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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WEI SHAN DONG, ARUN HAMPAPUR,
HONGFEI LI, LI LI, XUAN LIU, CHUN YANG MA, and
SONGHUA XING

Appeal 2019-000495
Application 14/450,712
Technology Center 2100

Before ALLEN R. MACDONALD, MICHAEL J. ENGLE, and
IFTIKHAR AHMED, *Administrative Patent Judges*.

AHMED, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from a final rejection of claims 1–20, which are all of the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Technology

The application relates generally to performing spatio-temporal prediction by generating new features for each of at least two multi-scale

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). According to Appellant, the real party in interest is International Business Machines Corp. App. Br. 1.

spatial datasets, the new features being based on features of each of the multi-scale spatial datasets and spatial relationships between and within the multi-scale spatial datasets. Spec. Abstract. The process then further selects, using a processor, features of interest from among the new features, trains a predictive model based on the features of interest, and predicts an event based on the predictive model. *Id.*

Illustrative Claim

Claim 1 is illustrative and reproduced below with certain limitations at issue emphasized:

1. A method of performing spatio-temporal prediction, the method comprising:

obtaining, based on communication with one or more sources, multi-scale spatial datasets, each of the multi-scale spatial datasets providing a type of information at a corresponding granularity, at least two of the multi-scale spatial datasets providing at least two different types of information at ***different corresponding granularities***, wherein each granularity defines a minimum area to which the corresponding multi-scale spatial dataset corresponds;

generating, using a processor, spatial relationships both between the multi-scale spatial datasets at the different corresponding granularities and within the multi-scale spatial datasets;

generating, using the processor, features from each of the multi-scale spatial datasets, wherein each feature of each of the multi-scale spatial datasets is a unit of the multi-scale spatial dataset;

generating, using the processor, ***new features for each of the multi-scale spatial datasets***, the new features being based on the features of each of the multi-scale spatial datasets and the ***spatial relationships between and within the multi-scale spatial datasets***;

selecting, using the processor, features of interest from among the new features;

training a predictive model based on the features of interest; and

predicting an event based on the predictive model.

REJECTION²

Claims 1–20 stand rejected under 35 U.S.C. § 101 as being directed to ineligible subject matter without significantly more. Final Act. 2–6.

ISSUE

Did the Examiner err in concluding that claim 1 was directed to ineligible subject matter without significantly more under § 101?

ANALYSIS

Principles of Law

Section 101 defines patentable subject matter: “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” 35 U.S.C. § 101. The Supreme Court, however, has “long held that this provision contains an important implicit exception” that “[l]aws of nature, natural phenomena, and abstract ideas are not patentable.” *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70 (2012) (quotation omitted). “Eligibility under 35 U.S.C. § 101 is a question of law,

² Separate patentability is not argued for claims 2–20. Therefore, we select independent claim 1 as representative. Except for our ultimate decision, we do not discuss the § 101 rejection of claims 2–20 further herein.

based on underlying facts.” *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1166 (Fed. Cir. 2018). To determine patentable subject matter, the Supreme Court has set forth a two part test.

“First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts” of “laws of nature, natural phenomena, and abstract ideas.” *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 217 (2014).

“The inquiry often is whether the claims are directed to ‘a specific means or method’ for improving technology or whether they are simply directed to an abstract end-result.” *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1326 (Fed. Cir. 2017). A court must be cognizant that “all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas” (*Mayo*, 566 U.S. at 71), and “describing the claims at . . . a high level of abstraction and untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule.”

Enfish, LLC v. Microsoft Corp., 822 F.3d 1327, 1337 (Fed. Cir. 2016).

Instead, “the claims are considered in their entirety to ascertain 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).

If the claims are directed to an abstract idea or other ineligible concept, then we continue to the second step and “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*, 573 U.S. at 217 (quoting *Mayo*, 566 U.S. at 79, 78). The Supreme Court has “described step two of this analysis as 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.” *Id.* at 217–18 (quotation omitted).

The U.S. Patent & Trademark Office recently published revised guidance on the application of § 101. USPTO, *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Guidance”). Under that guidance, we look to whether the claim recites

- (1) a judicial exception, such as a law of nature or any of the following groupings of abstract ideas:
 - (a) mathematical concepts, such as mathematical formulas;
 - (b) certain methods of organizing human activity, such as a fundamental economic practice; or
 - (c) mental processes, such as an observation or evaluation performed in the human mind;
- (2) any additional limitations that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)); and
- (3) any additional limitations beyond the judicial exception that, alone or in combination, were not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)).

See Guidance 52, 55, 56. Under the Guidance, if the claim does not recite a judicial exception, then it is eligible under § 101 and no further analysis is necessary. *Id.* at 54. Similarly, under the Guidance, “if the claim as a whole integrates the recited judicial exception into a practical application of that exception,” then no further analysis is necessary. *Id.* at 53, 54.

*The Examiner's Determination and Appellant's Contentions*³

Here, the Examiner concludes that claim 1 is directed to “the abstract idea of processing gathered data to predict an event.” Ans. 9. The Examiner further concludes that claim 1 is directed toward

collecting information (step of “obtaining [. . .] multi-scale spatial datasets [. . .]”), and *analyzing it* (steps of “generating spatial relationships both between the multi-scale spatial datasets at the different corresponding granularities and within the multi-scale spatial datasets,” “generating features from each of the multi-scale spatial datasets [. . .],” “generating new features for each of the multi-scale spatial datasets [. . .],” “selecting features of interest from among the new features,” “training a predictive model based on the features of interest,” and “predicting an event based on the predictive model”).

Id. (emphasis added). The Examiner determines that “the claim is essentially directed to collection of data, analysis of said data by generating relationships, features, selecting features used to train a model, training the model, and predicting using the model.” *Id.* The Examiner therefore concludes that “[t]he concept described in claims [1], 10, and 19 is not meaningfully different than those concepts relating to organizing or analyzing information in a way that can be *performed mentally* or is *analogous to human mental work* found by the courts to be abstract ideas.” Final Act. 3 (emphasis added).

The Examiner further determines “that the claims are not directed to a specific improvement to the way computers operate” or “to a non-conventional and non-generic arrangement of additional elements, and the

³ The contentions we discuss herein are determinative as to the § 101 rejection on appeal. Therefore, we do not discuss Appellant’s other § 101 contentions herein.

application does not describes how its particular arrangement of elements is a technical improvement over prior art ways.” Ans. 10. Specifically, the Examiner determines that although “[c]laims 1, 10, and 19 do appear to recite additional elements” such as “a processor,” “an input interface,” and “a non-transitory computer program medium comprising instructions,” those additional limitations “are [also] directed towards the abstract idea,” similar to the patents in *Electric Power Group*. *Id.* at 9. The Examiner finds that although the claims recite a computer-implemented method or system, the invention claimed “is merely a generic computer implementation that does not amount to significantly more.” *Id.*

Appellant argues that “[t]he claimed invention performs spatio-temporal prediction in a way that accounts for spatial relationships between datasets available at different scales.” App. Br. 5 (citing Spec. ¶ 14). According to Appellant, “[w]hen data (e.g., population, crime records) is available at different scales (e.g., street level, city level), prior methods failed to consider spatially sensitive factors.” *Id.* Appellant contends that the claimed invention improves event predictions by generating new features based on “spatial relationships between and within the multi-scale spatial datasets.” *Id.* at 5–6 (citing Spec. ¶ 16). Therefore, Appellant argues, claim 1 is directed to a method that improves the relevant technology of spatio-temporal prediction, and is patent eligible. *Id.* at 6 (citing *Enfish*, 822 F.3d at 1336).

Our Analysis

We are persuaded by Appellant’s arguments that the Examiner has not satisfied the proper burden for making a *prima facie* case for patent ineligibility under 35 U.S.C. § 101.

A) *USPTO Step 2A, Prong 1*

Claim 1 recites, in part, (A) “obtaining . . . multi-scale spatial datasets”; (B) “generating . . . spatial relationships both between the multi-scale spatial datasets at the different corresponding granularities and within the multi-scale spatial datasets”; (C) “generating . . . features from each of the multi-scale spatial datasets”; (D) “generating . . . new features for each of the multi-scale spatial datasets, the new features being based on the features of each of the multi-scale spatial datasets and the spatial relationships between and within the multi-scale spatial datasets”; and (E) “selecting . . . features of interest from among the new features.” App. Br. Appx. 2. Additionally, claim 1 recites the steps of (F) “training a predictive model based on the features of interest” and (G) “predicting an event based on the predictive model.” *Id.*

The Examiner concludes that claim 1 is directed to the abstract idea of “processing gathered data to predict an event,” which is similar to “collecting information, analyzing it, and displaying certain results of the collection and analysis.” Ans. 9 (citing *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016)); Final Act. 3. The Examiner broadly characterizes the step of obtaining datasets as “collection of data,” and the remaining steps recited in claim 1 as “analysis of said data by generating relationships, features, selecting features used to train a model, training the model, and predicting using the model,” finding that analysis “is similar to other ideas found to be abstract by various courts.” Ans. 9 (citing *Elec. Power Grp.*, 830 F.3d 1350); Final Act. 3. The Examiner therefore finds that claim 1 recites a process “that can be *performed mentally* or is analogous to *human mental work*.” Final Act. 3 (emphasis added).

As relevant to prong 1 of step 2A of the Guidance, Appellant argues that “the Examiner does not provide sufficient analysis with respect to the first step in the *Alice* test to establish that the claims are directed to patent ineligible subject matter,” and that the Examiner’s description of the claims as collecting information and analyzing it is “at such a high level of abstraction and untethered from the language of the claims [that it] all but ensures that the exceptions to § 101 swallow the rule.” App. Br. 6–7 (quoting *Enfish*, 822 F.3d at 1337).

We agree with the Examiner that claim 1 recites a mental process because the steps (A) through (E) listed above are recited at a high level of generality such that they could practically be performed in the human mind or by a human with a pen and paper. *See Elec. Power Grp.*, 830 F.3d at 1354 (“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”). Step (A), which requires obtaining multi-scale spatial datasets, is merely a data-gathering step, which cannot alone confer patentability. *See CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1372 (Fed. Cir. 2011). Steps (B) through (E), which recite generating relationships between the various datasets and features, are steps that can be performed with a pen and paper. *See id.* (reasoning that when a person may implement claimed steps by simply writing down the claimed data elements, those steps can all be performed in the human mind); *see also Univ. of Utah Research Found. v. Ambry Genetics Corp.*, 774 F.3d 755, 763 (Fed. Cir. 2014) (finding claims to comparing BRCA sequences, where such comparison can practically be performed in the human mind, to be directed to an abstract idea); Guidance

52 & n.14 (listing cases). Therefore, on the record before us, we determine that the Examiner’s articulated reasoning is sufficient on USPTO Step 2A, Prong 1, and that claim 1 recites a mental process, which is an abstract idea.

B) USPTO Step 2A, Prong 2

Although we agree with the Examiner that claim 1 recites the mental process of processing gathered data, the Examiner has not shown that the claim, as a whole, fails to “integrate[] the recited judicial exception into **a practical application** of the exception.” Guidance 54 (emphasis added). Put another way, the Examiner has not sufficiently addressed whether the claim does “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.* (emphasis added). Further, the analysis under prong 2 considers the claim **as a whole**, i.e., “the limitations containing the judicial exception as well as the additional elements in the claim besides the judicial exception need to be evaluated together to determine whether the claim integrates the judicial exception into a practical application.” October 2019 Patent Eligibility Guidance Update, at 12, available at <http://www.uspto.gov/PatentEligibility>.

Here, Appellant argues that “[s]patio-temporal prediction of an event is a known technological field,” and when “new features are generated based on ‘spatial relationships between and within the multi-scale spatial datasets,’ as recited by [c]laim 1,” “[t]he method of obtaining event predictions is improved.” App. Br. 5 (citing Spec. ¶¶ 14, 16). “The generation of these spatial relationships ‘both between the multi-scale spatial datasets at the **different corresponding granularities** and within the multi-scale spatial

datasets,” Appellant argues, “is a key improvement in *event prediction*.” *Id.* at 6 (citing Spec. ¶ 16) (emphasis added). Appellant points to the Specification as describing the resulting benefits over existing technology, which, Appellant argues “failed to consider spatially sensitive factors” when data was available at different granularities, e.g., population or crime records for a city, available at different scales, such as the street level and the city level. *Id.* at 5 (citing Spec. ¶ 14).

We are persuaded that the Examiner has erred. In the context of revised Step 2A, claim limitations “that reflect an improvement in the functioning of a computer, or an improvement to other technology or technical field” are indicative of a recited judicial exception being integrated into a practical application. Guidance 55 (citing *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014)); *see also* MPEP § 2106.05(a). A limitation that “applies or uses the judicial exception in some other meaningful way beyond generally linking the use of the judicial exception to a particular technological environment” similarly integrates the exception into a practical application. Guidance 55 (citing *Diamond v. Diehr*, 450 U.S. 175, 184 (1981)); *see also* MPEP § 2106.05(e).

Here, claim 1 is specifically directed to generating new features based on spatial relationships between diverse datasets and using those newly available features to *train a predictive model* that can be used to predict an event. The Specification explains how the claimed use of these new features, which were unavailable for use in prior art systems, results in an improvement when utilized in training a predictive model. Figure 2 from the Specification is reproduced below.

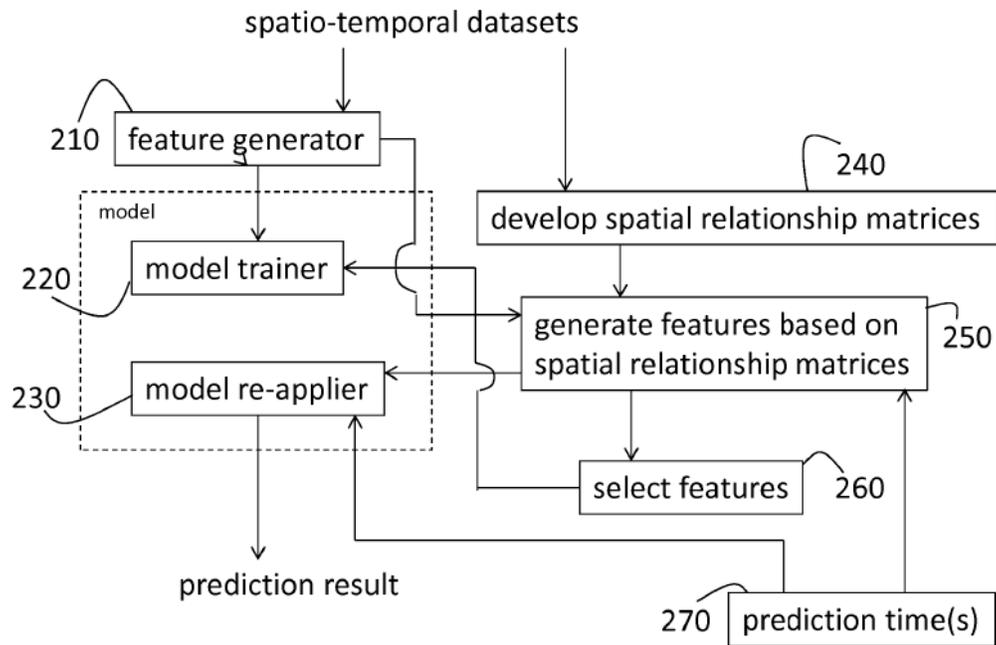


FIG. 2

Figure 2, above, is a flow diagram of performing spatio-temporal prediction according to the claimed invention. Spec. ¶ 16. With reference to Figure 2, the Specification explains:

The feature generation at block 210 in the known prediction system[s] referred to features at the *same scale*. That is, as noted above, datasets at *different scales could not* be used together unless one dataset was mapped into the scale of the other. Thus, once a scale was selected for the prediction result, features from datasets that were only available at a scale other than the selected scale *could not be used* in training the model (block 220) in the known prior prediction systems. The features refer to elements of a dataset that are factors in the prediction. For example, when the prediction is a prediction of the probability of crime and weather is one of the available datasets, temperature may be a feature (i.e., increased crime may be related to temperatures over 90 ° Fahrenheit (°F), for example).

...

Generating new features based on the spatial relationship matrices, at block 250, facilitates selecting features in consideration of spatial sensitivity at block 260. These so-called spatially sensitive features . . . are provided to the model training process at block 220.

Id. ¶ 16, 17 (emphasis added). The Specification further states:

At block 210, features are generated from the spatio-temporal datasets, the features are used *to train a model* at block 220, and the model is reapplied at block 230 based on specified prediction times at block 270 *to output the prediction result*.

Id. ¶ 16 (emphasis added).

The method recited in claim 1 is aimed at “predicting an event based on the predictive model.” The Specification lists examples of these events as pertaining to the likelihood of crime, traffic congestion, and epidemic spread characterization for a given city. *Id.* ¶ 2. The claim language and Specification therefore support that claim 1 is not only limited to the technical field of spatio-temporal prediction of an event, but also improves the predictive model used for such predictions. Claim 1 therefore improves the technical functioning of the computer by reciting a specific technique for improving the technological process of spatio-temporal prediction. *See SRI Int’l, Inc. v. Cisco Sys., Inc.*, 930 F.3d 1295, 1303 (Fed. Cir. 2019) (concluding that a claim that recites using a plurality of network monitors to analyze specific network traffic data and integrate generated reports from the monitors to identify hackers and intruders on the network constitutes an improvement in computer network technology); *see also BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350 (Fed. Cir. 2016) (holding that even though the claim at issue recites the abstract idea of

filtering, the claimed invention improves technology when the filtering limitations are considered in combination with the remaining limitations).

Because claim 1 *as a whole* integrates the recited abstract idea into a practical application of that idea under the Guidance, it is not “directed to” the recited abstract idea and thus qualifies as eligible subject matter under § 101. The Examiner thus erred in rejecting independent claim 1; independent claims 10 and 19, which recite commensurate limitations; and dependent claims 2–9, 11–18, and 20 as being patent-ineligible for the same reasons.⁴

Accordingly, given the record before us, we do not sustain the Examiner’s rejection of claims 1–20 under § 101.

⁴ We note that claim 20, which depends from claim 19, recites “[t]he computer program *product* according to claim 19.” Claim 19, however recites “[a] non-transitory computer program *medium*.” App Br. 5–6 (emphasis added). For the purposes of this Appeal, we read claim 20 as also reciting a “computer program medium.”

DECISION

For the reasons above, we reverse the Examiner's decision rejecting claims 1–20.

In summary:

Claims Rejected	35 U.S.C. §	Basis	Affirmed	Reversed
1–20	101	Ineligible subject matter		1–20
Overall Outcome				1–20

REVERSED