

# Machine Learning Tech Remains A Challenge In Patent Claims

Support vector machine-recursive feature elimination, or SVM-RFE, is a technology that can be used to find relevant patterns in a large dataset, such as the data generated in the sequencing of genomes and production of smaller subsets.

In *Health Discovery Corp. v. Intel Corp.*,<sup>[1]</sup> the patent owner HDC, in its complaint for infringement, discussed the innovative aspects of the technology:

Support Vector Machine — Recursive Feature Elimination ("SVM-RFE") is an application of SVM that was invented by Dr. Weston and Dr. Guyon as members of HDC's science team, to find discriminate relationships within clinical datasets, as well as within gene expression and proteomic datasets created from micro-arrays of tumor versus normal tissues. In general, SVMs identify patterns — for instance, a biomarker/genetic expression signature of a disease. The SVM-RFE utilizes this pattern recognition capability to identify, rank and order the features that contribute most to the desired results, and successively eliminate the features with the lowest rank order, until the optimal feature set is obtained to define the model.

However, in his Dec. 27 opinion, U.S. District Judge Alan Albright of the [U.S. District Court for the Western District of Texas](#) stated that the patent claim reciting the pattern recognition method would "merely improve or 'enhance' an abstract idea"<sup>[2]</sup> and satisfy step one of the two-step framework set forth in the [U.S. Supreme Court's](#) 2014 *Alice Corp. v. CLS Bank International* decision — meaning it is directed to the judicial exception of abstract idea.<sup>[3]</sup>

Judge Albright analyzed whether the claim is directed to a "specific means or method that improves [that] relevant technology."<sup>[4]</sup> The claim would be found eligible in Alice step one if it is directed to "improvements to the functioning of a computer or network."<sup>[5]</sup>

However, looking at representative claim 1 of U.S. Patent No. [7,177,188](#), Judge Albright stated that "the claims here merely produce data with improved quality relative to that produced by conventional mathematical methods."<sup>[6]</sup>

The relevant technology that is improved is an abstract, mathematical method, and the improvement is not tied to the physical,<sup>[7]</sup> which was the distinction over cases such as *McRO Inc. v. Bandai Namco Games America Inc.* in the [U.S. Court of Appeals for the Federal Circuit](#).

In *McRO*, the improvement was "allowing computers to produce 'accurate and realistic lip synchronization and facial expressions in animated characters.'"<sup>[8]</sup>

Claim 1 is reproduced below:

1. A computer implemented method for identifying patterns in data, the method comprising:

(a) Inputting into at least one support vector machine of a plurality of support vector machines a training set having known outcomes, the at least one support vector machine comprising a decision function having a plurality of weights, each having a weight value, wherein the training set comprises features corresponding to the data and wherein each feature has a corresponding weight;

(b) Optimizing the plurality of weights so that classifier error is minimized;

(c) Computing ranking criteria using the optimized plurality of weights;

(d) Eliminating at least one feature corresponding to the smallest ranking criterion;

(e) Repeating steps (a) through (d) for a plurality of iterations until a subset of features of pre-determined size remains; and

(f) Inputting into the at least one support vector machine a live set of data wherein the features within the live set are selected according to the subset of features.

Alice step two did not save the claim, either, as the inventive concept was lacking. Judge Albright cited the 2021 *In re: Board of Trustees of Leland Stanford Junior University*, or *Stanford II*, decision, below, in the Federal Circuit:

That a specific or different combination of mathematical steps yields more accurate [data] than previously achievable under the prior art is not enough to transform the abstract idea in claim 1 into a patent eligible application.[9]

In other words, the claim was not sufficient to move "the claims out of the realm of abstract ideas." [10]

Based on Judge Albright's analysis in Alice step one, the claim should have been drafted to involve improvement tied to something physical, not improvement in an abstract idea itself or a mathematical method.

In the Alice step one analysis, as noted above, Judge Albright ultimately found the facts of the case analogous to those of *Stanford II*, and in the 2018 *SAP v. InvestPic LLC* Federal Circuit decision, and stated:

In *Stanford II*, *SAP*, and the instant Action, the patents' written description characterizes conventional systems as invoking mathematical analyses that the claimed inventions merely improve.[11]

Judge Albright also found the present facts different than those of *McRO*, [12] as well the 2017 *Thales Visionix Inc. v. U.S.* decision in the Federal Circuit, [13] which were found to have improvements tied to the physical.

As stated by the court:

McRO's invention was directed to the display of "animated characters on screens for viewing by human eyes ... In Thales, the invention used mathematics to improve a "physical tracking system." [14]

Recently, HDC refiled its infringement lawsuit against Intel [15] since the dismissal in the instant case was without prejudice. While this is being litigated at the district court level, if this case ends up before the Federal Circuit, it should put all artificial intelligence-based pattern recognition developers on notice.

One takeaway from this opinion that is significant to this particular field of AI is that the court has viewed the field of SVM-RFE itself as a mathematical concept.

The court pointed out that the written description explained the conventional methods and contrasted with the claimed method which "ranks and eliminates features using SVM-RFE, a purportedly novel but nevertheless mathematical technique." [16]

There are many significant innovations where mathematical concepts form the basis of the technology. Video encoding and data encryption are just two examples that come to mind.

In those situations, improvement to the underlying math results in a tangible improvement in the real world, such as improved video quality or increased security. So the question an inventor must grapple with is what are the extra details that make math-driven innovations patent-eligible?

Here, in the court's view, requiring the math technique to apply to a particular type of input data such as gene expression data or biologic data would not make a difference. [17]

This portion of the opinion raises questions on what constitutes an integration of an abstract idea into a practical application if a very specific form of input for a specific purpose is not enough. It also shines a spotlight on the tension between machine learning as a technology and our patent laws.

Machine learning includes many situations where computers are able to recognize objects and patterns in real world data, such as imagery, music, and in this case genetic and biologic data. However, while the innovation involved to achieve such recognition is undeniable, this case shows how challenging it remains for patent practitioners to figure out how to claim this technology in a patent.

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[1] **Health Discovery Corp. v. Intel Corp.**, Case No. 6:20-cv-00666-ADA, 2021 WL 6116891 (W.D. Tex. Dec. 27, 2021).

[2] Health Discovery Corp., slip op. at 21.

[3] <https://www.uspto.gov/web/offices/pac/mpep/s2106.html>

[4] **McRO, Inc. v. Bandai Namco Games Am. Inc.**, 837 F.3d 1299, 1314 (Fed. Cir. 2016).

[5] Health Discovery Corp., slip op. at 9.

[6] Id. at 21.

[7] Id. at 14.

[8] McRO at 1313.

[9] **In re Bd. of Trustees of Leland Stanford Junior Univ.**, 991 F.3d 1245, 1252 (Fed. Cir. 2021) (Stanford II).

[10] **SAP Am., Inc. v. InvestPic, LLC**, 898 F.3d 1161, 1163 (Fed. Cir. 2018).

[11] Health Discovery Corp., slip op. at 19.

[12] **McRO, Inc. v. Bandai Namco Games Am. Inc.**, 837 F.3d 1299, 1313 (Fed. Cir. 2016).

[13] **Thales Visionix Inc. v. United States**, 850 F.3d 1343 (Fed. Cir. 2017).

[14] Health Discovery Corp., slip op. at 13.

[15] Complaint filed April 4, 2022, in Health Discovery Corp. v. Intel Corp., Case No. 6:22-cv-00356-ADA-DTG (W.D. Tex.).

[16] Health Discovery Corp., slip op. at 21.

[17] See id. at 24.