

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

HEALTH DISCOVERY CORPORATION,
Patent Owner.

IPR2021-00555
Patent 10,402,685 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 1–23 (the “challenged claims”) of U.S. Patent 10,402,685 B2 (Ex. 1001, the “’685 patent”) pursuant to 35 U.S.C. § 311 *et seq.* Paper 2 (“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 ’685 patent: *Health Discovery Corp. v. Intel Corp.*, Civil Action No. 6:20-cv-666 (W.D. Texas July 23, 2020). *See* Pet. 8; Paper 3, 2.

B. THE ’685 PATENT

The ’685 patent addresses identifying a determinative subset of features from within a group of features by training a support vector machine (SVM) using training samples with class labels to determine a value of each feature. Ex. 1001, code (57). Features with the smallest values are removed and an updated kernel matrix is generated. *Id.* The process is repeated until a predetermined number of features remain that can accurately separate data into different classes. *Id.*

Figure 2 is reproduced below.

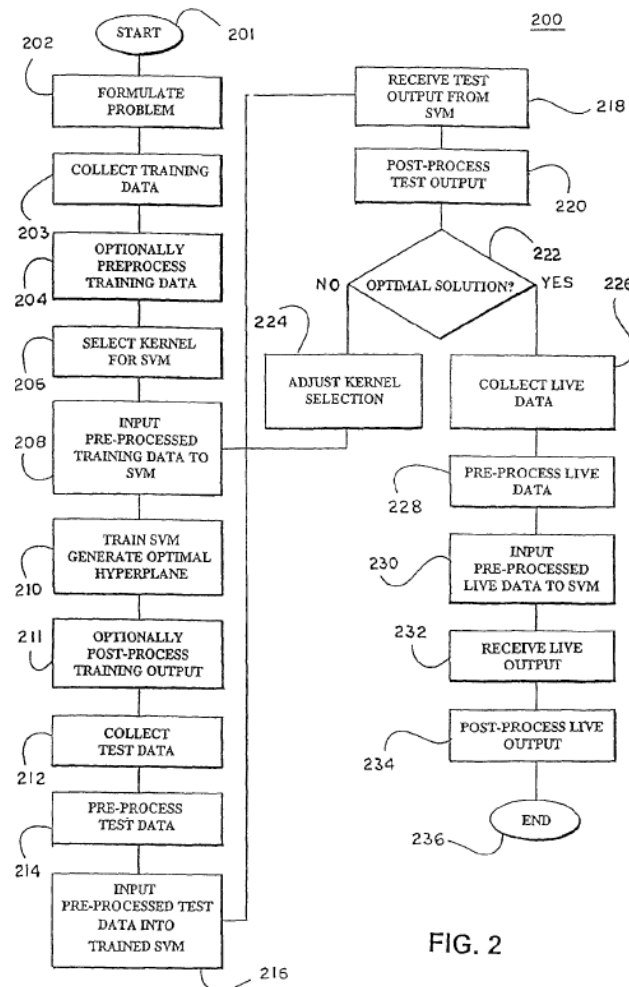


FIG. 2

Figure 2 is a flowchart illustrating an example method for increasing knowledge that may be discovered using a support vector machine. *Id.* at 5:6–8. As shown in Figure 2, the SVM is trained using training data to generate an optimal hyperplane. *Id.* at 9:61–10:18. Test data is input into the trained SVM “to determine whether the SVM was trained in a desirable manner.” *Id.* at 10:26–28. If not, the kernel selection is adjusted at step 224 and the training process is repeated from step 208. *Id.* at 10:61–11:4. After the optimal kernel is selected, the SVM is further optimized through feature selection to reduce the dimensionality of feature space. *See id.* at 2:37–39, 15:48–57. The ’685 patent uses recursive feature elimination (RFE), where

one or more features are removed at each iteration and a new classifier is trained with the remaining features. *Id.* at 14:61–64, 17:4–9.

C. ILLUSTRATIVE CLAIM

Petitioner challenges claims 1–23 of the '685 patent. Pet. 1. Challenged claims 1, 7, 12, and 18 are independent. Claim 1 is reproduced below.

1. A method, comprising:
 - retrieving training data from one or more storage devices in communication with a processor, the processor operable for:
 - determining a value for each feature in a group of features provided by the training data;
 - eliminating at least one feature with a minimum ranking criterion from the group, wherein the minimum ranking criterion is obtained based on the value for each feature in the group;
 - subtracting a matrix from the kernel data to provide an updated kernel data, each component of the matrix comprising a dot product of two of training samples provided by at least a part of the training data that corresponds to the eliminated feature;
 - updating the value for each feature of the group based on the updated kernel data;
 - repeating of eliminating the at least one feature from the group and updating the value for each feature of the group until a number of features in the group reaches a predetermined value to generate a feature ranking list; and
 - recognizing a new data corresponding to the group of features with the feature ranking list.

Ex. 1001, 71:56–72:12.

D. ASSERTED GROUND OF UNPATENTABILITY

Petitioner asserts the following ground 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
1–23	103	Mukherjee ² , Bradley ³ , Cortes 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 '685 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. 20 (citing Ex. 1003 ¶ 15). Further, “[a]dditional 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

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 '685 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 Bradley, Paul, “Mathematical Programming Approaches to Machine Learning and Data Mining,” University of Wisconsin-Madison (Aug. 27, 1998) (Ex. 1015, “Bradley”).

⁴ Cortes, C., et al, “Support-Vector Networks,” *Machine Learning*, 20, 273–297 (1995) (Ex. 1011, “Cortes”).

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 ’685 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

Petitioner asserts that claims 1–23 would have been obvious over Mukherjee, Bradley, and Cortes. Pet. 20–78. As explained below, we find Petitioner has not shown a reasonable likelihood that it would prevail in its obviousness challenge based on Mukherjee, Bradley, and Cortes.

1. 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.12.

2. Summary of Bradley (Ex. 1015)

Bradley is titled “Mathematical Programming Approaches to Machine Learning and Data Mining,” and describes various “mathematical programming approaches to supervised and unsupervised machine learning problems.” Ex. 1015, 1.

3. Summary of Cortes (Ex. 1011)

Cortes is titled “Support-Vector Networks.” Ex. 1011, 1. Cortes describes a “new learning machine for two-group classification problems.” classifying objects using support vector machines. *Id.*

4. Feature Values

Independent claims 1, 7, 12, and 18 recite the iterative determination and use of feature values. Claim 1, for example, recites “determining a value for each feature in a group of features provided by the training data; eliminating at least one feature with a minimum ranking criterion . . . updating the value for each feature of the group . . . [and] repeating of eliminating the at least one feature from the group and updating the value for each feature of the group until a number of features in the group reaches a predetermined value . . .” Ex. 1001, 71:60–72:9. Claims 7, 12, and 18, the other challenged independent claims, have similar language requiring the iterative determination and use of feature values. Ex. 1001, 72:41–59, 73:17–33, 74:18–32. According to Petitioner, Mukherjee teaches feature value determination because “Mukherjee’s decision function includes variables x (training patterns) [and] α (weight value for each pattern).” Pet. 35 (quoting Ex. 1003 ¶ 130). Further, “[i]n comparison to the ‘primal’ space decision function $D(x) = \mathbf{w} \cdot \mathbf{x} + b$, Mukherjee’s decision function is presented in ‘dual’ space, where the ‘primal’ weight vector $\mathbf{w}$ is replaced by

the summation of 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 ‘*determining a value [(w)] for each feature [(x)] in a group of features provided by the training data*’ 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 36.

Patent Owner contends that Mukherjee does not teach the claimed feature values because Mukherjee instead “only computes *pattern* weights, expressed as α s.” Prelim Resp. 27. We agree with Patent Owner that Petitioner has not adequately bridged the gap between the claimed feature values and Mukherjee’s pattern weights⁵. 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, 91 n.12. We are also not persuaded by Petitioner’s argument that “a relationship exists between feature weight vectors, w , and pattern weight vectors, α , such that one can be mathematically derived and calculated from the other.” Pet. 35. 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 [determine feature weight values].”

⁵ Neither party distinguishes *weights* from *values*. Rather, the parties’ dispute centers on whether Mukherjee’s *pattern* weight/value teaches the claimed *feature* weight/value. *See* Prelim Resp. 25–33; Paper 15, 4–7.

Prelim. Resp. 27–28. 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, 7, 12, or 18 (or claims 2–6, 8–11, 13–17, and 19–23, which depend from those claims) would have been obvious over the asserted combination of Mukherjee, Bradley, and Cortes.

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 1–23 are unpatentable. We therefore do not institute an *inter partes* review of claims 1–23.

IV. ORDER

Accordingly, it is:

ORDERED that the Petition is denied as to the challenged claims of the ’685 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* weights instead of the claimed *feature* values, 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, 130. Dr. Evgeniou further explains 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.” *Id.* ¶ 131. Last, according to Dr. Evgeniou, “there are only two known alternative representations (‘primal’ and ‘dual’) for the decision function.” *Id.* ¶ 132. In light of that uncontested testimony, *see* Prelim. Resp. 25–33, I agree with Petitioner that “Mukherjee’s linear SVM . . . renders the [feature-value] limitation obvious to try.” Pet. 34 (citing Ex. 1003 ¶ 132); *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 in the art 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 ’685 patent.

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PETITIONER:

Lori Gordon
Lauren May Eaton
PERKINS COIE LLP
Gordon-ptab@perkinscoie.com
Eaton-ptab@perkinscoie.com

PATENT OWNER:

Tarek Fahmi
Jonathan Tsao
ASCENDA LAW GROUP, PC
tarek.fahmi@ascendalaw.com
jonathan.tsao@ascendalaw.com

Eleanor Musick
MUSICK DAVISON LLP
eleanor@mdiplaw.net