UNITED STATES PATENT AND TRADEMARK OFFICE

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Tutunjian & Bitetto, P.C.
401 Broadhollow Road
Suite 402
Melville, NY 11747

EXAMINER
ROTARU, OCTAVIAN

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte SONGYUN DUAN, PAUL T. KEYSER,
GEETIKA T. LAKSHMANAN, and DAVOOD SHAMSI[1]

_____

Appeal 2018-002318
Application 14/054,468
Technology Center 3600

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Before BRADLEY W. BAUMEISTER, SHARON FENICK, and
RUSSELL E. CASS, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's
Final Rejection of claims 1–5 and 15. App. Br. 1. These claims stand
rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject
matter. Final Action mailed January 31, 2017 ("Final Act."), 9–14. We
have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] Appellants identify International Business Machines Corporation as the
real party in interest. Appeal Brief filed June 26, 2017 ("App. Br."), 3.

THE INVENTION

Appellants describe the present invention as follows:

> Systems and methods are provided for the automatic detection of different types of changes in a business process. A system includes a transformer for performing a transformation on data derived from process traces or models extracted from the processes traces to generate transformed data. The process traces are for a business process corresponding to a set of related tasks for a specified goal. Each of the models has at least a transition matrix of dimension N x N, where N is a total number of the related tasks. The system further includes a change detector for performing change detection on the transformed data to identify at least one of when a change occurs in the business process and a degree of the change.

Abstract.

Independent claim 1 is representative of the appealed claims.[2] It is reproduced below with modified formatting for clarity and with emphasis added to the language that recites an abstract idea:

1. A change detection processing system, comprising:

   at least one processor;

   [i] *a transformer* executed by the at least one processor to receive a plurality of process graphs of an execution of a business process of related tasks, and *transform each of the plurality of process graphs into a respective matrix comprising a plurality of values representing transition probabilities between different ones of the related tasks*;

   [ii] *a smoothing filter* executed by the at least one processor *to smooth, using Savitzky-Golay filtering, the transformed plurality of values prior to detecting a change occurring in the business process*; and

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[2] Appellants argue all of the claims together as a group. *See* App. Br. 36. Accordingly, we select independent claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

[iii]   *a change detector* executed by the at least one processor *to*

> [iv]   *calculate respective eigenvalues for respective spectrums of the plurality of process graphs to detect the change occurring in the business process and a degree of the change at a point in time,*
>
> [v]   *update a structured activity net model of the business process to reflect the detected change, and*
>
> [vi]   *compute a change metric by subtracting Estrada Indexes between each of the respective eigenvalues for the respective spectrums.*

PRINCIPLES OF LAW

A. SECTION 101

An invention is patent-eligible if it claims a "new and useful process, machine, manufacture, or composition of matter." 35 U.S.C. § 101. However, the Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: "'[l]aws of nature, natural phenomena, and abstract ideas'" are not patentable. *E.g., Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Supreme Court's two-step framework, described in *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012), and *Alice*. *Alice*, 573 U.S. at 217–18 (citing *Mayo*, 566 U.S. at 75–77). In accordance with that framework, we first determine what concept the claim is "directed to." *See Alice*, 573 U.S. at 219 ("On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.,* the use of a third party to mitigate settlement risk."); *see also Bilski v. Kappos*, 561

U.S. 593, 611 (2010) ("Claims 1 and 4 in petitioners' application explain the basic concept of hedging, or protecting against risk.").

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as "molding rubber products" (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); "tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores" (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1854))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Supreme Court held that "[a] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula." *Diehr*, 450 U.S. at 176; *see also id.* at 191 ("We view respondents' claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula."). Having said that, the Supreme Court also indicated that a claim "seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment." *Id.* (citing *Benson* and *Flook*); *see, e.g., id.* at 187 ("It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.").

If the claim is "directed to" an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where "we must examine the elements of the claim to determine whether it contains an 'inventive concept' sufficient to 'transform' the claimed abstract idea into a patent-eligible application." *Alice*, 573 U.S. at 221 (citation omitted). "A claim that recites an abstract idea must include 'additional features' to ensure 'that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].'" *Id.* (alterations in original) (quoting *Mayo*, 566 U.S. at 77). "[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention." *Id.*

B. USPTO SECTION 101 GUIDANCE

The United States Patent and Trademark Office ("USPTO") recently published revised guidance on the application of § 101. USPTO, *2019 Revised Patent Subject Matter Eligibility Guidance*, 84. Fed. Reg. 50 (Jan. 7, 2019) ("2019 Guidance"). Under the 2019 Guidance, we first look to whether the claim recites the following:

> (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human activities such as a fundamental economic practice, or mental processes); and
>
> (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)).

See 2019 Guidance, 84 Fed. Reg. at 52–55.

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim:

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(3) adds a specific limitation beyond the judicial exception that is not "well-understood, routine, conventional" in the field (*see* MPEP § 2106.05(d)); or

(4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

See 2019 Guidance, 84 Fed. Reg. at 56.

ANALYSIS

Step 2A, Prong 1

The Examiner determines, *inter alia*, that the claims recite an algorithm for detecting a change in a business process. Final Act. 9–10. Appellants argue, *inter alia*,

> the present claims are not directed to automating algorithms for calculating Eigenvalues, or solving a Fourier Transform, as in *Gottschalk v. Benson*, 409 U.S. 63 (1972), but [are, instead, directed to] a sequence of complex steps that takes raw information, *converts the raw information into new values, uses those not-previously-available values as inputs to another complex series of calculations that generates another new set of values, determines which of the new values are pertinent to the problem through filtering,* and *performs additional complex manipulations to provide a model that can be used for complex decision-making.*

Reply Brief filed Dec. 29, 2017 ("Reply Br."), 9 (emphasis added).

We are persuaded that the claims recite computer elements that perform mathematical calculations. For example, limitation [i] of claim 1 recites "*a transformer* [that] *transform[s] each of the plurality of process graphs into a respective matrix comprising a plurality of values representing transition probabilities between different ones of the related tasks.*"

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Limitation [ii] recites *"a smoothing filter . . . to smooth, using Savitzky-Golay filtering, the transformed plurality of values prior to detecting a change occurring in the business process.* Limitation [iii] recites *a change detector* that performs three mathematical calculations:

> [iv] *calculate respective eigenvalues for respective spectrums of the plurality of process graphs to detect the change occurring in the business process and a degree of the change at a point in time,*
>
> [v] *update a structured activity net model of the business process to reflect the detected change, and*
>
> [vi] *compute a change metric by subtracting Estrada Indexes between each of the respective eigenvalues for the respective spectrums.*

By Appellants' own admission (Reply Br. 9), the claims recite computer elements that perform the following mathematical algorithms: converting raw data, performing another complex series of calculations, filtering values, and performing additional complex manipulations to provide a model. The category of mathematical concepts, such as performing mathematical calculations, is one of the three categories of abstract ideas recognized by the 2019 Guidance.

In Appellants' own characterization, the claims further involve "determin[ing] which of the new values are pertinent to the problem through filtering" (Reply Br. 9), and this determination also may be characterized reasonably as either a mathematical concept or as a mental process. Like mathematical concepts, the category of mental processes that can be performed in the human mind or with the aid of pencil and paper, such as the mental processes of making evaluations and judgments, also is one of the three categories of abstract ideas recognized by the 2019 Guidance.

Appellants argue that the claims do not recite an abstract idea because "people do not p[er]form matrix algebra, Fourier transforms, Savitzky and Golay filtering, and model construction in their heads." Reply Br. 8. This argument is unpersuasive because Appellants provide insufficient evidence that, even if possibly inefficient, the claimed calculations are incapable of being performed with pen and paper. *See generally* App. Br.

The Supreme Court has held that performing mathematical calculations using a pencil and paper, even if the mathematical formula is primarily useful for computerized calculations, "cannot support a patent unless there is some other inventive concept in its application." *Flook*, 437 U.S. at 586, 594 (1978). Furthermore, the fact that claim 1 recites a system that comprises computer elements that perform mathematical calculations, as opposed to reciting a method, does not change our analysis. *See OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363 (Fed. Cir. 2015) ("[R]elying on a computer to perform routine tasks more quickly or more accurately is insufficient to render a claim patent eligible.").[3]

Appellants additionally argue that "the Examiner provides no evidence that the sequence of claimed steps were previously performed in the manner claimed." Reply Br. 8. This argument is unpersuasive.

"The 'novelty' of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject

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[3] Furthermore, independent claim 4, which is not argued separately from claim 1, recites limitations that are substantially similar to those of claim 1, but formats the limitations specifically as method steps of performing the mathematical calculations.

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matter." *Diehr*, 450 U.S. at 188–89. A novel and nonobvious claim directed to a purely abstract idea is, nonetheless, patent ineligible. *See Mayo*, 566 U.S. at 90; *see also Flook*, 437 U.S. at 594–95 (holding claims to "a new and presumably better method for calculating alarm limit values," of undisputed usefulness, to be directed to patent-ineligible subject matter); *see also Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 591 (2013) ("Groundbreaking, innovative, or even brilliant discovery does not by itself satisfy the § 101 inquiry.").

Accordingly, we are persuaded that the claims reasonably can be characterized as reciting either (1) mathematical concepts including elements that perform mathematical calculations or (2) mental processes including evaluations and judgments. Thus, we are persuaded that the claims recite an abstract idea.

We, therefore, turn to the inquiry of whether the claims integrate the abstract ideas into a practical application under Step 2A, prong 2, of the 2019 Guidance.

Step 2A, Prong 2

Appellants argue that the claims are integrated into a practical application because, for example,

> [a]s in *Bascom*,[4] claim 1 does not preempt an abstract idea, or the use of a processor to perform the mathematical calculations, but instead carves out a specific approach to solving the technological problem of updating a structured activity net

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[4] *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016).

> model of the business process to reflect the detected change and
> computing a change metric.

Reply Br. 11.

As a threshold matter, whether the claims preempt to abstract idea is
not dispositive. The Supreme Court has described "the concern that drives
this exclusionary principle [i.e., the exclusion of abstract ideas from patent
eligible subject matter] as one of pre-emption." *Alice*, 573 U.S. at 216.
However, characterizing preemption as a driving concern for patent
eligibility is not the same as characterizing preemption as the sole test for
patent eligibility. As our reviewing court has explained: "The Supreme
Court has made clear that the principle of preemption is the basis for the
judicial exceptions to patentability" and "[f]or this reason, questions on
preemption are inherent in and resolved by the § 101 analysis." *Ariosa
Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015)
(citing *Alice*, 573 U.S. at 216). Although "preemption may signal patent
ineligible subject matter, the absence of complete preemption does not
demonstrate patent eligibility." *Id.*

Turning to the remainder of Appellants' argument, we are
unpersuaded that the claims "solv[e] the technological problem of updating a
structured activity net model of the business process to reflect the detected
change and computing a change metric." App. Br. 17. Using a computer
merely to carry out a series of mathematical algorithms does not constitute
solving a technical problem. Nor does it constitute an improvement to the
functioning of a computer (*see* MPEP § 2106.05(a)), the creation of a
particular machine or transformation (*see* MPEP § 2106.05(b), (c)), or
otherwise add any meaningful limitations (*see* MPEP § 2106.05(e)). "It has
been clear since *Alice* that a claimed invention's use of the ineligible concept

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to which it is directed cannot supply the inventive concept that renders the invention 'significantly more' than that ineligible concept." *BSG Tech LLC v. Buyseasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018).

Appellants' comparisons of the present claims to the patent-eligible claims of *McRO*[5] and *Bascom* (*see, e.g.*, Reply Br. 8–11) also are unpersuasive. Claim 1 of *McRO* recited a step of actually applying the claimed morph data so as to carry out the three-dimensional animation: "applying said final stream of output morph weight sets to a sequence of animated characters to produce lip synchronization and facial expression control of said animated characters." *McRO*, 837 F.3d at 1308. Presently appealed claim 1, in contrast, does not include any limitations that actually apply the claimed mathematical algorithms. Claim 1 merely recites a list computer functionalities ("a transformer," "a smoothing filter," and "a change detector") for performing the mathematical-algorithm and decision-making abstract ideas, themselves.

Similarly contrastable, the *Bascom* court determined that the claimed content-filtering system at issue there represented an improvement to the performance of the computer system itself:

> *the invention is not claiming the idea of filtering content simply applied to the Internet. The '606 patent is instead claiming a technology-based solution* (not an abstract-idea-based solution implemented with generic technical components in a conventional way) *to filter content on the Internet that overcomes existing problems with other Internet filtering systems.* By taking a prior art filter solution (one-size-fits-all filter at the ISP server) and making it more dynamic and efficient (providing individualized filtering at the ISP server), *the claimed*

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

invention represents a "software-based invention[ ] that improve[s] the performance of the computer system itself." Bascom, 827 F.3d at 1351 (emphasis added).

The present claims, though, do not improve the functioning of the recited processor. Rather, the processor is being used to perform more efficiently the recited steps of transforming and smoothing graphs, calculating eigenvalues, updating models, and computing metric changes. Relying on a "processor" to "perform routine tasks more quickly or more accurately is insufficient to render a claim patent eligible." *OIP Techs., Inc.*, 788 F.3d at 1363 (Fed. Cir. 2015). Our reviewing court also held more recently that where an "invention makes the *trader* faster and more efficient, not the computer . . . [, it] is not a technical solution to a technical problem." *Trading Techs. Int'l v. IBG LLC*, 921 F.3d 1084, 1090 (Fed. Cir. 2019).

To be sure, limitation [i] of Appellants' claim 1 additionally recites that the transformer receives a plurality of process graphs of an execution of a business process prior to the graphs actually being transformed. This receiving limitation does not constitute a mathematical calculation. However, the step of receiving the process graph data is insufficient to integrate the abstract idea into a practical application. The receiving step merely constitutes insignificant extra-solution data-gathering activity. *See, e.g., OIP Techs.*, 788 F.3d at 1363 (presenting offers and gathering statistics amounted to mere data gathering); *see also* MPEP § 2106.05(g).

Step 2B

Appellants do not persuade of us that the Examiner erred in determining that the claims fail to recite significantly more than the noted abstract ideas. The Examiner cites Appellants' Specification for evidence

that the claimed computer, processor, and memory are generic computer structures merely are used for well-understood, routine, and conventional activities. Final Act. 12–14 (citing Spec. ¶¶ 8, 27, 36, 41–44, 46, 55–65, 67).

We agree with the Examiner that these cited passages do not indicate that anything other than generic computer components are being employed to carry out the claimed steps. Other passages of Appellants' Specification also support the Examiner's conclusion. For example, Appellants' Specification includes the following disclosure:

> *Aspects of the present invention are described below with reference to* flowchart illustrations and/or block diagrams of methods, apparatus (systems) and *computer program products according to embodiments of the invention.* It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. *These computer program instructions may be provided to a processor of a general purpose computer*, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

Spec. ¶ 31 (emphasis added).

Conclusion

Appellants do not persuade us that the Examiner erred in determining that independent claim 1 is directed to patent-ineligible subject matter. Accordingly, we sustain the rejection of that claim and also the rejection of claims 2–5 and 15, which Appellants do not argue separately. App. Br. 36.

DECISION

The Examiner's decision rejecting claims 1–5 and 15 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). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED