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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JUN LIU, RUIWEN ZHANG, and ZHENG ZHAO

Appeal 2018-004371
Application 15/237,209
Technology Center 2100

Before TERRENCE W. McMILLIN, KARA L. SZPONDOWSKI, and
SCOTT B. HOWARD, *Administrative Patent Judges*.

SZPONDOWSKI, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C § 134(a) of the Examiner's Final Rejection of claims 1–9, 11–19, and 21–29, constituting all claims currently pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

STATEMENT OF THE CASE

Appellants' invention is directed "to modeling and simulation," and more specifically to "enhancing processing speeds for generating a model on an electronic device." Spec. ¶ 2. Claim 1, reproduced below, is representative of the claimed subject matter:

1. A non-transitory computer readable medium comprising program code for reducing the number of processing iterations and memory accesses to generate one or more models usable to perform data analysis, the program code being executable by a processor for causing the processor to:

determine a plurality of regression coefficient values associated with a regression analysis of data using a coordinate descent method for finding a minimum value of a least absolute shrinkage and selection operator (LASSO) cost function, wherein each iteration of the coordinate descent method comprises:

determining a starting coordinate based on (i) a previous starting coordinate or a previous regression coefficient value from an immediately prior iteration of the coordinate descent method; (ii) a current regression coefficient value associated with a current iteration of the coordinate descent method; and (iii) a refinement factor configured to minimize a result of a univariate algorithm comprising a relationship between (a) the refinement factor, (b) the previous starting coordinate or the previous regression coefficient value, and (c) the current regression coefficient value for the current iteration; and

starting at the starting coordinate and performing a coordinate descent to determine a next regression coefficient value for a next iteration of the coordinate descent method;

generate a model that represents a relationship between a plurality of independent variables and the data by assigning a respective weight to each respective independent variable of the

plurality of independent variables, each respective weight being a particular regression coefficient value of the plurality of regression coefficient values that corresponds to the respective independent variable;

receive additional data; and

determine a characteristic associated with additional data using the model.

App. Br. 19–20 (Claims Appendix).

REJECTION

Claims 1–9, 11–19, and 21–29 stand rejected under 35 U.S.C. § 101 because the claimed invention is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more. Final Act. 2; Ans. 2.

ANALYSIS

Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 134 S. Ct. 2347 (2014), identifies a two-step framework for determining whether claimed subject matter is judicially excepted from patent eligibility under 35 U.S.C. § 101. In the first step, “[w]e must first determine whether the claims at issue are directed to a patent-ineligible concept.” *Alice*, 134 S. Ct. at 2355. In the second step, we “consider the elements of each claim both individually and ‘as an ordered combination’ to determine whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application.” *Alice*, 134 S. Ct. at 2355 (quoting *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66, 78–79 (2012)). In other words, the second step is to “search for an ‘inventive concept’ – i.e., an element or combination

of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’” *Id.* (alteration in original) (quoting *Mayo*, 566 U.S. at 72–73).

The Examiner determines the claims are directed towards a method of generating a model and determining a characteristic associated with a set of data using the model by determining a plurality of regression coefficients using the LASSO cost function and determining a starting coordinate, current regression coefficient, and a minimization refinement factor which minimizes the result of a univariate algorithm representing a relationship between these three values, and finally performing the coordinate descent method, which is “similar to the abstract idea of collecting information, analyzing it, and displaying certain results of the collection and analysis (*Electric Power Group*).” Ans. 3, 5 (citing *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016)). In addition, the Examiner determines “[t]he inventive concept and novelty in the claims are directed toward an improvement of an abstract idea (coordinate descent algorithm and model) and are not an improvement on a technology.” Ans. 5.

Appellants argue the present claims are “directed to ‘reducing the number of processing iterations and memory accesses to generate one or more models usable to perform data analysis.’” App. Br. 5. According to Appellants, the claimed invention “is entirely different than detecting events on a power grid in real time and automatically analyzing the events, as in *Electric Power Group*.” App. Br. 5–6. Specifically, Appellants contend the claims “improve the functioning of a computer at least by improving processing speeds and reducing an amount of memory used by an electronic device such that the pending claims amount to significantly more than the

alleged abstract idea.” App. Br. 6; *see* App. Br. 12–15; *see also* Reply Br. 3–4. According to Appellants, the claimed invention is directed to “reducing the number of processing iterations and memory accesses to generate one or more models usable to perform data analysis,” which improves upon the typical methods that “require a significant amount of time, memory, processing power, and electrical power,” thereby “improving processing speeds and reducing an amount of memory.” App. Br. 12–13 (citing Spec. ¶¶ 35, 38–39, 44, 144–145).

We are persuaded by Appellants’ arguments. We find the present claims are more similar to the patent-eligible claims in *Enfish LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016) than the patent-ineligible claims in *Electric Power Group*. *See Visual Memory LLC, v. Nvidia Corp.*, 867 F.3d 1253, 1260 (Fed. Cir. 2017). At step one of the *Alice* analysis, “it is not enough to merely identify a patent-ineligible concept underlying the claim; we must determine whether that patent-ineligible concept is what the claim is ‘directed to.’” *Rapid Litigation Management Ltd. v. CellzDirect, Inc.*, 827 F.3d 1042, 1050 (Fed. Cir. 2016). We analyze “whether the focus of the claims is on the specific asserted improvement in computer capabilities . . . or, instead, on a process that qualifies as an ‘abstract idea’ for which computers are invoked merely as a tool.” *Enfish*, 822 F.3d at 1335–36. “Software can make non-abstract improvements to computer technology.” *Enfish*, 822 F.3d at 1355. We agree with Appellants that the claims at issue are not directed to an abstract idea within the meaning of *Alice*, but are instead directed to a specific improvement in the way computers operate.

Appellants' invention is titled and directed to "Enhancing Processing Speeds for Generating a Model on an Electronic Device." Spec. ¶ 2. Appellants' Specification discusses processing problems encountered when statistical models are generated from large sets of data with hundreds or thousands of interrelated pieces of data, including increased processing times, increased electrical power requirements, reduction of the available resources for performing other tasks, slowdown of other processes executed on the computing device, and the need for complicated and expensive hardware. Spec. ¶ 3. The Specification describes "improving processing speeds and reducing an amount of memory used by an electronic device to generate a model from a data set by reducing a number of processing iterations and memory accesses required to generate the model." Spec. ¶ 35. Appellants disclose a "modified coordinate descent method that requires fewer processing iterations and fewer memory accesses to generate the model" that "can result in less processing power, memory, and electrical power being consumed by an electronic device to generate the model." Spec. ¶ 35; *see also* Spec. ¶¶ 44, 144, 145. Appellants' Specification further describes that "it can take thousands, if not hundreds of thousands, of processing iterations and computations to generate the model using traditional approaches for analyzing high-dimensional data sets" but that the claimed invention can "overcome the above and other issues by using a least absolute shrinkage and selection operator (LASSO) method in conjunction with a modified coordinate descent method." Spec. ¶¶ 38–39. The Specification states that the "combination of LASSO and the modified version of the coordinate descent method [can] analyze high-dimensional

data sets at faster speeds and using less memory than alternative approaches.” Spec. ¶ 44.

Here, like in *Enfish*, the claimed invention, in light of the disclosure in Appellants’ Specification, is focused on “an improvement to computer functionality itself, not on economic or other tasks for which a computer is used in its ordinary capacity.” *Enfish*, 822 F.3d at 1336. As set forth above, Appellants’ Specification extensively describes improvements to computer functionality (e.g., improving processing speeds, reducing memory, using less electrical and processing power, etc.), as well as the benefits of using Appellants’ approach for generating models and the advantages of using Appellants’ approach as opposed to traditional approaches. *See, e.g., Enfish*, 822 F.3d at 1333, 1337; *Visual Memory*, 867 F.3d at 1259–1260 (Fed. Cir. 2017). Moreover, the claims recite more than just a result (e.g., reducing the number of processing iterations) – they recite the specific steps that accomplish the desired result. *See Finjan, Inc. v. Blue Coat System, Inc.*, 879 F.3d 1299, 1305–1306 (Fed. Cir. 2018). In other words, “the claims are directed to a specific implementation of a solution to a problem in the software arts.” *Enfish*, 822 F.3d at 1339.

Therefore, Appellants have persuasively established that the claimed invention is directed to a specific improvement in the operation of the computer itself and cannot be considered abstract.

Accordingly, we do not sustain the Examiner’s 35 U.S.C. § 101 rejection of claims 1–9, 11–19, and 21–29.

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DECISION

The Examiner's 35 U.S.C. § 101 rejection of claims 1–9, 11–19, and 21–29 is reversed.

REVERSED