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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* ANTHONY A. RENSHAW

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Appeal 2019-000412  
Application 14/482,685  
Technology Center 3600

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Before J. JOHN LEE, DANIEL J. GALLIGAN, and  
DAVID J. CUTITTA II, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>1</sup> appeals from the Examiner's decision to reject claims 1–22. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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<sup>1</sup> We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Axioma, Inc. Appeal Br. 1.

### CLAIMED SUBJECT MATTER

The present invention relates generally to calculating factor risk models to analyze the risk of a portfolio of financial investments. Abstract. Independent claim 1 is illustrative of the claims on appeal and is reproduced below with bracketed lettering added for discussion purposes:

1. A non-transitory computer-readable medium having stored thereon computer-executable instructions which when executed by a programmed computer perform a method for modifying an original factor-factor covariance matrix of an original factor risk model, comprising:

[a] electronically receiving by the programmed computer the original factor risk model, said original factor risk model comprising a set of factors, a matrix of factor exposures, the original matrix of factor-factor covariances, and a matrix of specific covariances;

[b] partitioning by the programmed computer the set of factors of the original factor risk model into three or more groups of factors, three of which are a dominant first group, and a subordinate second group, and a subordinate third group;

[c] determining a new estimate for a submatrix of the original matrix of factor-factor covariance matrix between the second and third groups that depends only on submatrices of the original factor-factor covariance matrix of the first group with itself, the first group with the second group, and the first group with the third group;

[d] determining a modified factor-factor covariance matrix  $m$  which the new estimate replaces the submatrix of the original factor-factor covariance matrix between the second and third groups;

[e] determining a modified factor risk model that uses the matrix of factor exposures and matrix of specific covariances of the original factor risk model and the modified factor-factor covariance matrix; and

[f] electronically outputting the modified factor risk model using an output device.

#### REJECTIONS ON APPEAL

Claims 1–22 stand rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Final Act. 8–13.

Claims 1–22 stand rejected under 35 U.S.C. § 102(a)(1) as being anticipated by Madhavan.<sup>2</sup> *Id.* at 14–23.

Our review in this appeal is limited only to the above rejections and the issues raised by Appellant. Arguments not made are waived. *See* 37 C.F.R. §§ 41.37(c)(1)(iv), 41.39(a)(1); MPEP § 1205.02.

#### ANALYSIS

##### A. *Rejection Under § 101 for Patent-Ineligible Subject Matter*

Appellant appeals the Examiner’s rejection of claims 1–22 as ineligible subject matter under § 101. Appeal Br. 19–25. The majority of Appellant’s arguments are directed to limitations recited in claim 1. *See* Appeal Br. 19–22. Appellant also discusses limitations specific to claims 13, 15, and 19–22. *See id.* at 23–25. We select independent claim 1 as representative of Appellant’s § 101 arguments for all claims and discuss the additional limitations recited in claims 13, 15, and 19–22 as appropriate. *See* 37 C.F.R. § 41.37(c)(1)(iv).

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 held that § 101 includes implicit exceptions—laws of nature, natural phenomena, and abstract ideas—which

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<sup>2</sup> Madhavan, US 2004/0078319 A1, published Apr. 22, 2004.

are not patent-eligible. *See Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014). In January 2019, the Office issued the 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (“January 2019 Guidance”), which addresses the manner in which § 101 case law is to be applied by the Office. More recently, the Office issued an update to the 2019 Guidance to explain further the manner in which the January 2019 Guidance should be implemented. *See* October 2019 Patent Eligibility Guidance Update, 84 Fed. Reg. 55,942 (Oct. 18, 2019); October 2019 Update: Subject Matter Eligibility, *available at* [https://www.uspto.gov/sites/default/files/documents/peg\\_oct\\_2019\\_update.pdf](https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf) (“October 2019 Update”). The Board is required to adhere to the January 2019 Guidance as a matter of Office policy. *See* January 2019 Guidance 51.<sup>3</sup> The January 2019 Guidance sets forth a four-part analysis for determining whether a claim is eligible subject matter under § 101; the four parts are denominated Step 1, Step 2A Prong 1, Step 2A Prong 2, and Step 2B. *See id.* at 53–56.

1. *January 2019 Guidance Step 1*

First, under “Step 1,” we consider whether the claimed subject matter falls within the four statutory categories set forth in § 101, namely “[p]rocess, machine, manufacture, or composition of matter.” January 2019 Guidance 53–54; *see* 35 U.S.C. § 101. Each of the relevant claims recites “[a] non-transitory computer-readable medium” or “[a] system.” As such, the claims are each directed to a statutory class of invention within

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<sup>3</sup> Although the Office Action at issue, as well as all the briefing for this appeal, was completed before the 2019 Guidance was issued, the 2019 Guidance “applies to all applications . . . filed before, on, or after January 7, 2019.” 2019 Guidance 50.

35 U.S.C. § 101, i.e., manufactures or machines. Consequently, we proceed to the next step of the analysis.

2. *January 2019 Guidance Step 2A Prong 1*

Second, under “Step 2A Prong 1,” we evaluate “whether the claim recites a judicial exception, i.e., an abstract idea, a law of nature, or a natural phenomenon.” 2019 Guidance 54; *see Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216–17 (2014). The Examiner determined the claims describe an abstract idea because the claims recite “mathematical algorithms to be carried out on mathematical descriptions of mathematical relationships.” Final Act. 8, 11. We agree with the Examiner’s determination because such mathematical algorithms, descriptions, and relationships are “mathematical concepts,” as described in the January 2019 Guidance and October 2019 Update. October 2019 Update 3–4.

Appellant argues, “the present invention relates to a particular approach that can be utilized to improve the factor-factor covariance estimates of a factor risk model,” and “[s]uch approaches are not abstract at all as they are implemented in systems employed around the world which are advantageously employed in the management of billions of dollars of investments.” Appeal Br. 21. Still further, Appellant argues the Examiner read “large numbers of words out of claims” and did not consider the claims as a whole. *Id.* at 20.

We are not persuaded. Our reviewing court, addressing similar claims reciting systems and methods for performing certain mathematical analyses of investment information, has stated that “selecting certain information, analyzing it using mathematical techniques, and reporting or displaying the results of the analysis” is an ineligible concept. *See SAP Am., Inc. v.*

*InvestPic, LLC*, 898 F.3d 1161, 1167 (Fed. Cir. 2018). Here, like *SAP*, even assuming “the present invention relates to a particular approach that can be utilized to improve the factor-factor covariance estimates of a factor risk model” to manage investments (Appeal Br. 21), the claimed approach recites mathematical concepts and, so, recites an abstract idea. Indeed, the Specification supports the determination that the claimed approach to improving factor-factor covariance estimates of a factor risk model is a process reflecting mathematical concepts. The exemplary factor risk model disclosed by the Specification is a mathematical equation (equation 6) representing a collection of matrices, i.e., an array of mathematical objects:

$$B = [B_1 \quad B_2 \quad B_3] \quad \Delta = [\Delta] \quad f = \begin{bmatrix} f_1 \\ f_2 \\ f_3 \end{bmatrix} \quad \Omega = \begin{bmatrix} \Omega_{11} & \Omega_{12} & \Omega_{13} \\ \Omega_{12}^T & \Omega_{22} & \Omega_{23} \\ \Omega_{13}^T & \Omega_{23}^T & \Omega_{33} \end{bmatrix}$$

Spec. 16:3–4. The Specification goes on to describe a series of mathematical equations, i.e., equations 7–23, resulting in a modified factor-factor covariance matrix, i.e., equation 24:

$$\ddagger \quad \tilde{\Omega} = \begin{bmatrix} \Omega_{11} & \Omega_{12} & \Omega_{13} \\ \Omega_{12}^T & \Omega_{22} & (\Omega_{21}\Omega_{11}^{-1}\Omega_{13}) \\ \Omega_{13}^T & (\Omega_{31}\Omega_{11}^{-1}\Omega_{12}) & \Omega_{33} \end{bmatrix}$$

*Id.* at 17:10–19:14. As such, the Specification supports the Examiner’s determination that the claims recite mathematical concepts.

Turning to the claims, and representative claim 1 in particular, we disagree with Appellant that the Examiner read words out of the claim and “fail[ed] to consider the actual words of the claims as a whole.” Appeal Br. 20. The Examiner addressed the claim’s limitations sufficiently, in the

context of the whole claim, and explained cogently why the claim recites mathematical concepts. *See* Final Act. 8–12.

For example, the Examiner described limitation [a] as “receiv[ing] mathematical descriptions of mathematical relationships,” reflecting “a speculation, i.e., a theory, based on influences on the stock market derived from events past, present and even anticipated.” Final Act. 8, 10. Indeed, limitation [a] recites receiving an “original factor risk model,” which, as discussed above, is a mathematical concept. That risk model comprises “a set of factors” that are variables in the model and certain matrices, again describing mathematical concepts. Further, the Examiner described limitations [b]–[e] as “apply[ing] mathematical algorithms to the mathematical descriptions,” which, in particular, “apply mathematics and probability laws” and “use the result of the applied mathematics and probability laws to improve the original speculation,” i.e., the original risk model. *Id.* at 8–9, 11. These limitations recite, for example, an “estimate for a submatrix,” “a modified factor-factor covariance matrix,” and “a modified factor risk model.” Still further, the Examiner described limitation [f] as presenting the resultant application of mathematical concepts. Final Act. 9, 11. This is consistent with the language of limitation [f], which recites “outputting” the “modified factor risk model” that was the result of the mathematical concepts applied in the prior limitations. After examining the limitations in the claim, the Examiner determined that the collection of limitations recited in the claim as a whole recites a process for “applying mathematics and probability laws.” Final Act. 10–11. We agree with the Examiner’s analysis, as discussed above, as well as her conclusion that the claim recites mathematical concepts.

The Examiner’s description of the claim’s application of mathematical concepts also indicates a mental process, an additional category of abstract idea. *See* January 2019 Guidance 52. Specifically, limitation [b], reciting “partitioning . . . the set of factors” into a “dominant first group, a subordinate second group, and a subordinate third group,” describes a process of prioritizing risk factors, i.e., market, country, local, and industry risk factors. *See* Spec. 9:24–10:1 (“[I]dentify the dominant factors in a factor-factor covariance matrix that best describe the sources of return and risk.”), 20:6–7. Prioritizing which factors are considered to manage risk in an investment is an evaluation or judgement a human can practically perform in the mind. In fact, the Specification describes that “in one aspect of the present invention, the user must determine the factor groups.” Spec. 11:1–3; *see id.* at 20:10–11 (“[R]esearchers have been focused on the performance of the industry and country factors.”). “If a claim, under its broadest reasonable interpretation, covers performance in the mind but for the recitation of generic computer components, then it is still in the mental processes category unless the claim cannot practically be performed in the mind.” January 2019 Guidance 52 n.14.

Accordingly, the claims recite multiple categories of abstract ideas, i.e., mathematical concepts and a mental process, which are designated as meeting the abstract idea exception under the January 2019 Guidance and the October 2019 Update. Rather than considering those categories as a plurality of separate abstract ideas, we consider those related multiple categories together as one abstract idea for purposes of our analysis, as provided by the October 2019 Guidance. October 2019 Guidance at 2.

3. *January 2019 Guidance Step 2A Prong 2*

Having determined that the claims recite an abstract idea, we proceed to “Step 2A Prong 2” of the January 2019 Guidance, which requires that we evaluate whether “the claim as a whole integrates the recited judicial exception into a practical application of the exception.” January 2019 Guidance 54. “A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception.” *Id.*; see *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 78 (2012).

The January 2019 Guidance specifies that this evaluation is conducted by first “[i]dentifying whether there are any additional elements recited in the claim beyond the judicial exception(s),” then “evaluating those additional elements individually and in combination to determine whether they integrate the exception into a practical application.” January 2019 Guidance 54–55. Appellant argues “the present claims address new and improved tools not found in the prior art.” Appeal Br. 20, 23–24; see Reply Br. 2. Additionally, Appellant asserts that “the present invention is necessarily rooted in computer technology” and, so, “an asserted technological improvement is achieved.” Appeal Br. 24; see *id.* at 28. According to the Examiner, however, the “claims do not offer any ‘technological improvement’” that would integrate the recited abstract ideas into a practical application. See Ans. 5. We agree with the Examiner.

We are not persuaded that the claims integrate the abstract idea into a practical application by providing “new and improved tools.” Appeal

Br. 20, 23–24. Turning to representative claim 1, the “tool” recited in the claim is “a programmed computer” performing “computer-executable instructions.” But the improvement recited in the claim does not improve the programmed computer itself. Instead, the alleged improvement recited in the claim is an improvement to the abstract idea, i.e., mental processes and mathematical concepts used to analyze investment risk. Although the computer is programmed to execute steps to perform the abstract idea discussed above, the execution of programming is simply the generic function of a computer. Similarly, while Appellant argues that claims 13, 15, and 19–22 also “provide a user with an improved” or “advantageous tool,” the “programmed computer” recited by those claims also is not improved. *Id.* at 23. Appellant again points out additional improvements to the abstract idea, i.e., “testing partitioning[] under selected market conditions” or selecting “factors.” *Id.* As in claim 1, however, improvements to the abstract idea that a computer merely executes are not improvements to the computer itself. As such, we are not persuaded the claims recite an improvement to the “tool” recited in the claims, i.e., a “programmed computer.” Like *SAP*, the present “subject is nothing but a series of mathematical calculations based on selected information and the presentation of the results of those calculations . . . . No matter how much of an advance in the finance field the claims recite, the advance lies entirely in the realm of abstract ideas” and does not confer subject matter eligibility. 898 F.3d at 1163.

We also are not persuaded the claims are rooted in computer technology. Appeal Br. 24. As discussed above, the claims recite mental processes and mathematical concepts. Those mental processes and

mathematical concepts are used to “analyz[e] the risk of a portfolio of financial investments,” and, in particular, to “calculat[e] factor risk models that predict the risk and tracking error of portfolios.” Spec. 1:6–9, 9:10–13. Analyzing and predicting investment risk is a financial problem, not a computer problem. Thus, Appellant does not persuade us that the claims are rooted in computer technology.

Additionally, none of the remaining indicia of integration listed by the January 2019 Guidance are present in the claims. January 2019 Guidance 55; *see* MPEP § 2106.05(a)–(c), (e). For example, the claims do not recite a particular machine and, instead, generically recites “a programmed computer.” Nor do the claims recite the “[t]ransformation and reduction of an article ‘to a different state or thing.’” *Bilski*, 561 U.S. 593, 604 (2010); MPEP § 2106.05(c).

Therefore, we determine the claims are not directed to a specific asserted improvement in computer technology or otherwise integrated into a practical application. Consequently, we conclude the claims are “directed to” a judicial exception. January 2019 Guidance 54.

#### 4. *2019 Guidance Step 2B*

Having concluded that the claims recite judicial exceptions but do not integrate them into a practical application, we finally turn to whether the claim provides an “inventive concept,” i.e., whether the additional elements beyond the exceptions, individually and as an ordered combination, amount to “significantly more” than the exceptions themselves. *Id.* at 56.

The Examiner determined the “claims do not include additional elements amounting to significantly more than the judicial exception” because any additionally recited elements are “generic computer

components . . . described at a high level of generality” that “provide only conventional and routine computer functions previously known in the industry.” Final Act. 12. We agree with the Examiner.

Appellant argues “the claims should be addressed consistent with *Berkheimer v. HP Inc.*, 881 [F.3d] 1360 (Fed Cir 2018) which addressed whether certain claim limitations represent well-understood, routine conventional activity or not.” Reply Br. 1–2; *see* Appeal Br. 24. While the fact that *Berkheimer* is applicable precedent cannot be disputed, Appellant fails to point out which “certain claim limitations” are not well-understood, routine, or conventional, whether under *Berkheimer* or any other authority. *See* Reply Br. 1–2; *see also* Appeal Br. 24. We decline to speculate as to which “certain claim limitations” Appellant refers to.

Further, other than the recited abstract ideas discussed above, the claims recite a “non-transitory computer-readable medium having stored thereon computer-executable instructions which when executed by a programmed computer perform a method” and steps performed “by the programmed computer.” *See* Final Act. 10–11. As the Examiner finds, that language recites “generic computer components” that, considered alone or as an ordered combination, “provide only conventional and routine computer functions previously known in the industry.” Final Act. 12. In particular, the Examiner relies on *Alice* to support the finding that the computing components recited in the claims, i.e., “a programmed computer,” a “programmed processor,” and “memory,” are generic components that do not transform the claim into a patent-eligible invention. *Id.* at 9. Moreover, the Specification supports the Examiner’s finding. In particular, the Specification states that the claimed invention is performed by common, off-

the-shelf computing equipment, e.g., “personal computers, workstations, computer servers or mobile devices such as cell phones, tablets, iPads™, iPods™ and the like.” Spec. 13:15–17; *see id.* 13:18–14:24. Thus, we conclude that the claims do not provide an inventive concept because the additional elements recited in the claims do not provide significantly more than the recited judicial exception, whether the claims’ limitations are considered individually or as an ordered combination.

Further, Appellant argues that “the claimed approaches to solving the prior art problems do not preempt other and different strategies.” Appeal Br. 21, 23–25. Although “preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015). Where claims are deemed to recite only patent-ineligible subject matter, as they are here, “preemption concerns are fully addressed and made moot.” *Id.*

Accordingly, we are not persuaded that the claims recite patent-eligible subject matter. Further, Appellant has not proffered sufficient evidence or argument to persuade us that any of the limitations in the remaining claims provide a meaningful limitation that transforms the claims into a patent-eligible application. *See* Appeal Br. 19–25. Therefore, we sustain the rejection of claims 1–22 under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter.

A. *Rejection Under § 102*

The Examiner rejected all claims as anticipated by Madhavan. Final Act. 14–23. Appellant argues all the rejected claims together. *See* Appeal Br. 25–27. As explained below, we are persuaded the Examiner erred.

Appellant argues that the Examiner erred in finding Madhavan recites “an original factor-factor covariance matrix of an original factor risk model,” “partitioning . . . the set of factors of the original factor risk model into three or more groups of factors, three of which are a dominant first group,” “determining a modified factor-factor covariance matrix,” and “determining a modified factor risk model,” as recited in claim 1 and similarly recited in claims 5, 9, 13, 15, and 17. Appeal Br. 26–27. Specifically, Appellant argues that Madhavan does not describe “factors can or should be advantageously partitioned into groups” where “one group is dominant while the others are subordinate.” *Id.* at 27. Appellant further argues that Madhavan “describe[s] a procedure for producing one and only one best factor risk model.” *Id.*

We are persuaded the Examiner erred. According to the Examiner, Madhavan’s size, growth, and market factors are “orthogonalized” to one another, and such an orthogonalization discloses “partitioning . . . the set of factors of the original factor risk model into three or more groups of factors, three of which are a dominant first group.” Ans. 9; Final Act. 2. Although Madhavan discloses that “size and growth factors are orthogonalized to the market factor; and industry factors are orthogonalized to the sector factor to which the industry belongs and to size, growth, and market factors” (Madhavan ¶¶ 27–28), it is unclear how orthogonalizing factors partitions

those factors into dominant and subordinate groups. Nor has the Examiner explained adequately how orthogonalizing factors does so. *See* Ans. 9.

Further, the Examiner found that “orthogonaliz[ing] the factors discloses ‘before’ and ‘after’, i.e., an unmodified matrix and a modified matrix.” Ans. 9–10; *see* Final Act. 14–15. However, the Examiner did not explain what “unmodified matrix” she refers to. *See* Ans. 9–10. The matrix the Examiner identifies in paragraph 30 of Madhavan is formed after the factor orthogonalization, and so appears to be the “modified matrix” the Examiner references, but it is unclear what previous, unmodified matrix that modified matrix is constructed from, if any. *See also* Madhavan Fig. 1.

Accordingly, based on the record before us, we determine the Examiner erred in finding that Madhavan describes “an original matrix of factor-factor covariance matrix of an original factor risk model,” “partitioning . . . the set of factors of the original factor risk model into three or more groups of factors, three of which are a dominant first group,” “determining a modified factor-factor covariance matrix,” and “determining a modified factor risk model,” as recited in claim 1 and similarly recited in claims 5, 9, 13, 15, and 17. Dependent claims 2–4, 6–8, 10–12, 14, 16, and 18–22 fall with their respective independent claims. Therefore, we do not sustain the rejections of claims 1–22 under 35 U.S.C. § 102.

CONCLUSION

In Summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>References/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1-22	101	Eligibility	1-22	
1-22	102(a)(1)	Madhavan		1-22
<b>Overall Outcome</b>			1-22	

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

AFFIRMED