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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JONG WOOK KIM, ASHWIN S. KASHYAP, DEKAI LI, SANDILYA BHAMIDIPATI, AVINASH SRIDHAR, SAURABH MATHUR, and BANKIM A. PATEL

Appeal 2018-005344[1]
Application 13/701,347[2]
Technology Center 2600

Before CARLA M. KRIVAK, JAMES B. ARPIN, and NABEEL U. KHAN, *Administrative Patent Judges*.

ARPIN, *Administrative Patent Judge*.

I. DECISION ON APPEAL

Appellants appeal, under 35 U.S.C. § 134(a), the Examiner's final decision rejecting claims 1–3, 5–8, 10–12, 14–16, 18–21, 23–25, and 27–30. App. Br. 2. Claims 4, 9, 13, 17, 22, 26, and 31 are cancelled. *Id.* at 14–18 (Claims Appx.). We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

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[1] In this Decision, we refer to Appellants' Appeal Brief ("App. Br.," filed July 11, 2017); the Final Office Action ("Final Act.," mailed December 30, 2016); the Examiner's Answer ("Ans.," mailed February 22, 2018); and the Specification ("Spec.," filed November 30, 2012).

[2] According to Appellants, the real party-in-interest is Thomas Licensing DTV. App. Br. 3.

II. STATEMENT OF THE CASE

The Specification discloses methods, systems, instructions stored on computer readable media, and apparatus, which relate to "obtaining one or more keywords for semantic interpretation; computing top-k concepts in a knowledge database for the one or more keywords; and mapping the one or keywords into a concept space using the top-k concepts." Spec. 3:14–17.

> The one or more keyword[s] can be obtained in any number of ways. Keywords may be obtained using keyword extraction involving close caption data as described above in reference to FIG. 3. In other embodiments keywords can be extracted from data related to a piece of content such a summary, program description, abstract, synopsis, etc. In still other embodiments a user can provide search terms. In the description of the process below the keywords are provided as part of a document.

Id. at 11:9–24, 14:3–8, Fig. 3; *see also* App. Br. 14, 16, 17 (Claims Appx. (*see* claims 3, 16, and 25)). In particular, the Specification describes use of a SparseTopk algorithm "that can effectively estimate the scores of unseen objects in the presence of a user (application) provide[] acceptable precision rate and compute[] the approximate top-k results based on these expected scores." Spec. 3:11–13; *see id.* at 22:6–23:12, Fig. 7. A content search based on the concept space then is performed, and one or more content recommendations are provided to a user based on the performed content search. *See id.* at 12:2–4.

As noted above, claims 1–3, 5–8, 10–12, 14–16, 18–21, 23–25 and 27–30 are pending. Claims 1, 10, 14, and 23 are independent. *See* App. Br. 14, 15, 16, and 17 (Claims Appx.). Claims 2, 3, and 5–8 depend directly from claim 1; claims 11 and 12 depend directly from claim 10; claims 15, 16

and 18–21 depend directly from claim 14; and claims 24, 25, and 27–30 depends directly from claim 23. *Id.* at 14–18 (Claims Appx.).

Claim 1, reproduced below, is illustrative.

> 1. A method performed by a device for searching audio, video and/or web content, the method comprising:
>
> obtaining one or more keywords for the searching;
>
> accessing a knowledge database wherein the knowledge database is not generated from the content;
>
> computing top-k concepts in the knowledge database for the one or more keywords using a SparseTopk algorithm;
>
> mapping the one or keywords into a concept space using the computed top-k concepts from the knowledge database;
>
> performing a content search based on the concept space; and
>
> providing one or more content recommendation[s] to a user based on the performed content search.

Id. at 14 (Claims Appx.).

