Paper 10
Filed: April 28, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS, LLC,
Petitioner,

v.

DigiMedia Tech, LLC,
Patent Owner.

Case IPR2022-01182
Patent 6,473,532

PATENT OWNER'S RESPONSE

37 C.F.R. § 42.120

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PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description
2001	Merriam-Webster's Dictionary, "detail," *available at* https://www.merriam-webster.com/dictionary/detail
2002	Merriam-Webster's Dictionary, "separate," *available at* https://www.merriam-webster.com/dictionary/separate
2003	Image Processing in MATLAB – Fourier Analysis and Filtering of Images, Laboratory No. 3 Solutions, ECE 447, Fall Course, School of Electrical and Computer Engineering, Rutgers University, *available at* https://web.ece.ucsb.edu/Faculty/Rabiner/ece259/image_processing_labs/lab3_solution.pdf.
2004	R. Santhoshkumar, et al., "Activity Based Human Emotion Recognition in video," International Journal of Pure and Applied Mathematics, Vol. 117, No. 15, 2017, p. 1185, *available at* https://www.researchgate.net/publication/327743831_Activity_Based_Human_Emotion_Recognition_in_video

I. INTRODUCTION

Patent Owner DigiMedia Tech, LLC (DigiMedia) submits this Patent Owner's Response in opposition to the petition for *inter partes* review (IPR) filed by Unified Patents, LLC (Unified or Petitioner) regarding claims 6 and 16 (the "Challenged Claims") of U.S. Patent No. 6,473,532 (the '532 patent). Paper 1 (Petition or Pet.). As explained below, the Board should reject the grounds of the Petition because the asserted prior art does not teach or suggest every claimed feature of the challenged claims, as properly interpreted according to the plain meaning of the terms consistent with the specification.

More specifically, the asserted *Chiu* and *Gu* references do not teach or suggest "spatially and temporally separating and analyzing details of said frames." To support its position, Petitioner must interpret the term "details" in at least three inconsistent ways, depending on which portion of the claim it is addressing. Moreover, Petitioner tacitly admits that if its overly broad interpretations are not adopted, then the proposed combination fails—there are no arguments presented based on the correct interpretation as disclosed in the patent.

Looking briefly at the proposed combination, Petitioner asserts that the calculation of local characteristics of individual pixels on a pixel basis is disclosure of "separating ... details of said frames." But properly construed, "details" are composed of pixels. Therefore, calculated local characteristics of an individual

pixel cannot be a "detail." Additionally, the plain language of the claim recites "separating" details from "frames." But calculating a local characteristic of an individual pixel, as Petitioner relies on, is not a disclosure of "separating" anything, but rather generating new content, let alone "separating" something from "frames" as required by the claims.

The proposed combination of *Chiu* and *Gu* also does not teach or suggest "classifying said frame picture details into subclasses in accordance with said visual perception thresholds and said detail parameters." Petitioner asserts that the proposed combination classifies surviving pixels in macroblocks into small, random details (subclass 1) and large, connected details (subclass 2). However, this assertion requires another reinterpretation of "details" and an improper interpretation of the term "subclass."

Because the cited prior art does not teach these features of independent claim 6 (and by extension, claim 16), the Petition has not proven the claims to be unpatentable as obvious over *Chiu* and *Gu*.

II. CLAIM CONSTRUCTION

In this IPR, claim terms are "construed using the same claim construction standard that would be used to construe the claim in a civil action." 37 C.F.R. § 42.100(b); *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

A. *detail(s)* means element(s) of an image composed of pixels that have high frequency content

DigiMedia's Construction	Unified's Construction
elements of an image composed of pixels that have high frequency content	a pixel or a group of pixels that is detectable or distinguishable by the human visual system.

The '532 patent discloses, "details which the human eye distinguishes are ones of high contrast and ones whose details have small dimensions. Areas of high contrast are areas with a lot of high frequency content." Ex. 1001, 6:27-30.

Such "details" are contrasted with "large swaths of the image (in the background) which have no details in them." *Id.* at 5:24-25. "The background … is very dark at the top of the image and very light at the bottom of the image." *Id.* at 5:18-20. The background forms a gradient that spans the height of the image and therefore has no high frequency content. Therefore, areas with no high frequency content "have no details in them." *Id.* at 5:25.

The '532 patent discloses that "details" are identified by generating "a plurality of filtered frames from the current frame, each filtered through a different high pass filter (HPF), where each high pass filter retains a different range of frequencies therein." *Id.* at 6:31-34.

Note that "if the pixel is not present in any of the filtered frames, the pixel must belong to an object of large size or the detail is only detected but not distinguished." *Id.* at 8:43-46. In other words, consistent with the disclosure

concerning the background, if there is no high frequency content present (i.e., pixel is not in any of the high pass filtered frames) then the pixel is only detected but not distinguished—because there are no "details" present.

Moreover, the '532 patent discloses that "details" are composed of multiple pixels. "Each subclass includes **pixels related to the same detail** and which generally cannot be distinguished from each other." *Id.* at 2:39-41; *see also id.* at 8:40-41 ("**detail** in the image **of which the pixel forms a part**").[1]

Additionally, "details" cannot simply mean *pixels*, as asserted by the Petitioner, because the '532 patent discloses details have dimensionality: "'[S]ignificantly present' is defined by the [visual perception] threshold level and by the 'detail dimension' (i.e., the size of the object or detail in image of which the pixel forms a part)." Ex 1001, 8:38-41. If "details" were to simply mean "pixels," there would not be a size component to the determination of whether pixels are significantly present because all pixels are the same size (e.g., 1 pixel).

The '532 patent further discloses examples of "details" in Table 2 including a horizontal edge, vertical edge, single small detail, very small vertical edge, and very small single detail. *Id.* at 8:55–9:10.

[1] All **bold** and *italics* emphasis in quotations in this Patent Owner's Preliminary Response are added unless otherwise indicated.

The Petitioner asserts that "while 'detail' is not explicitly defined, the term at least *encompasses a pixel or group of pixels* that is detectable or distinguishable by the human visual system." Pet. 8. However, that broad definition renders the term "detail" meaningless because *every* pixel is either detectable or distinguishable by the human visual system.

An image comprises pixels, and every pixel must be either part of a detail or *not* part of a detail. The patent explains that "large swaths of the image (in the background) ... *have no details* in them." *Id.* at 5:24-25. These "swaths" of the image with "no details" are still comprised of pixels. These pixels accordingly cannot be part of a "detail."

Pixels that do form a part of a detail, on the other hand, can be further categorized as pixels of details that are only *detected* and pixels of details that are *distinguished*. "The present invention separates the details of a frame into two different types, those that can only be detected ... and those which can be distinguished …." Ex. 1001, 5:28-32. "[I]f the pixel is not present in any of the filtered frames, the pixel must belong to an object of large size or the detail is only detected but not distinguished." *Id.* at 8:43-46. Therefore, *all pixels*—pixels in areas without details, pixels that form part of details that are only detected, and pixels that form part of details that are distinguished—are classified as either

detected or distinguished. So a "detail" must mean something other than simply a "pixel" that is either "detectable or distinguishable" as asserted by the Petitioner.

Additionally, the '532 patent discloses evaluating details to determine whether they are distinguished based on a comparison to a visual perception threshold:

> Subclass determiner 56 compares each pixel i of each high pass filtered frame HPF-X to its associated [visual perception] threshold THD_i to determine whether or not that pixel is significantly present in each filtered frame where "significantly present" is defined by the [visual perception] threshold level and by the "detail dimension" (i.e. the size of the object or detail in the image of which the pixel forms a part).

Id. at 8:34-41. In other words, it is only *after* the "details" are identified via generation of high pass filtered frames that it is determined whether pixels forming a detail are detected or distinguished (i.e., significantly present, above the visual perception threshold).

The identification of "details" and determination of whether pixels are detected or distinguished are separate operations. And because they are separate operations, Petitioner's proffered definition is overly broad and conflates the identification of details and determination of whether pixels are detected or distinguished.

