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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BRADLEY SUTTON, JOHN G. GEORGIADIS, and
CURTIS JOHNSON

Appeal 2018-001285
Application 14/178,355¹
Technology Center 2800

Before KAREN M. HASTINGS, CHRISTOPHER C. KENNEDY, and
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants request our review under 35 U.S.C. § 134 of the Examiner’s Final Rejection of claims 1–11 and 13–20 under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.² We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ Appellants identify the Board of Trustees of The University of Illinois as the real party in interest. Appeal Br. 3.

² References are to the Final Rejection, mailed Jan. 11, 2017 (“Final”), the Appeal Brief, filed June 29, 2017 (“Appeal Br.”), the Examiner’s Answer, mailed Sept. 20, 2017 (“Ans.”) and the Reply Brief, filed Nov. 29, 2017 (“Reply Br.”).

THE INVENTION

Appellants' claims are directed to applying magnetic resonance elastography to a sample, capturing a corrupted image including uncorrected k-space data, and obtaining a corrected image based on adjusting the uncorrected k-space data to corrected k-space data (independent claims 1, 9 and 18).

Claim 1, reproduced below, is illustrative of the subject matter on appeal.

1. A method comprising:

applying, by a system including a processor, magnetic resonance elastography to a sample;

obtaining and capturing a corrupted image that includes uncorrected k-space data, wherein the magnetic resonance elastography utilizes a multi-shot spin-echo sequence with variable density spiral readout gradients;

adjusting, by the system, the uncorrected k-space data to corrected k-space data by:

determining a point of maximum signal intensity for each shot,

adjusting a k-space trajectory by shifting a center point for each shot to a corresponding point of maximum signal intensity, and

adjusting a phase for each shot by applying a negative of a phase at the corresponding point of maximum signal intensity;

obtaining, by the system, a corrected image by applying a Fourier transform to the corrected k-space data summed over all shots; and

presenting the corrected image on a display.

Appeal Br. 22 (Claims Appendix).

ANALYSIS

Appellants argue claims 1–8 as a group and focus their arguments principally on independent claim 1 while also presenting separate arguments for claim 2. Appellants also argue claims 9–11, 13–17 (Appeal Br. 18–20 (Claims Appendix)) and claims 18–20 (Appeal Br. 20–21 (Claims Appendix)) as separate claim groups and rely on the same line of arguments for claims 1 and 2 to also address these claim groups. Consequently, we select claim 1 as representative of the subject matter before us for review on appeal. Independent claims 9 and 18 as well as dependent claims 3–8, 10, 11, 14–17, and 19 stand or fall with claim 1. *See* 37 C.F.R. § 41.37 (c)(1)(iv). We address claim 2 separately. Claims 13 and 20 stand or fall with claim 2.

The rejection under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Alice Corp. Pty. Ltd. v. CLS Bank International, 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.

According to *Alice* step one, “[w]e must first determine whether the claims at issue are directed to a patent-ineligible concept,” such as an abstract idea. *Alice*, 134 S.Ct. at 2355. In that regard, the Examiner concluded that the subject matter of the claims is directed to the judicial exception of abstract ideas because the claims “are directed to an abstract idea of adjusting the uncorrected k-space data to corrected k-space data.” Final 3; *see also* Ans. 3.

Appellants challenge the Examiner’s finding that the claims are directed to patent-ineligible subject matter, but the challenge is unfounded. *See* Appeal Br. 9–12. For example, drafting the claims to “a specific type of MRE imaging (i.e., requiring a multi-shot spin-echo sequence with variable density spiral readout gradients) and further appl[ying] a specific type of data generation,” as argued by Appellant, is not dispositive. Appeal Br. 10. The question is what the claims are “directed to.” *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016).

[T]he “directed to” inquiry applies a stage-one filter to claims, considered in light of the specification, based on whether “their character as a whole is directed to excluded subject matter.” *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015); *see Genetic Techs. Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1375, 2016 WL 1393573, at *5 (Fed. Cir. 2016) (inquiring into “the focus of the claimed advance over the prior art”).

Enfish, 822 F.3d at 1335. “The ‘abstract idea’ step of the inquiry calls upon us to look at the ‘focus of the claimed advance over the prior art’ to determine if the claim’s ‘character as a whole’ is directed to excluded subject matter.” *Affinity Labs of Texas v. DirectTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016) (quoting *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)). “In determining the eligibility of respondents’ claimed process for patent protection under § 101, their claims must be considered as a whole.” *Diamond v. Diehr*, 450 U.S. 175, 188 (1981).

As set out in the Background section of Appellants’ Specification, multi-shot spin echo sequencing and its drawbacks were known in the art. Spec. ¶¶ 26, 32. Appellants’ described improvement involves obtaining a

corrected image by applying a series of mathematical steps comprising k-space shifts, phase offsets and Fourier transforms (detailed in equations 1–9). *See* Spec. ¶¶ 34–44. Based on these circumstances, the Examiner determined that Appellants’ claims are directed to abstract ideas involving mathematical algorithms (i.e. adjusting k-space data) because their claims are analogous to those in *Gottschalk v. Benson*, 409 U.S. 63 (1972) and *Digitech Image Tech., LLC v Electronics for Imaging, Inc.*, 758 F.3d 1344 (Fed. Cir. 2014). Final 2–3.

Appellants argue that their claims are distinguished from the claims in *Benson* and *Digitech* because “claim 1 would not preempt MRE” since it “is limited to a specific type of MRE imaging” (i.e. requiring a multi-shot spin-echo sequence) (Appeal Br. 10), whereas the court in *Benson* found that “the patent would wholly preempt the mathematical formula and, in practical effect, would be a patent of the algorithm itself” (*id.*) and the court in *Digitech* found that the claim was “‘so abstract and sweeping’ as to cover any and all uses of a device profile.” Appeal Br. 11. Appellants’ argument incorrectly focuses on preemption as determinative. Claims directed to mathematical algorithms where “the only physical step involves merely gathering data for the algorithm” are patent ineligible. *In re Grams*, 888 F.2d 835, 839 (Fed. Cir. 1989). The only physical steps in Appellants’ claims include the steps of applying the MRE to a sample and utilizing multi-shot spin-echo sequence to obtain the corrupted image (i.e. gathering data) for performing the subsequent algorithms (i.e. the steps of adjusting the K-space data, determining signal intensity, adjusting trajectory, adjusting a phase, and applying a Fourier transform). As such, we agree with the Examiner that Appellants’ claims are analogous to those in *Digitech* and

Benson in that they are directed to the abstract idea of performing mathematical algorithms.

We find that Appellants' claims are also analogous to those in *Electric*, where the court found the claims patent ineligible for being directed to the abstract idea of gathering and analyzing information of a specified content, then displaying the results (*Electric*, 830 F.3d at 1354). The claims in *Electric* obtain data streams, perform calculations to analyze/process the received data streams (based on rates of change for “one or more measurements from the data streams,” “dynamic stability metrics derived from analysis of the measurements” and “oscillation modes”) and conclude by “displaying the event analysis results” (*Electric*, 830 F.3d at 1352). Similarly, Appellants' claims are also directed to the abstract idea of collecting and analyzing information (obtaining a corrupted image and performing/analyzing a series of calculations to obtain the corrected image after which the corrected image is displayed),

Appellants further argue that their claims are not directed to an abstract idea because they are analogous to the claims from *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016) in which the court found that the claims “allow computers to produce accurate and realistic lip synchronization and facial expressions in animated characters” “to efficiently produce accurate MRE imaging.” Appeal Br. 12. However, Appellants' arguments are not persuasive. Appellants specifically argue that claim 1 is patent eligible because, like the claims in *McRO*, it recites “an ordered combination of steps, which utilize unconventional techniques” as “features that improve medical imaging technology.” Appeal Br. 13–14. Merely reciting an improvement to a specific technology is insufficient to

render claims patent eligible because “limiting the claims to the particular technological environment . . . is, without more, insufficient to transform them into patent-eligible applications of the abstract idea at their core.” *Electric*, 830 F.3d at 1354 (citing *Alice*, 134 S.Ct. at 2358). In addition, the court in *McRO* found that claim 1 was patent eligible because it incorporated the specific features of the rules into the claim by requiring “that the rules be rendered in a specific way: as a relationship between sub-sequences of phonemes, timing, and the weight to which each phoneme is expressed.” *McRO*, 837 F.3d at 1315. The claims in *McRO* explicitly disclosed “obtaining a first set of rules that define output morph weight set stream as a function of phoneme sequence and time of said phoneme sequence.” *Id.* at 1307–08. In addition, the claimed improvement in *McRO* allowed “computers to produce ‘accurate and realistic lip synchronization and facial expressions in animated characters’ that previously could only be produced by human animators.” *Id.* at 1313. In contrast, Appellants’ claims are fundamentally different from those in *McRO* because they do not disclose rules or policies and the improvement claimed by Appellants does not enable computers to produce something previously only humans were capable of producing. *See* Spec. ¶¶ 26, 32 (Disclosing MREs and multi-shot spin echo sequencing were known in the art as being performed on computers.). Consequently, a preponderance of the evidence supports the Examiner’s determination that Appellants’ claims are not analogous to *McRO* (Ans. 5–6).

Appellants also argue that their claims are not directed to an abstract idea because their claims are analogous to the claims in *Enfish*, in which the court found the claims patent eligible because they were focused “on an

improvement to computer functionality.” Appeal Br. 15–16. Appellants argue that their claims are similarly patent eligible since claim 1 “recites features that allow a computer to efficiently produce accurate MRE imaging” by overcoming “long readout times and limited image resolution.” *Id.*

Appellants’ arguments are unpersuasive. The claims in *Enfish* were directed to a “specific type of data structure designed to improve the way a computer stores and retrieves data in memory” and were therefore directed to a specific improvement to operating the computer. *Enfish*, 822 F.3d at 1339. Appellants’ claims, on the other hand, are directed to improving a method that is merely performed on a computer (i.e. performing a MRE) rather than improving the functionality of the computer itself. Therefore, a preponderance of the evidence supports the Examiner’s determination that Appellants’ claims are not analogous to *Enfish* because “claim [1 is not directed to a] database [and is not directed to an] improvement [in] computer functionality.” Ans. 6.

Accordingly, Appellants do not point to error in the Examiner’s determination that the claims, as a whole and in light of the Specification, are directed to the abstract idea of performing mathematical functions. *See* Ans. 3–5.

Step two is “a 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.’” *Alice*, 134 S.Ct. at 2355 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 72–73 (2012)). Appellants argue that their claims are directed to significantly more because the claims

“improve the image” and “result in an improvement in determining mechanical properties of the sample through use of the MRE technique.”

Appeal Br. 7.

In response, the Examiner determined that the claim limitations linking the use of a judicial exception to a particular technological environment or field of use (i.e., MRE techniques) are insufficient to constitute significantly more than the abstract idea because these limitations only describe mathematical manipulation of data that can be performed by a generic computer. Ans. 7. Claims do not become patent eligible simply because they disclose a specific solution to a particular problem. *Alice*, 134 S.Ct. at 2358 (“[P]atenting abstract ideas cannot be circumvented by attempting to limit the use of [the idea] to a particular technological environment.”).

The Specification does not support Appellants’ argument that the claims comprise additional elements that constitute significantly more than the abstract idea of using mathematical equations to generate corrected k-space data. The claims employ conventional devices (processor, display, magnetic resonance system) for performing their common functions and mathematical steps. As such, the Specification does not disclose the mathematical steps as being tied to any special or non-generic hardware. *Cf. Alice*, 134 S.Ct. 2358 (citation omitted). “[T]he mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention. Stating an abstract idea ‘while adding the words “apply it” is not enough for patent eligibility.’ *Id.* While claim 1 includes a step of displaying the corrected image, the step of displaying the results of the calculations is not enough to constitute significantly more than the abstract

idea because merely presenting the results of abstract processes of collecting and analyzing information, without more (such as identifying a particular tool for presentation), is abstract as an ancillary part of such collection and analysis. (*See Id.* at 1350 (citing *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat'l Ass'n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014); *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014)). As such, Appellants' claimed step of presenting the corrected image on display is therefore insufficient to constitute significantly more than the abstract idea.

Appellants further contend that their claims constitute significantly more because they are analogous to the claims in the third abstract idea example provided by the United States Patent & Trademark Office (USPTO) in the document "Abstract Idea Examples" on January 27, 2015 (pp. 7–9, available at https://www.uspto.gov/sites/default/files/documents/abstract_idea_examples.pdf).

This argument is not persuasive. Appellants argue that the third abstract idea example is a digital image processing case in which the claims were determined to be patent eligible because the steps would tie the mathematical operations to the processor's ability to process digital images. Appeal Br. 16. Appellants argue that their claims are analogous to the claims in the third abstract idea by similarly incorporating algorithms and formulas for MRE imaging which are "more complex in processing images than the elements of the example claim," and therefore the claimed steps also tie any mathematical operations in the claim to the processor's ability to process images. Appeal Br. 16–17. However, the USPTO explained in the

analysis section of the third example that the claims were found to be patent eligible because the steps improve the functioning of the computer by allowing the computer to use less memory than previously required and resulting in faster computation time without sacrificing the quality of the resulting image (*see* Abstract Idea Examples, 9). Rather than just being performed on a computer, the claims of the third example were tied to the hardware of the claim because the results of each of the mathematical steps were stored in specific memory locations (i.e. “storing the blue noise mask in a first memory location” and “storing the gray scale image in a second memory location”). In contrast, Appellants’ steps do not disclose an improvement to any of the claimed hardware (i.e. display, system & processor) and are not tied to memory. Since Appellants’ claims lack an improvement tied to hardware, the third abstract idea example does not support a finding of their claims as patent eligible.

Appellants separately argue that the limitations of claims 2, 13 and 20 comprise significantly more than the abstract idea of “adjusting k-space data”; however, Appellants’ arguments are unpersuasive. Appeal Br. 17, 19. The limitations of claims 2, 13 and 20 comprise “determining a material property of the sample by applying an inversion algorithm to the corrected k-space data.” *Id.* at 17. As such, the limitations of claims 2, 13 and 20 are directed to the abstract idea of mathematical algorithms themselves and therefore cannot comprise significantly more than the abstract idea. Therefore, we agree with the Examiner’s determination that dependent claims 2, 13 and 20 do not constitute significantly more than the abstract idea of adjusting k-space data by performing mathematical algorithms. Ans. 8.

Appellants also argue with regards to claims 1 and 2 that the claim limitations comprise significantly more because the Examiner does not cite any prior art against them. Appeal Br. 13, 17. However, a finding of novelty or nonobviousness does not necessarily lead to the conclusion that subject matter is patentable eligible. “Groundbreaking, innovative, or even brilliant discovery does not by itself satisfy the § 101 inquiry.” *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2117 (2013). The question in step two of the Alice framework is not whether an additional feature (i.e., the calculation) is novel but whether the implementation of the abstract idea involves “more than the performance of ‘well-understood, routine, [and] conventional activities previously known to the industry.’” *Content Extraction and Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1347–48 (quoting *Alice*, 134 S.Ct. at 2359) based upon whether “[t]aking the claim elements separately, the function performed by the computer at each step of the process is ‘[p]urely conventional.’” *Alice* 134 S.Ct. at 2359 (citing *Mayo*, 566 U.S. at 66). *Cf. Alice* 134 S.Ct. at 2359 (“Considered ‘as an ordered combination,’ the computer components of petitioner’s method ‘ad[d] nothing . . . that is not already present when the steps are considered separately.’”) In Appellants’ claims 1 and 2, the processor serves as the platform in which the following generic functionality is performed: applying magnetic resonance elastography; obtaining and capturing a corrupted image; obtaining a corrected image; and presenting the corrected image. Regardless of whether the mathematical functions for performing the steps of correcting the image are themselves novel, the functionality performed by the processor is generic. As such, the novelty of the claims does not comprise significantly more than the abstract idea

because Appellant's Specification and claims support a view that the processor acts merely as a platform or conduit for the data-manipulating abstract idea. *Cf. In re TLI Communications LLC Patent Litigation*, 823 F.3d 607, 612 (Fed. Cir. 2016).

For the foregoing reasons, the Appellants have not shown error in the Examiner's *Alice* step two determination that the claims do not include an element or combination of elements sufficient to ensure that in practice they amount to significantly more than to be upon the ineligible concept itself. The remaining arguments have been carefully considered but are unpersuasive as to error in the rejection.

The rejection of claims 1–11 and 13–20 under 35 U.S.C. § 101 as being directed to non-statutory subject matter is sustained.

DECISION

The decision of the Examiner to reject claims 1–11 and 13–20 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED