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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SRINIVAS RAO KUDAVELLY and NEVENKA DIMITROVA

Appeal 2017-010179
Application 13/129,412
Technology Center 1600

Before ERIC B. GRIMES, RICHARD M. LEBOVITZ, and
JEFFREY N. FREDMAN, *Administrative Patent Judges*.

FREDMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal^{1,2} under 35 U.S.C. § 134 involving claims to a method for designing a test kit for diagnosing genetic diseases. The Examiner rejected the claims as lacking patentable subject matter under 35 U.S.C. § 101. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

¹ Appellants identify the Real Party in Interest as Koninklijke Philips Electronics N.V. (App. Br. 1).

² We have considered and herein refer to the Specification of May 16, 2011 (“Spec.”); Final Office Action of July 14, 2016 (“Final Act.”); Appeal Brief of Dec. 19, 2016 (“App. Br.”); Examiner’s Answer of June 2, 2017 (“Ans.”), and Reply Brief of July 25, 2017 (“Reply Br.”).

Statement of the Case

Background

“Bioinformatics seeks to organize tremendous volumes of biological data into comprehensible information, which can be used to derive useful knowledge” (Spec. 1:12–13). “A common problem for BLAST and other search tools known in the art is that the query sequence is limited. If the query sequence length is larger than around a few thousand nucleotides, the search tool will be unacceptably time consuming” (Spec. 1:21–23).

DNA spectral analysis offers an approach to systematically tackle the problem of deriving useful information from DNA sequence data. Generally, DNA spectral analysis involves an identification of the occurrences of each nucleotide base in a DNA sequence as an individual digital signal, and transforming each of the four different nucleotide signals into a frequency domain. The magnitude of a frequency component can then be used to reveal how strongly a nucleotide base pattern is repeated at that frequency. A larger magnitude/value usually indicates a stronger presence of the repetition.

(Spec. 1:29 to 2:5).

The Claims

Claims 1–7, 9–13, 15, and 16 are on appeal. Claim 1 is representative and reads as follows:

1. A method for designing a test kit for diagnosing genetic diseases, the method comprising:

with one or more processors, retrieving a plurality of sequences of nucleotides from a DNA database, each of the plurality of sequences corresponding to a genetic disease;

with the one or more processors, calculating a density value for each retrieved sequence of nucleotides by calculating:

$$\frac{F(\omega)F^*(\omega)}{2\pi}$$

where ω is angular frequency, $F(\omega)$ is a Fourier transform of discrete elements over an infinite number of elements and $F^*(\omega)$ is a complex conjugate of $F(\omega)$;

with the one or more processors, storing the calculated density values in a DNA spectrogram database;

with the one or more processors, receiving an input DNA query sequence derived from a disease sample;

with the one or more processors, calculating a query sequence density value for said input DNA query sequence;

with the one or more processors, calculating a difference between the calculated query sequence density value and each of the calculated density values in the DNA spectrogram database;

with the one or more processors, selecting a first group of nucleotide sequences, from the DNA spectrogram database that have density values within a predetermined density value range of the calculated query sequence density value based on the calculated differences; and

with the one or more processors, providing to an operator a list of the genetic diseases associated with each of the nucleotide sequences within the first group.

The Rejection

The Examiner rejected claims 1–7, 9–13, 15, and 16 under 35 U.S.C. § 101 (Final Act. 3–4).

The Examiner finds that the claims on appeal are directed to “a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without including additional elements that are sufficient to amount to significantly more than the judicial exception itself” (Ans. 2). The Examiner

finds that the claims are “directed to a purely abstract process involving only the performance of a series [of] mathematical/algorithmic operations” (Ans. 3). The Examiner also finds the “recited processor only requires routine computer functions” (Ans. 2).

Appellants contend “claim 1 provides a solution to the problem that a large query sequence length results in an unacceptably long search time” and therefore “[c]laim 1 thus improves the technical functioning of the system and thus recites patent-eligible subject matter” (App. Br. 8–9).

We apply the test set out in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012), based on the two-step *Alice* framework. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014).

In *Alice* step one, we ask whether the claims are directed to a patent ineligible concept, such as an abstract idea. *Alice*, 134 S.Ct. at 2355; *Mayo*, 566 U.S. at 75–77; *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1375 (Fed. Cir. 2015). While method claims are generally eligible subject matter, method claims that are directed only to abstract ideas and/or natural phenomena are patent ineligible concepts. *Ariosa*, 788 F.3d at 1376. In *Alice* step two, we examine the elements of the claims to determine whether they contain an inventive concept sufficient to transform the claimed naturally occurring phenomena into a patent-eligible application. *Alice*, 134 S.Ct. at 2355 (citing *Mayo*, 566 U.S. at 71–72).

Alice Step One

Claim 1 is directed to an abstract idea. In particular, the recited step of “calculating a density value for each retrieved sequence of nucleotides by calculating:

$$\frac{F(\omega)F^*(\omega)}{2\pi}$$

where ω is angular frequency, $F(\omega)$ is a Fourier transform of discrete elements over an infinite number of elements and $F^*(\omega)$ is a complex conjugate of $F(\omega)$ ” involves categorizing and analyzing information.