Additionally, the '532 patent clearly differentiates between a "pixel" and a "detail"—e.g., describing a "detail in the image of which the pixel forms a part," *id.* at 8:40-11, versus "pixels related to the same detail," *id.* at 2:40-41. The distinction between "pixels" and "details" is further confirmed by at least claim 1 of the '532 patent, which recites a "means, utilizing … threshold levels and said detail dimensions, for **associating said pixels** of said video frame **into subclasses**, wherein each subclass includes **pixels related to the same detail** and which generally cannot be distinguished from each other." *Id.* at 12:21-25. Because claim 1 recites both "pixels" and "details" and defines a relationship therebetween, "details" must mean something other than simply "pixels."

Moreover, the Petitioner's definition of "details" conflicts with the disclosure of the '532 patent, which differentiates between "details" and portions of the image "which have no details in them," such as the "background." *Id.* at 5:24-25. In contrast to the assertions of the Petitioner, it is not until the pixels of "details" are compared to their associated visual perception threshold (THD_i) that is it determined whether the "details" are distinguished or merely detected. *E.g.*, *id.* at 8:26-41. Therefore, whether or not a pixel is detectable or distinguishable is not relevant to whether it is part of a "detail."

Based on the above, and consistent with the Specification, the term "details" encompasses "elements of an image composed of pixels that have high frequency

content," such as a horizontal edge, vertical edge, single small detail, very small vertical edge, or very small single detail. This definition of "details" is also consistent with the ordinary and plain meaning of the term "detail." For example, Merriam-Webster's Dictionary defines "detail" as "photography: the small elements of an image corresponding to those of the subject." Ex. 2001, 1. The "elements of an image composed of pixels that have high frequency content," such as a horizontal edge, vertical edge, single small detail, very small vertical edge, or very small single detail are the small elements of an image corresponding to the subject. *See also*, Figure 14 of Ex. 2003, reproduced and discussed in more detail below.

Additionally, as discussed in detail below, Petitioner is inconsistent with its interpretation of "details."

Therefore, Patent Owner's construction of "details" should be adopted.

B. *spatially and temporally separating … details of said frames* encompasses setting apart, isolating, or dividing the spatial details from the frames and setting apart, isolating, or dividing temporal details from the frames

DigiMedia's Construction	Unified's Construction
set apart, isolate, or divide into parts the spatial details from the frame and to set apart, isolate, or divide into parts the temporal details from the frame relative to an earlier frame	analysis to describe spatial and temporal characteristics of pixels on a per pixel basis

Claim 6 recites, "spatially and temporally separating and analyzing details of said frames." Ex. 1001, 12:53-54. Based on the plain language of the claim, claim 6 at least encompasses "spatially and temporally separating … details of said frames."

The '532 patent discloses, "spatial-temporal analyzer 50 generates a plurality of filtered frames from the current frame, each filtered through a different high pass filter (HPF), where each high pass filter retains a different range of frequencies therein." Ex. 1001, 6:30-34. "[A]nalyzer 50 also generates difference frames between the current frame and another, earlier frame." *Id.* at 7:5-6. More specifically, "FIG. 9 generally illustrates the operation of spatial-temporal analyzer 50 and FIGS. 10A and 10B provide one detailed embodiment for the spatial analysis and temporal analysis portions 51 and 53, respectively." *Id.* at 11:53-56.

The specification therefore discloses the extraction of two different types of content from the frames: 1) high frequency filtered frames (spatially separated and analyzed details of frames); and 2) difference frames (temporally separated and analyzed details of frames). In other words, the '532 patent discloses extraction of two sets of particular information contained within the frames.

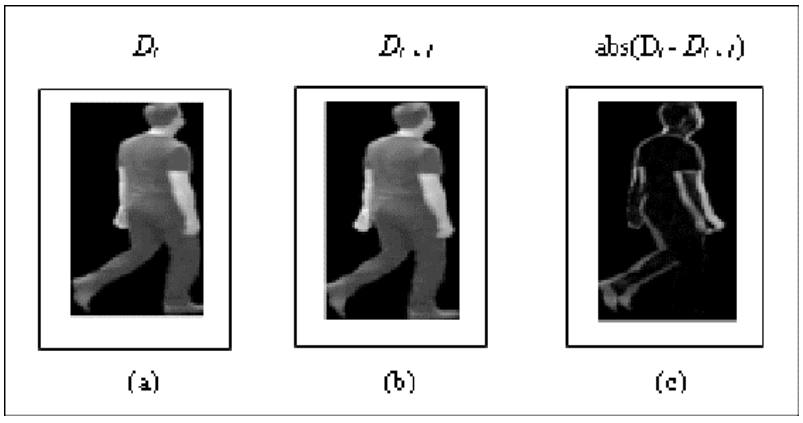
The effect of the generation of filtered frames with different ranges of frequencies is illustrated in Exhibit 2003, MATLAB – Fourier Analysis and Filtering of Images, Laboratory No. 3 Solutions, ECE 447, Fall Course, School of

Electrical and Computer Engineering, Rutgers University, ("High Pass Filtering Examples").[2] As shown in the image below, "Plots of the lena [sic] image subjected to higpass [sic] filtering using a Gaussian highpass filter with cutoff frequencies of 20 (top left image), 50 (top right image), 100 (bottom left image) and 200 (bottom right image)." Ex. 2003, p. 20, Figure 14.

[2] Patent Owner cites this document as an example of the technique for illustrative purposes only, not as evidence of the skill in the art at the time of the invention.

The high pass filtered images are contrasted with the original Lena image, cropped from the top left image of Figure 13. *Id.*, p. 19, Figure 13. As shown in this example, the high pass filtered images separate the high frequency content (e.g., lines or edges) of the subject from the original image. With different frequencies, more or less of the high frequency content (e.g., more or fewer of the lines or edges) of the subject are separated from the original image.

Exhibit 2004 similarly illustrates the effect of the generation of difference frames. Ex. 2004, at 1187:



As shown above, "(a) and (b) are two sequence frames. (c) difference frame of (a) and (b)." Ex. 2004, p. 1187, Figure 2.[3] These examples merely illustrate the different *spatial* and *temporal* separations of frames that can be performed, consistent with the description and use of those terms in the '532 patent.

Patent Owner notes that Merriam-Webster's Dictionary defines "separate" as "1a: to set … apart … 5a: to isolate from a mixture … b: to divide into constituent parts." Ex. 2002, 1.

Based on the disclosure of the '532 patent and consistent with the ordinary meaning of the term "separate," it is clear that "separating" within the context of claim 6 means to set apart, isolate, or divide into parts the spatial details from the frame (e.g., generate one or more high frequency filtered frames) and to set apart, isolate, or divide into parts the temporal details from the frame relative to an earlier frame (e.g., generate a difference frame).

Moreover, it is clear from the plain language of claim 6 that "spatially and temporally separating … details" is performed on a frame basis based on the recitation "of said frames." In other words, the thing from which the "details" are

[3] For additional context, also see a video illustration of difference frames at Richard Almond, *Open CV Processing 2 - Absolute Difference*, VIMEO (June 4, 2009), https://vimeo.com/4998215.

"separated" is "said frames." Such an interpretation is consistent with the disclosure in the '532 patent of the generation of the filtered frames and the difference frames where two sets of information are extracted from a current frame.

Petitioner's expert, Dr. Karam, asserts that "the specification describes how its invention operates on a *per-pixel* basis as opposed to a *per-detail* basis." Ex. 1002 ¶ 29 (citing over three full columns of the '532 patent Specification to support that assertion). However this characterization of the '532 patent is inaccurate.

Patent Owner concedes that *certain* operations are performed on a pixel basis, for example:

- "parameters are determined on a pixel-by-pixel basis," Ex. 1001, 7:13-14;
- The "visual perception threshold THD_i" is determined "per pixel," *Id.* at 8:26-27;
- "Subclass determiner 56 compares each pixel i of each high pass filtered frame HPF-X to its associated threshold THD_i," *Id.* at 8:35-36;
- "Intra-frame processor 44 performs spatial filtering of the frame, where the type of filter utilized varies in accordance with the subclass to which the pixel belongs." *Id.* at 9:13-15; and

- "inter-frame processor 48 determines which pixels have changed significantly from the previous frame and amends those only," *Id.* at 11:2-4.

However, the '532 patent also discloses that **other operations are performed on a *frame* basis**:

- "spatial-temporal analyzer 50 generates a plurality of filtered frames from the current frame," *id.* at 6:30-32;
- "analyzer 50 also generates difference frames between the current frame and another, earlier frame," *id.* at 7:5-6;
- "parameters are determined … on a per frame basis," *id.* at 7:13-14; and
- "the present invention provides a full frame as output," *id.* at 11:1-2.

Petitioner does not set out an explicit interpretation for "spatially and temporally separating and analyzing details of said frames." But as discussed in more detail below, Petitioner's arguments imply an interpretation of "spatially and temporally separating and analyzing details of said frames" that includes analysis to describe spatial and temporal characteristics of pixels *on a per pixel basis*.

Petitioner likely does not set out a specific interpretation for "spatially and temporally separating and analyzing details of said frames" because the interpretation used in its arguments requires *reinterpreting* the term "details" as

"local characteristics of the neighborhood associated with each pixel," Pet. 32, which is inconsistent with its earlier proffered definition, *cf. id.* at 8. This inconsistency is a recurring theme, as the meaning of "details" is similarly warped another time to fit Petitioners interpretation of "subclass," discussed in more detail below.

Nevertheless, an interpretation of "spatially and temporally separating and analyzing details of said frames" to include "analysis to describe spatial and temporal characteristics of pixels on a per pixel basis" is inconsistent with the ordinary meanings of the words and inconsistent with their usage in the '532 patent. Therefore, Patent Owner's construction, which is more consistent with the intrinsic evidence and arguments presented here, should be adopted.

C. *subclass* means an area with pixels related to the same detail which cannot be distinguished from each other

DigiMedia's Construction	Unified's Construction
an area with pixels related to the same detail and which cannot be distinguished from each other	characteristic of a macroblock as containing small, random details or large, connected details

The '532 patent consistently uses the term subclass to refer to an "area[] whose pixels cannot be distinguished from each other." Ex. 1001, 6:3-5; *see also id.* at Abstract ("subclass includes pixels related to the same detail and which generally cannot be distinguished from each other"); 2:36-41 ("The association unit … associate[s] the pixels of the video frame into subclasses. Each subclass

includes pixels related to the same detail and which generally cannot be distinguished from each other."); 8:35-42 (defining "the subclass to which [each] pixel belongs"); 8:55-9:12 ("The output of subclass determiner 56 is an indication of the subclass to which each pixel of the current frame belongs").

"Subclass determiner 56 compares each pixel i of each high pass filtered frame HPF-X to its associated threshold THD_i to determine whether or not that pixel is significantly present in each filtered frame." *Id.* at 8:35-38. As summarized in Table 2, the subclass is determined based on which combination of high pass filtered frames the pixel is significantly present in and includes features such as different types of horizontal edges (subclasses 2, 3), vertical edges (subclasses 4, 7), single small details (subclasses 5, 6, 8, 9), very small single details (subclasses 11, 12), and a very small vertical edge (subclass 10). *Id.* at 8:55-9:10.

Petitioner's expert, Dr. Karam, agrees with this characterization, noting:

> For example, if a pixel is not significantly present in the filtered frames, it belongs to a large detail or one that is "only detected but not distinguished." Or if the pixel is present in all of the filtered frames, then it belongs to a very small single detail.

Ex. 1002 ¶ 34 (citations omitted).

Petitioner does not set out an explicit interpretation for "subclass." As discussed in more detail below, Petitioner's arguments imply an interpretation of

"subclass" to include a characteristic of a macroblock as containing: (1) "small, random details" or (2) "large, connected details." *E.g.*, Pet. 51.

Therefore, according to Petitioner's interpretation, the thing to be classified is a *macroblock*. In contrast, claim 6 of the '532 patent recites, "classifying said frame picture details into subclasses." Ex. 1001, 12:59-60. Petitioner has not presented any arguments for considering the macroblocks of *Chiu* as the claimed "details." Therefore, it is clear that Petitioner's construction is wrong.

Petitioner's interpretation is inconsistent with the definition of "subclass" in the '532 patent as "pixels related to the same detail and which cannot be distinguished from each other" and is inconsistent with Petitioner's own prior interpretations.

Patent Owner's construction should be adopted.

III. INDEPENDENT CLAIM 6 HAS NOT BEEN SHOWN TO BE UNPATENTABLE AS OBVIOUS OVER CHIU AND GU

A. The proposed combination of *Chiu* and *Gu* does not teach or suggests spatially and temporally separating and analyzing details of said frames.

Claim 6 recites, "spatially and temporally separating and analyzing details of said frames." Ex. 1001, 12:53-54. Petitioner asserts that "*Gu* discloses that the [(just-noticeable-distortion)] JND value is generated by spatially and temporally separating and analyzing details." Pet. 29.

Petitioner asserts that "spatially and temporally separating … details of said frames" is taught based on calculating "local characteristics" of individual pixels (e.g., calculating mg(x,y), bg(x,y), and ild(x,y,n) on a pixel basis, which define spatial and temporal characteristics of each pixel based on neighboring pixels). Pet. 32, 36.

While *Gu* provides disclosure of calculating intermediate values that are used in the generation of the JND threshold, nothing is being *separated out* from the frame in either *Chiu* or *Gu*, as required by the claim. In other words, calculating characteristics of pixels based on neighboring pixels as taught by *Gu* is not a disclosure of *separating* pixels from a frame as required under the proper construction of the claim.

As discussed above, "spatially and temporally separating … details of said frames" means setting apart, isolating, or dividing into parts the spatial details of frames and setting apart, isolating, or dividing into parts the temporal details of frames relative to an earlier frame. See Section II.C, above. Additionally, "details" means elements of an image composed of pixels that have high frequency content. See Section II.B, above.

For example, the '532 patent discloses generating "a plurality of filtered frames from the current frame, each filtered through a different high pass filter (HPF), where each high pass filter retains a different range of frequencies therein."

Ex. 1001, 6:31-34. "[A]nalyzer 50 also generates difference frames between the current frame and another, earlier frame." *Id.* at 7:5-6.

Neither *Chiu* nor *Gu* provide any teaching of setting apart, isolating, or dividing into parts the spatial elements of an image composed of pixels that have high frequency content of frames and setting apart, isolating, or dividing into parts the temporal elements of an image composed of pixels that have high frequency content of frames relative to an earlier frame. Additionally, neither Petitioner nor its expert have asserted that *Chiu* nor *Gu* provide any such disclosure.

Instead, Petitioner asserts, "*Gu* discloses that the [(just-noticeable-distortion)] JND value is generated by spatially and temporally separating and analyzing details." Pet. 29. Dr. Karam describes that the JND value is generated based on local characteristics of the neighborhood associated with each pixel:

> JND generation [of *Gu*] spatially and temporally separates and analyzes details as it … **describes pixels based on the local characteristics of the neighborhood associated with each pixel** using spatial texture characteristics due to local luminance changes, spatial average background luminance, and temporal characteristics due to intensity changes between frames.

Ex. 1002 ¶ 76 (colorization omitted).

Dr. Karam also describes how *Gu* calculates the JND for each pixel based on calculations of mg(x,y), bg(x,y), which are calculations of characteristics of pixels

in the spatial domain and ild(x,y,n), which is a calculation of temporal characteristics of pixels. *See, e.g.*, Ex. 1002 ¶¶ 78-83:

> To summarize, mg(x,y) and bg(x,y) filter the pixel information in each video frame with respect to its visual characteristics 'in the spatial domain,' while ild(x,y,n) filters the pixel information in each video frame with respect to its temporal characteristics. A POSA would have understood these functions to be forms of **separating details because they relate neighboring pixels to one another**, both within the frame to which they belong and between frames."

Ex. 1002 ¶ 84 (citations and colorization omitted).

But Dr. Karam shifts between characterizing the JND calculations as a description of "pixels based on the local characteristics of the neighborhood associated with each pixel" (*Id.* ¶ 76) to a characterization that "these functions [are] forms of separating details because they relate neighboring pixels to one another." (*Id.* ¶ 84). As discussed above, calculating characteristics of pixels based on neighboring pixels is not a disclosure of separating pixels from a frame—as claim 6 requires. Moreover, even if Petitioner's construction of "details" were adopted, the calculation of the JND is not a disclosure of *separating* "details" ("a pixel or group of pixels that is detectable or distinguishable by the human visual system", according to Petitioner) of a frame, spatially and temporally.

Petitioner is taking a position that the thing to be separated are calculations of "local characteristics of the neighborhood associated with each pixel." Pet. 32. More specifically, Petitioner asserts that *Gu* teaches the claim by disclosing calculating mg(x,y), bg(x,y) and ild(x,y,n). Pet. 36. In other words, Petitioner takes the position that the thing that is being separated is the calculation of mg(x,y), bg(x,y), and ild(x,y,n) on a pixel-by-pixel basis. Therefore, Petitioner is reinterpreting "details" to mean the calculation of mg(x,y), bg(x,y), and ild(x,y,n). Recall that Petitioner has already taken the position that "details" are "a pixel or a group of pixels that is detectable or distinguishable by the human visual system." Pet. 8. Therefore, Petitioner is internally inconsistent in its interpretation "details," and its interpretations should not be adopted.

More to the point, Petitioner's interpretation is not consistent with the plain language of claim 6, which recites, "separating … details of said frames." As discussed above, Petitioner takes an interpretation that the thing from which the "details" (e.g., "local characteristics of the neighborhood associated with each pixel") are "separated" are *pixels* as opposed to *frames*. That is not what the claim plainly requires. The "local characteristics" of a pixel are not separated "details of said frames," as claimed.

Simply calculating "local characteristics of the neighborhood associated with each pixel" is not the same as setting apart, isolating, or dividing into parts the

spatial details of frames or setting apart, isolating, or dividing into parts the temporal details of frames relative to an earlier frame, as claimed.

Thus, Petitioner has not shown by a preponderance of the evidence that the proposed combination meets or renders obvious all the limitations of claim 6.

B. The proposed combination of *Chiu* and *Gu* does not teach or suggests classifying said frame picture details into subclasses in accordance with said visual perception thresholds and said detail parameters.

Claim 6 also recites, "classifying said frame picture details into subclasses in accordance with said visual perception thresholds and said detail parameters." Ex. 1001, 12:59-61.

According to the Petitioner, "In the proposed combination, the improved process classifies the details in the macroblocks into small, random details (subclass 1) and large, connected details (subclass 2)." Pet. 51. Specifically, Dr. Karam notes that *Chiu* discloses whether a particular macroblock is encoded based on a number of surviving pixels in the macroblock after a comparison of the difference frame value of a pixel to the visual perception threshold:

> For each pixel, the δ-function test compares the value of the difference frame ($|p(x, y, \mathrm{n}) - p(x, y, n-1)|$) to the visually perceptible threshold value T ($\mathrm{JND}_{S-T}(x, y, n) + C * Q\mathrm{P}$). If the value of the difference frame is above the threshold, it is assigned a 1; and if it is below the threshold, it is assigned a 0. *Chiu* further discloses that

> "the number of surviving pixels' in a particular macroblock, i.e., the number of pixels assigned with the value 1, 'are compared with the decision value n to determine whether [the] particular macroblock is to be encoded or not."

Ex. 1002 ¶ 111 (citations omitted, alteration in original). Dr. Karam then quotes *Chiu* for disclosing dividing macroblocks into "multiple sub-blocks." *Id.* (merely copying most of the text of Ex. 1005, 11:1-38).

Dr. Karam then concludes that *Chiu* discloses determining whether surviving pixels in a macroblock are large, connected details or small, random details based on analysis of the sub-blocks:

> As annotated in the orange boxes and as understood by a POSA, if all the sub-blocks in a particular macroblock have likely connected surviving pixels (i.e., details), the surviving pixels (i.e., details) in the macroblock form large, connected details; otherwise, the surviving pixels (i.e., details) in the macroblock are small, random details.

Ex. 1002 ¶ 113.

Note that Petitioner and Dr. Karam have again reinterpreted "details" as "surviving pixels" following a comparison of a difference frame value to the visual perception threshold. Yet again, Petitioner's interpretation of "details" is contrary to the plain and ordinary meaning of the term in light of the disclosure of the '532 patent, as discussed above.

Whereas Petitioner previously interpreted "details" as the thing that was analyzed in order to *generate* the visual perception threshold (e.g., calculating mg(x,y), bg(x,y), and ild(x,y,n) in order to generate the just-noticeable-distortion (JND) value), now the Petitioner and Dr. Karam are interpreting "details" as the thing that is the result of a comparison *using* the visual perception threshold (e.g., surviving pixels). Neither *Chiu* nor *Gu* disclose or teach classifying the calculations of mg(x,y), bg(x,y), and ild(x,y,n) "into *subclasses* in accordance with said visual perception thresholds," as claimed. Nor do Petitioner nor Dr. Karam assert that this is taught by the prior art.

Petitioner has adopted the position that a subclass is a characteristic of a macroblock as containing small, random details (subclass 1) or large, connected details (subclass 2) as determined based on a number of surviving pixels following a comparison to a visual perception threshold. Such an interpretation is clearly contrary to the definition of "subclass" in the '532 patent—"an area with pixels related to the same detail and which generally cannot be distinguished from each other." See Section II.C, above. For example, while *Chiu* may disclose identifying macroblocks with large, connected details, *Chiu* does not disclose that the large, connected details in macroblocks, any other pixels in the macroblocks, or the macroblocks themselves are an area with pixels "related to the same detail" and "cannot be distinguished from each other."

In contrast, the "subclasses" in the claims are "an area with pixels related to the same detail and which generally cannot be distinguished from each other." Section II.C, above. And subclasses in the '532 patent are determined based on which combination of high pass filtered frames the pixel is significantly present in, as summarized in Table 2. *Id.* at 8:55-9:10. For example, the '532 patent discloses subclasses as different types of horizontal edges (subclasses 2, 3), vertical edges (subclasses 4, 7), single small details (subclasses 5, 6, 8, 9), very small single details (subclasses 11, 12), and a very small vertical edge (subclass 10). *Id.*

Because *Chiu* and *Gu*, alone or in combination, do not disclose classifying frame picture details into subclasses, as those terms are used in the '532 patent, Petitioner has not shown by a preponderance of the evidence that the proposed combination renders claim 6 obvious.

C. Claim 16 has not been shown to be unpatentable as obvious based on its dependency from claim 6

Petitioner also challenges claim 16 as obvious over *Chiu* and *Gu*. Patent Owner responds that claim 16 has not been shown to be obvious over these references for the same reasons as claim 6, from which claim 16 depends. Patent Owner does not oppose Petitioner's request to consider whether claim 16 is obvious over the cited references under the holding of *Fitbit*. *See* Pet. 66–67;

Decision to Institute, Paper 7, 21.[4] But Patent Owner presents no further arguments for claim 16 in response to the obviousness challenge in the Petition.

IV. CONCLUSION

Because of the deficiencies identified above, Petitioner cannot carry its burden to show that any of the challenged claims are unpatentable. The Board should deny the Grounds of the Petition.

Respectfully submitted,

/Warren Thomas/
Warren J. Thomas (Reg. No. 70,581)

[4] Because the '532 patent has expired, Patent Owner has not filed a motion to amend to correct any "perceived violation" of § 112, as suggested by the Board's Institution Decision.

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4) and consent of the Petitioner, I certify that on April 28, 2023, a copy of Patent Owner's Response and accompanying exhibits was served on the counsel of record by email to:

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CERTIFICATION OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner certifies that the foregoing Patent Owner's Preliminary Response contains 5790 words, inclusive of all content in this paper.

/Warren Thomas/
Warren J. Thomas (Reg. No. 70,581)