitioner contends that claims 1–5 and 15–19 are unpatentable under § 103 as obvious over Krishnan and Lee. Pet. 25–44.

1. Legal Principles

"In an [inter partes review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring inter partes review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")).

A claim is unpatentable under § 103 if the differences between the claimed subject matter and the prior art are "such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). When a ground in a petition is based on a combination of references, we consider "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *Id.* at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). We base our obviousness inquiry on factual considerations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) any objective indicia of obviousness or non-obviousness that may be in evidence. *See Graham*, 383 U.S. at 17–18.

2. Claim 1

We begin our analysis with independent claim 1. We determine that Petitioner has not shown a reasonable likelihood that claim 1 is unpatentable as obvious over Krishnan and Lee, for the reasons explained below.

Petitioner contends that Krishnan and Lee teach or suggest all the limitations of claim 1. Pet. 25–44. Patent Owner contends that Petitioner's showing for claim 1, specifically limitation 1i, is deficient. Prelim. Resp. 17–28. Because it is dispositive, we focus on limitation 1i.

Limitation 1i recites, in pertinent part, "a neural network having a plurality of layers including an input layer *configured to receive one or more echocardiographic images* and an output layer configured to output one or more quality assessment values (emphasis added)." Ex. 1001, 34:42–52.

Limitation 1i also recites "view categories associated with a respective set of assessment parameters." *Id.*

Petitioner identifies Krishnan's determining of echocardiographic image quality assessment values using view-category-specific templates or a "bank of classifiers," wherein the classifiers are built using "neural networks." Pet. 33 (citing Ex. 1005 ¶¶ 35, 42–44; Ex. 1002 ¶¶ 119–120). Petitioner explains that "neural networks, by necessity, include an input layer and an output layer," and that Krishnan's classifiers output a quality assessment value of an echocardiographic image. *Id.* at 36 (citing Ex. 1002 ¶ 122). Petitioner solely relies on Lee for teaching image quality classifiers based on different "view-category-specific assessment parameters." *Id.* at 33.

Petitioner contends that "[a] POSITA would understand from these combined disclosures that Krishnan's 'bank of classifiers' could be a plurality of view-category-specific quality assessment classifiers." Pet. 33 (citing Ex. 1002 ¶¶ 113–114, 119–120). Petitioner further contends that the combination teaches or suggests, "as claimed, a plurality of view quality assessment neural networks, each associated with a respective echocardiographic image view category, each having respective assessment parameters, and each configured to output a view-category-specific quality assessment value of one or more received images." Pet. 34 (citing Ex 1002 ¶¶ 114–122).

Absent from Petitioner's analysis is whether Krishnan, Lee, or their combination teach or suggest limitation 1i's requirement that the quality assessment neural network is configured to receive an image. Pet. 34; *see generally id.* 32–37.

For example, Petitioner does not contend that Krishnan's quality assessment neural network is configured to receive an image. *See* Pet. 32–37. Moreover, as Petitioner admits and Patent Owner points out, Krishnan teaches a neural network configured to receive *extracted features/parameters* of an image, not the image itself. Pet. 29–30 (citing Ex. 1005 ¶ 20); Prelim. Resp. 22 (citing Ex. 1005 ¶ 42).

Nor does Petitioner contend that Lee discloses a *quality assessment* neural network configured to receive an image. *See* Pet. 32–37. Petitioner provides no argument or evidence that Lee's quality assessing "image quality evaluating module 550" or "image quality classifiers" involve a neural network. *Id.*; *see* Prelim Resp. 20 (citing Pet. 36) (noting Petitioner's reliance on *Krishnan's* quality assessment neural network). Although Petitioner states that Lee's quality assessment uses "machine learning," machine learning is not necessarily a neural network. Pet. 34 (citing Ex.1006 ¶¶ 9, 38, 168); s*ee, e.g.,* Ex. 1006 ¶ 6 (discussing machine learning Support Vector Machine or naïve bayes classifiers), ¶¶ 151, 168 (distinguishing classifying using feature vectors from neural networks/deep learning).

According to our review, Lee teaches a *category classifying* neural network, configured to receive an image and output an image category, not a *quality assessment* neural network as recited in limitation 1i. *See* Ex. 1002 ¶ 81 ("category classifying module 520 may use 'deep learning' to determine a 'category or a class' of an image"); Prelim Resp. 23 (explaining that Lee teaches "deep learning" for classifying images into categories but not for image quality assessment); Ex. 1006 ¶¶ 151–153, 160, 168.

Thus, neither Krishnan nor Lee individually teaches or suggests a *quality assessment* neural network configured to receive an *image*, and Petitioner fails to explain how the references combined teach or suggest this claim element. *See* Pet. 32–34. At best, the combination, as proposed in the Petition, teaches a quality assessment neural network configured to receive extracted features of an image and a category classifying neural network configured to receive an image.

Petitioner also fails to provide sufficient rationale and a reasonable expectation of success in combining Krishnan and Lee to arrive at a quality assessment neural network configured to receive an image. *See* Pet. 34–37. For example, the Petition lacks an explanation of why a POSITA would have been motivated to modify Krishnan's quality assessment neural network to be configured to receive an image, instead of extracted features, in view of Lee's image-receiving category classifying neural network. *Id.* Without such further explanation, Petitioner's challenge falls short.

Petitioner's argument that neural networks for image quality assessment were "well-known" is not persuasive—it does not address the particular scope of limitation 1i, which also requires that the neural network is *configured to receive images*. Pet. 35 (citing Ex. 1002 ¶¶ 47–51, 118; Exs. 1017, 1023, 1024, 1026). Petitioner's argument that combining Krishnan and Lee "would merely amount to applying known work from the field . . . to yield predictable results" is not persuasive because the Petition ties this reasoning to modifying Krishnan with Lee's view-category-specific assessment parameters, not modifying Krishnan's quality assessment neural network to receive images instead of extracted features. *Id.* at 37 (citing Ex. 1002 ¶ 126).

Lastly, we note Petitioner's expert's discussion regarding neural networks for image quality assessments. Ex. 1002 ¶¶ 43–53 (citing Exs. 1010, 1015, 1016, 1017, 1018, 1023, 1024, 1026). However, the Petition does not explain how this evidence demonstrates that the proposed combination teaches or suggests a quality assessment neural network configured to receive images, or that such would have been obvious in the context of the claimed invention. *See* Pet. 32–37.

Accordingly, we find that the Petition does not sufficiently identify where certain claim elements in limitation 1i are found in Krishnan and Lee. Accordingly, we determine that Petitioner has not shown that the combination of Krishnan and Lee renders obvious claim 1.

3. Claims 2–5 and 15–19

Like claim 1, independent claim 15 requires a neural network configured to receive an image and to output a quality assessment value. Ex. 1001, 37:28–33. Petitioner relies on the same arguments for claims 1 and 15. Compare Pet. 32–37 with *id.* at 43–44. Claims 2–5 and 16–19 depend from claims 1 or 15. *Id.* at 35:4–44, 39:19–40:35.

For the same reasons as discussed above with respect to claim 1, we determine that Petitioner has not shown that Krishnan and Lee render obvious claims 2–5 and 15–19.

E. OTHER GROUNDS

With respect to remaining claims 6–14 and 20, Petitioner challenges claims 7–9 and 11–13 under § 103 as obvious over Krishnan, Lee, and Pagoulatos (Ground B), claims 6 and 20 as obvious over Krishnan, Lee, and Chen (Ground C), and claims 10 and 14 as obvious over Krishnan, Lee, Pagoulatos, and Chen (Ground D). *Id.* at 44–66.

Of remaining claims 6–14 and 20, claim 11 is the sole independent claim and, like claim 1, requires a neural network configured to receive an image and to output a quality assessment value. Ex. 1001, 37:28–33. Claims 6–10, 12–14, and 20 depend from claims 1, 11, or 15. *Id.* at 35:45–36:35, 37:55–38:21, 40:29–34.

Petitioner's arguments for claim 11 rely on the same arguments premised on Krishnan and Lee (claims 1 and 15 under Ground A), which we determined above to be deficient. Compare Pet. 32–37, 37 43–44 with *id.* at 54–55. For the same reasons discussed above with respect to claims 1 and 15, Petitioner has not demonstrated that Krishnan and Lee in combination with Pagoulatos and/or Chen render obvious claims 6–14 and 20.

IV. CONCLUSION

We determine that Petitioner has not shown a reasonable likelihood that it would prevail in showing that at least one challenged claim of the '591 patent is unpatentable. Therefore, we deny the Petition.

V. ORDER

It is

ORDERED that the Petition is *denied*, and no trial is instituted.

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