Information as such is an intangible Accordingly, we have treated collecting information, including when limited to particular content (which does not change its character as information), as within the realm of abstract ideas In a similar vein, we have treated analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, as essentially mental processes within the abstract-idea category.

Electric Power Group, LLC v. Alstom S.A., 830 F.3d 1350, 1353–54 (Fed. Cir. 2016) (internal citations omitted)) Additionally, the Federal Circuit in *Electric Power Group* stated that the “advance they purport to make is a process of gathering and analyzing information of a specified content, then displaying the results, and not any particular assertedly inventive technology for performing those functions” (*id.* at 1354). Here, Appellants acknowledge the advancement is the process of analyzing information, stating “DNA spectral analysis offers an approach to systematically tackle the problem of deriving useful information from DNA sequence data” (Spec. 1:29–30).

In *Digitech*, the Federal Circuit stated that “[w]ithout additional limitations, a process that employs mathematical algorithms to manipulate

existing information to generate additional information is not patent eligible. ‘If a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.’” *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014). Here, the claimed process employs mathematical algorithms to manipulate existing DNA sequence information to generate additional information and therefore is not patent eligible.

Moreover, the calculating step is the type of work that is equivalent to human mental work. As the Federal Circuit explained, “methods which can be performed mentally, or which are the equivalent of human mental work, are unpatentable abstract ideas ----the ‘basic tools of scientific and technological work’ that are open to all.” *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1372 (Fed. Cir. 2011) (citing *Gottschalk v. Benson*, 409 U.S. 63 (1972)).

This case is distinguishable from cases like *Diamond v. Diehr*, 450 U.S. 175 (1981), because in *Diehr* an algorithm was used to control the change in state of rubber in a curing process. *In re Diehr*, 602 F.2d 982, 983–84 (CCPA 1979). The algorithm calculated the Arrhenius equation for the reaction time during the cure to determine when the compound was cured and to automatically open the press when the cured state was achieved. *Id.* By contrast, in the rejected claims, the recited algorithm is not used to determine when a change of state is complete as it was in *Diehr*. Rather, in the rejected claims, the algorithm is used to convert nucleotide data to DNA spectrogram data, but no final physical step analogous to opening the press after curing is present. Instead, the final “providing” step

in the instant claims “tell[s] the relevant audience about the laws while trusting them to use those laws appropriately where they are relevant to their decisionmaking.” *Mayo*, 566 U.S. at 78. Thus, the algorithm does not determine when the change of state is complete and perform a manipulative step based on it as in *Diehr*.

Because the claims are directed to an abstract idea, we turn to the second step of the *Alice* framework.

Alice Step Two

In *Alice* step two, we examine the elements of the claims to determine whether they contain an inventive concept sufficient to transform the claimed abstract idea into a patent-eligible application. *Alice*, 134 S.Ct. at 2355 (quoting *Mayo*, 566 U.S. at 71–72). We must consider the elements of the claims both individually and as an ordered combination to determine whether the additional elements transform the nature of the claims into a patent-eligible concept. *Ariosa*, 788 F.3d at 1375.

The Specification acknowledges the “invention may be implemented in any suitable form including hardware, software, firmware or any combination of these” (Spec. 9:20–21). Thus, the Specification acknowledges that data analysis on computers is routine and conventional. The evidence of record supports the position that the claims do not add something “significantly more” to the abstract idea. Instead, the evidence shows that the additional elements in the claims (e.g., using processors to retrieve, calculate, store, and further analyze sequence data) are conventional, routine, and well-known. We conclude that the method claim does not result in an inventive concept that transforms the abstract idea described above into a patentable invention.

Appellants contend “claim 1 provides a solution to the problem that a large query sequence length results in an unacceptably long search time . . . This allows for a large query sequence length to be processed in a reasonable amount of time” (App. Br. 8–9). Appellants analogize this fact pattern to claim 2 in Example 36 of the USPTO “Subject Matter Eligibility Examples: Business Methods” (Dec. 15, 2016),³ where the guidelines found “the claimed solution here is necessarily rooted in computer technology to address a problem specifically arising in the realm of computer vision systems” (App. Br. 10, *citing* USPTO examples at 16).

We find this argument unpersuasive because the calculating steps in the rejected claim 1 are directed to an abstract mathematical approach to data analysis that is applied to known associations between particular sequences and genetic diseases. There is no improvement to the computer itself. “If a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.” *Digitech*, 758 F.3d at 1351.

Similar to the claims in *Electric Power Group*, these steps are directed to data analysis and mathematical calculations, because they transform the nucleotide sequence data to another form without applying the resulting data further to the method to alter anything other than data for use in comparison of data. That is, the calculation of the density values to generate a spectrogram database does not change anything about how the computer processor itself operates, nor is anything physical in the computer processor altered by the claimed method. Rather the instant claims focus on particular

³ See <https://www.uspto.gov/sites/default/files/documents/ieg-bus-meth-exs-dec2016.pdf>.

mathematical operations for reformulating nucleotide sequence data into a new form and using this form for database analysis. Claim 1 uses “certain information, analyzing it using mathematical techniques, and reporting or displaying the results of the analysis. That is all abstract.” *SAP America, Inc. v. Investpic, LLC*, 898 F.3d 1161, 1167 (Fed. Cir. 2018).

We do not dispute that the use of mathematical operations in this case may be “a positive and valuable contribution to science. But even such valuable contributions can fall short of statutory patentable subject matter, as it does here.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1380 (Fed. Cir. 2015). We note that even the limitation to “diagnosing genetic diseases” does not rescue the claim from being abstract because “limitation of the claims to a particular field of information . . . does not move the claims out of the realm of abstract ideas.” *SAP*, 898 F.3d at 1169.

Appellants contend “both *McRO [Inc. v. Bandai Namco Games Am.*, 837 F.3d 1299 (Fed. Cir. 2016)] and PTO’s November 2, 2016 Guidance show that the claims recite patent-eligible subject matter” and that “the Office Action has overgeneralized the claims” (App. Br. 11–12). Appellants similarly contend “both *Bascom Global [Internet Services v. AT&T Mobility*, 827 F.3d 1341 (Fed. Cir. 2016)] and PTO’s November 2, 2016 Guidance show that the claims recite patent-eligible subject matter” (App. Br. 12). Appellants also contend that “the PTO issued additional guidance regarding 35 U.S.C. § 101 based on the Federal Circuit’s decision in *Enfish, LLC v. Microsoft Corp.* [822 F.3d 1327] (Fed. Cir. 2016). It is respectfully submitted that the PTO’s guidance show that the claims recite patent-eligible subject matter” (App. Br. 13).

We recognize, but find unpersuasive, Appellants’ reliance on the

Federal Circuit decisions in *McRO*, *Bascom*, and *Enfish*.

The claims in *McRO* were drawn to automation of the operation of a computer at a task of lip reading, where the method “uses a combined order of specific rules that renders information into a specific format that is then used and applied to create desired results: a sequence of synchronized, animated characters.” *See McRO*, 837 F.3d at 1315. Unlike *McRO*, Appellants have not demonstrated an improvement in the operation of the computer itself, nor do Appellants create any structure such as an animated character, but rather Appellants rely on calculations using a particular algorithm to detect the presence of particular sequence information by converting sequence data into a spectrogram database (*see Spec. 2:24–25*). The algorithm is an abstract idea that involves data transformation. “[T]he focus of the claims is not a physical-realm improvement but an improvement in wholly abstract ideas—the selection and mathematical analysis of information, followed by reporting or display of the results.” *SAP*, 898 F.3d at 1168.

Appellants do not argue the invention is a software-based invention that improves the performance of the computer system itself. Thus, this case is unlike *Bascom*, whose installation of an Internet content filter at a particular network location was “a technical improvement over prior art ways of filtering such content.” *Bascom*, 827 F.3d at 1350. *Bascom*’s arrangement advantageously allowed the Internet content filter to have “both the benefits of a filter on a local computer and the benefits of a filter on the ISP server” and “to give users the ability to customize filtering for their individual network accounts” (*id.* at 1350, 1352). Appellants do not identify a technical improvement that impacts the processor performing the analysis

recited in claim 1 on appeal.

Enfish explains that “the first step in the *Alice* inquiry in this case asks 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. Applied to claim 1, the method does not teach any improvement in computer capabilities, or indeed, any technical improvement in a computer processor, but rather “represent[s] an improvement over manual DNA pattern analysis techniques, which aim at identifying DNA patterns serving as biological markers related to important biological processes” (Spec. 2:7–9).

Appellant contends “that it should be considered that the claims of the present application do not unduly preempt the field” because claim 1’s “specific features act to confine the claim to a particular, useful application, and do not unduly preempt the field” (App. Br. 16–17).

While preemption is a concern underlying the judicial exceptions, it is not a stand-alone test for determining eligibility. *Rapid Litig. Mgmt. v. CellzDirect, Inc.*, 827 F.3d 1042, 1052, (Fed. Cir. 2016). “[W]e have consistently held that claims that are otherwise directed to patent-ineligible subject matter cannot be saved by arguing the absence of complete preemption.” *Return Mail, Inc. v. United States Postal Service*, 868 F.3d 1350, 1370 (Fed. Cir. 2017).

The final step of the claim in which the information is provided to operator is also insufficient to confer eligibility to otherwise ineligible subject. The act of providing information to an operator is routine and conventional and simply reads on a mental step of informing an operator

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without any physical transformative step.

We therefore conclude that all of the claims on appeal are directed to patent-ineligible subject matter.

SUMMARY

In summary, we affirm the rejection of claim 1 under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Pursuant to 37 C.F.R. § 41.37(c)(1), we also affirm the rejection of claims 2–7, 9–13, 15, and 16 as being directed to non-statutory subject matter as these claims were not argued separately.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED