

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

HEALTH DISCOVERY CORPORATION,
Patent Owner.

IPR2021-00551
Patent 7,542,959 B2

Before LYNNE H. BROWNE, GARTH D. BAER, and FREDERICK C.
LANEY, *Administrative Patent Judges*.

Opinion for the Board filed PER CURIAM.

Opinion Dissenting filed by *Administrative Patent Judge* BAER.

PER CURIAM.

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

I. INTRODUCTION

Intel Corp. (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1, 5, 6, 10, 12, and 16 (the “challenged claims”) of U.S. Patent 7,542,959 B2 (Ex. 1001, the “’959 patent”) pursuant to 35 U.S.C. § 311 *et seq.* Paper 3 (“Petition” or “Pet.”). Health Discovery Corp. (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”).

Institution of an *inter partes* review is authorized by statute when “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.” 35 U.S.C. § 314(a); *see* 37 C.F.R. § 42.108. For the reasons discussed below, we deny the Petition and do not institute *inter partes* review.

A. RELATED MATTERS

The parties identify the following related proceeding involving the ’959 patent: *Health Discovery Corp. v. Intel Corp.*, Civil Action No. 6:20-cv-666 (W.D. Texas July 23, 2020). *See* Pet. 80; Paper 4, 2.

B. THE ’959 PATENT

The ’959 patent addresses using Support Vector Machines (SVM) to rank the features according to classifier weights, where features having the smallest weight values are removed and a new SVM is trained with the remaining weights to determine how their removal affects the value of the classifier weights. Ex. 1001, code (57). This process is repeated until a subset of features remain that is capable of accurately separating the data into different patterns or classes, which may be used to accurately distinguishing between medical conditions. *Id.* Figure 2 is reproduced below.

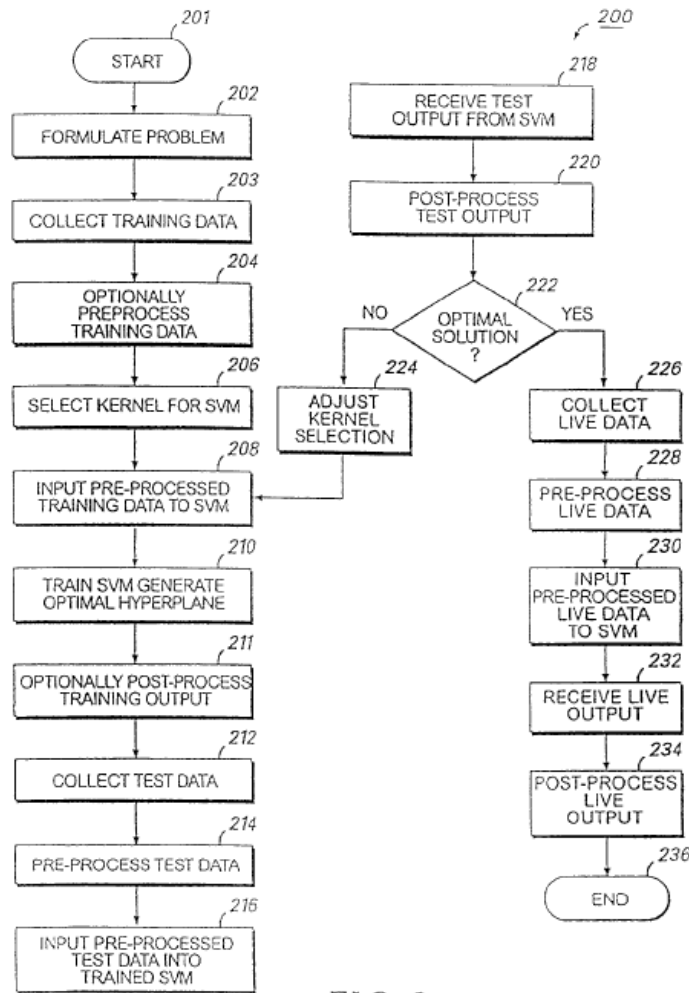


FIG. 2

Figure 2 is a flowchart illustrating an example method for increasing knowledge that may be discovered using a learning machine. *Id.* at 7:60–62. As shown in Figure 2, the SVM is trained using training data to generate an optimal hyperplane. *Id.* at 16:51–17:4. Test data is input into the trained SVM “to determine whether the SVM was trained in a desirable manner.” *Id.* at 16:11–13. If not, the kernel selection is adjusted at step 224 and the training process is repeated from step 208. *Id.* at 16:47–57. After the optimal kernel is selected, the SVM is further optimized through feature selection to reduce the dimensionality of feature space. *See id.* at 26:20–33. The ’959 patent uses RFE, where the feature corresponding to the smallest

weight in the new classifier is eliminated and, at each iteration, a new classifier is trained with the remaining features. *Id.* at 52:52–64.

C. ILLUSTRATIVE CLAIM

Petitioner challenges claims 1, 5, 6, 10, 12, and 16 of the '959 patent.

Pet. 1. Challenged claims 1, 12, and 16 are independent. Claim 1 is reproduced below.

1. A computer-implemented method for predicting patterns in biological data, wherein the data comprises a large set of features that describe the data and a sample set from which the biological data is obtained is much smaller than the large set of features, the method comprising:
identifying a determinative subset of features that are most correlated to the patterns comprising:
 - (a) inputting the data into a computer processor programmed for executing support vector machine classifiers;
 - (b) training a support vector machine classifier with a training data set comprising at least a portion of the sample set and having known outcomes with respect to the patterns, wherein the classifier comprises weights having weight values that correspond to the features in the data set and removal of a subset of features affects the weight values;
 - (c) ranking the features according to their corresponding weight values;
 - (d) removing one or more features corresponding to the smallest weight values;
 - (e) training a new classifier with the remaining features;
 - (f) repeating steps (c) through (e) for a plurality of iterations until a final subset having a pre-determined number of features remains; and

generating at a printer or display device a report comprising a listing of the features in the final subset, wherein the final subset comprises the determinative subset of features for determining biological characteristics of the sample set.

Ex. 1001, 62:6–35.

D. ASSERTED GROUNDS OF UNPATENTABILITY

Petitioner asserts the following grounds of unpatentability. Pet. 4. Petitioner submits the Declaration of Dr. Theodoros Evgeniou (Ex. 1003) in support of its arguments.

Claims Challenged	35 U.S.C. § ¹	References/Basis
1, 5, 6, 10, 12, 16	103	Mukherjee ² , Platt ³
1, 5, 6, 10, 12, 16	103	Mukherjee, Platt, Kohavi ⁴

II. DISCUSSION

A. LEVEL OF SKILL IN THE ART

Petitioner contends a person of ordinary skill in the art at the time of the alleged invention of the '959 patent (a “POSITA”) would have had “at least a Master’s degree in electrical engineering, computer science, or the equivalent with three years of experience in machine learning and data-analysis techniques.” Pet. 22 (citing Ex. 1003 ¶ 15). Further, “[a]dditional

¹ The Leahy-Smith America Invents Act (“AIA”) amended 35 U.S.C. § 103. See Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011). As the application that issued as the '959 patent was filed before the effective date of the relevant amendments, the pre-AIA version of § 103 applies.

² Mukherjee et al., “Support Vector Machine Classification of Microarray Data,” Technical Report C.B.C.L. Paper No. 182, A.I. Memo No. 1677, M.I.T. (1998) (Ex. 1005, “Mukherjee”).

³ US 6,327,581, Dec. 4, 2001 (Ex. 1006, “Platt”).

⁴ Kohavi et al., “Wrappers for Feature Subset Selection,” Artificial Intelligence 97, 273-324 (1997) (Ex. 1007, “Kohavi”).

education could substitute for professional experience, and vice versa.” *Id.* Patent Owner does not contest that a skilled artisan would have this kind of background knowledge and experience; nor does Patent Owner suggest that Petitioner’s proposed level of skill leads to an improper understanding of the prior art or an improper patentability analysis. *See generally* Prelim. Resp. At this stage in the proceeding, we adopt Petitioner’s articulation of the level of ordinary skill in the art, which is supported by Dr. Evgeniou’s testimony and appears commensurate with the level of ordinary skill as reflected in the asserted prior art and the ’959 patent.

B. CLAIM CONSTRUCTION

We find no claim terms require express construction for us to determine whether or not to institute *inter partes* review. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

C. UNPATENTABILITY ANALYSIS

1. Obviousness over Mukherjee and Platt

Petitioner asserts that claims 1, 5, 6, 10, 12, and 16 would have been obvious over Mukherjee and Platt. Pet. 22–61. As explained below, we find Petitioner has not shown a reasonable likelihood that it would prevail in its obviousness challenge based on Mukherjee and Platt.

a. Summary of Mukherjee (Ex. 1005)

Mukherjee, titled “Support Vector Machine Classification of Microarray Data” describes applying Support Vector Machines (SVMs) to a classification of DNA microarray data samples. Ex. 1005, Abstract. In

addition to its SVM disclosure, Mukherjee describes performing feature selection using an iterative algorithm that is based in part on optimized pattern weight values. Ex. 1005, 5; *see* Ex. 1003 ¶ 91 n.13.

b. Summary of Platt (Ex. 1006)

Platt is titled “Methods and Apparatus for Building a Support Vector Machine Classifier.” Ex. 1006, code (54). Platt describes classifying objects using support vector machines. *Id.* at 1:15–17.

c. Feature Weights

Independent claims 1, 12, and 16 recite the iterative calculation and use of feature weights. Claim 1, for example, recites “(b) . . . wherein the classifier comprises weights having weight values that correspond to the features in the data set and removal of a subset of features affects the weight values; (c) ranking the features according to their corresponding weight values; (d) removing one or more features corresponding to the smallest weight values; . . . [and] (f) repeating steps (c) through (e) for a plurality of iterations until a final subset having a pre-determined number of features remains” Claims 12 and 16, the other challenged independent claims, have parallel language requiring the iterative calculation and use of feature weights. According to Petitioner, Mukherjee teaches feature weight calculation because “Mukherjee’s decision function includes variables x (i.e., training patterns) [and] α (weight value for each pattern).” Pet. 39 (quoting Ex. 1003 ¶ 138). Further, “[i]n comparison to the decision function in primal form, $D(x) = \mathbf{w} \cdot \mathbf{x} + b$, Mukherjee’s decision function is presented in ‘dual’ space, where the ‘primal’ space weight vector $\mathbf{w}$ is replaced by the summation of individual patterns (observations/samples) x_k with corresponding pattern weight values α_k .” *Id.* Thus, according to

Petitioner, “Mukherjee’s linear SVM therefore either (a) discloses ‘*weights having weight values that correspond to the features*’ or (b) renders the limitation obvious to try as there are only two known alternative representations (‘primal’ and ‘dual’) for the decision function.” *Id.* at 40.

Patent Owner contends that Mukherjee does not teach the claimed feature weights because Mukherjee instead “only computes *pattern* weights, expressed as α s.” Prelim Resp. 23. We agree with Patent Owner that Petitioner has not adequately bridged the gap between the claimed feature weight and Mukherjee’s pattern weight. Although Petitioner’s expert contends that feature weight and pattern weight “are equivalent,” he implicitly concedes they are not in his additional assertion that they are “related and can be derived from one another.” *See* Ex. 1003, 53 n.13. We are also not persuaded by Petitioner’s argument that “a relationship exists between feature weight vectors, $\mathbf{w}$, and pattern weight vectors, α , such that one can be mathematically derived and calculated from the other.” Pet. 39. Even if correct, Petitioner’s argument falls short because Petitioner offers no explanation as to why a skilled artisan would have done so. As Patent Owner notes, “a conclusion of obviousness is not dependent upon what a person of ordinary skill in the art *could* do, but rather what the hypothetical individual *would* do, and there was no motivation for Mukherjee or any person of ordinary skill in the art to [compute feature weights].” Prelim. Resp. 24. In short, we find that Petitioner has not produced the required “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Therefore, Petitioner has not shown a reasonable likelihood that it would prevail in establishing independent claims 1, 12, or

16 (or claims 5, 6, and 10 that depend from those claims) would have been obvious over the asserted combinations involving Mukherjee and Platt.

2. Petitioner's Additional Obviousness Grounds Involving Kohavi

Petitioner asserts that claims 1, 5, 6, 10, 12, and 16 would have been obvious over combinations involving Mukherjee, Platt, and Kohavi. Pet. 61–75. Petitioner's alternative inclusion of Kohavi in its prior art combination does not remedy the deficiency outlined above related to the claimed feature weight. *See id.* at 61–62 (explaining that Petitioner includes Kohavi only to address “the ‘repeating’ limitations”). Therefore, Petitioner has also not shown a reasonable likelihood that it would prevail in establishing claims 1, 5, 6, 10, 12, and 16 would have been obvious over combinations involving Mukherjee, Platt, and Kohavi.

III. CONCLUSION

For the foregoing reasons, we determine that the information presented in the Petition does not establish a reasonable likelihood that Petitioner would prevail in showing claims 1, 5, 6, 10, 12, and 16. We therefore do not institute an *inter partes* review of claims 1, 5, 6, 10, 12, and 16.

IV. ORDER

Accordingly, it is:

ORDERED that the Petition is denied as to the challenged claims of the '959 patent; and

FURTHER ORDERED that no *inter partes* review is instituted.

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LANEY, *Administrative Patent Judges*.

BAER, *Administrative Patent Judge*, dissenting.

I respectfully dissent from the majority’s decision denying institution of *inter partes* review. Although Mukherjee uses pattern weight instead of the claimed feature weight, Petitioner’s expert, Dr. Evgeniou, explains that pattern weight and feature weight are related—feature weight ($\mathbf{w}$), used in primal space, is replaced with pattern weight (α) in dual space representations. Ex. 1003 ¶¶ 48, 138. Dr. Evgeniou further explains that “a relationship exists between the feature weight vectors, $\mathbf{w}$, and the pattern weight vectors, α , such that one can be mathematically derived and

calculated from the other.” *Id.* ¶ 139. Last, according to Dr. Evgeniou, “there are only two known alternative representations (‘primal’ and ‘dual’) for the decision function.” *Id.* In light of that uncontested testimony, *see* Prelim. Resp. 22–29, I agree with Petitioner that “Mukherjee’s linear SVM . . . renders the [feature-weight] limitation obvious to try.” Pet. 38–40 (citing Ex. 1003 ¶¶ 137–139); *see KSR*, 550 U.S. at 402 (explaining that “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp”).

For the foregoing reasons, in my opinion, Petitioner has shown a reasonable likelihood of prevailing in showing the unpatentability of at least one of the challenged claims of the ’959 patent.

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