III. THE REJECTION

Claims 1–3, 5–8, 10–12, 14–16, 18–21, 23–25, and 27–30 stand rejected "under 35 U.S.C. [§] 101 because the claimed invention is directed to non-statutory subject matter because the claimed invention is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more." Final Act. 2; *see also* Ans. 2. We address this rejection below.[3]

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[3] The Examiner also objects to claims 1, 10, 14, and 23 "because of the following informalities: It is not clear from the claim language how the keywords for searching are obtained, i.e., are they input by the user, or, are they somehow automatically obtained and if so how?" Final Act. 2; *see also* App. Br. 8–9. Such objections are not reviewed on appeal. MPEP 706.01

IV. ANALYSIS

Under 35 U.S.C. § 101, a patent may be obtained for "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." The U.S. Supreme Court has "long held that this provision contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)). The Court in *Alice* reiterated the two-step framework previously set forth in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66, 75–79 (2012), "for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice*, 134 S. Ct. at 2355. The first step in that analysis is to "determine whether the claims at issue are directed to one of those patent-ineligible concepts," such as an abstract idea. *Id.*

The Court acknowledged in *Mayo* 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. We, therefore, look to whether the claims focus on a specific method or means that improves the relevant technology, or are directed instead to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335–36 (Fed. Cir. 2016). If the claims are not directed to an abstract idea, the inquiry ends. *Enfish,* 822 F.3d at 1339; *see also Ancora Techs., Inc. v. HTC America, Inc.*, 908

Rev. 08.2017, January 2018. All MPEP citations herein are to MPEP Rev. 08.2017, January 2018.

F.3d 1343, 1349 (Fed. Cir. 2018) ("It therefore passes muster under *Alice* step one, as it is not directed to patent-ineligible subject matter. We need not and do not apply step two of the *Alice* analysis."); *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1346 (Fed. Cir. 2017) ("While the two steps of the *Alice* framework are related, the 'Supreme Court's formulation makes clear that the first-stage filter is a meaningful one, sometimes ending the § 101 inquiry.'") (citation omitted). Otherwise, the inquiry proceeds to the second step in which the elements of the claims are considered "individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent-eligible application." *Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 78, 79). That is, whether the claims recite elements making the claims *significantly more* than the judicially excepted subject matter.

A. Alice Step One

With regard to the first step of the *Alice* analysis, the Examiner determines that:

> Claims 1–3, 5–8 are directed to a method for performing semantic interpretation for keywords. *Claims 1–3, 5–8 are directed to an abstract idea of performing semantic interpretation by using mathematical principle to perform calculations.*
>
> . . . .
>
> Claims 14, 16, 18–21 are directed toward a non-transitory computer readable medium implementing the method of claims 1–3, 5–8 are rejected under 35 U.S.C. [§] 101 under similar rationale.
>
> Claims 23–25, 27–30 are directed toward an apparatus which perform the method of claims 1–3, 5–8 and are rejected under similar rationale.

Final Act. 3 (emphasis added); *see also* Ans. 2–3. In particular, the Examiner finds that the recited methods, systems, instructions stored on computer readable media, and apparatus "merely organize[] information through mathematical correlations, that can be performed on any general purpose computer, or hardware apparatus, or using a combination of both a computer and hardware." Final Act. 4; *see also*, *e.g.*, Spec. 5:1–6:13. Moreover, the Examiner finds that "[t]he claim(s) [do] not require improvements to another technology or technical field, improvements to the functioning of a computer, nor meaningful limitations beyond generally linking the use of an abstract idea to a particular technological environment." *Id.* at 5. Finally, the Examiner concludes that the recited methods, systems, instructions stored on computer readable media, and apparatus are directed

> merely [to] a generic computer performing the mathematical function of the independent claims. On pages 14–23 of the [S]pecification, the claimed invention is described in mathematical terms using probabilities functions for top-k processing, and as such the claimed invention is definitely mathematical in nature requiring no more than a generic computer to perform generic computer functions that are well understood, routine, and conventional activities previously known in the industry.

Id. at 6.

Appellants disagree and contend that the pending claims are not impermissibly directed to an abstract idea. In particular, Appellants contend:

> The present principles relate to improvements in computer-related technology and more specifically to improvements in computer-related technology of content (e.g., audio, video and/or web content) searching and recommendation. In particular, the

> present principles convert one or more search words into top k number of concepts using a knowledge database (e.g., Wikipedia). As explained in the specification, part of the improvement brought on by the present principles is to be able to efficiently map the search keywords into a limited number of the best k concepts from a concept knowledge database (see e.g., Abstract, [0008], [0009], [0049]). The obtained top k concepts are then used for further searching of the content in order to provide the improved audio, video and/or web content searching, and therefore, making better content recommendation to a user.

App. Br. 8–9. Although other methods of ranked or top-k processing have been proposed, the Specification explains that those methods are deficient. Spec. 15:20–16:13, 16:25–17:10–16 ("**Naive Solutions to** S_k In this section, naive schemes (i.e. impractical solutions) are first described for exactly computing the top-k concepts, S_k, of a given document."). The Specification asserts that the key challenge to the problem of mapping a document from word-space into concept-space is "to efficiently identify such approximate top-k concepts, $S_{k,\alpha}$. To address this problem, a *novel* ranked processing algorithm is presented to efficiently compute $S_{k,\alpha}$ for a given document." *Id.* at 17:11–13 (emphasis added), 22:6–23:12 (describing the SparseTopk algorithm with respect to pseudo code set forth in Fig. 7).

The Specification explains that the SparseTopk algorithm is a No Repeating Algorithm ("NRA") based method for computing S_k. *Id.* at 17:17–18:14. "NRA is employed as a base framework, since it requires only a sorted-access method, and thus is suitable for high-dimensional data, such as a concept matrix C." *Id.* at 17:6–10 (distinguishing NRA from "prohibitively expensive" alternatives). Nevertheless, NRA is itself deficient. As the Specification further explains,

> NRA maintains a cut off score, min_k, equals to the lowest score in the current top-k candidates. NRA would stop the computation

> when a cut off score, min_k, is greater than (or equal to) the highest best-score of concepts not belonging to the current top-k candidates. Although this stopping condition always guarantees to produce the correct top-k results (i.e., S_k in our case), such stopping condition is overly pessimistic, assuming that all unknown values of each concept vector would be read after the current scan position of each list. This, however, is not the case especially for the sparse *keyword-concept* matrix where unknown values of each concept vector are expected to be 0 with a very high probability. Therefore, NRA may end up scanning the entire lists, which would be quite expensive.

Id. at 18:6–14. Thus, the Specification explains that:

> As described above, the threshold-based algorithms are based on the assumption that given sorted-lists, each object has a single score in each list. The possible scores of unseen objects in NRA algorithm are computed based on this assumption. This assumption, however, does not hold for the sparse keyword-concept matrix where most of entries are 0. Thus, []first a method is described to estimate the scores of unseen objects with the sparse keyword-concept matrix, and then present a method to obtain the approximate top-k concepts of a given document leveraging the expected scores.

Id. at 18:21–27. Consequently, we understand that the recited SparseTopk algorithm is different from known ranking algorithms and achieves improvements in semantic reinterpretation in the recited methods, systems, instructions stored on computer readable media, and apparatus. *See id.* at 24:1–2 ("Experimental results show that the proposed technique significantly improves efficiency of semantic reinterpretation without causing significant reduction in precision.").

As the Federal Circuit explained in *Thales Visionix*,

> In *Enfish LLC v. Microsoft Corp.*, we held claims directed to a self-referential logical model for a computer database patent-eligible under step one of *Alice*. The disclosed technique enabled faster searching and more effective storage of data than previous

> methods. We found the claims directed to "a specific improvement to the way computers operate, embodied in the self-referential table." We explained that the claims are "not simply directed to any form of storing tabular data, but instead are specifically directed to a self-referential table for a computer database" *that functions differently than conventional databases*.
>
> In *Diamond v. Diehr[, 450 U.S. 175 (1981)], the Supreme Court confirmed the eligibility of patent claims despite the inclusion of a mathematical formula in a claimed method for molding raw, uncured rubber into cured rubber products.* The claimed method used the well-known Arrhenius equation to calculate the optimal cure time using, among other variables, the internal temperature of the mold. The invention improved upon prior art molding methods by constantly measuring the actual temperature inside the mold, recalculating the ideal cure time, and automatically opening the press when the ideal cure time equaled the actual time elapsed.

Thales Visionix, 850 F.3d. at 1347 (emphases added, citations omitted). Thus, the Federal Circuit concluded that, like those at issue in *Diehr*, the claims in *Thales Visionix* were not directed to a judicial exception to patent eligibility, but, instead, to the particular mathematical application of laws of physics. *Id.* at 1348.

Similarly, in *Ancora*, the Federal Circuit determined that methods of preventing a computer from running unauthorized software are not abstract "if done by a specific technique that departs from earlier approaches to solve a specific computer problem." *Ancora*, 908 F.3d. at 1348. Thus, the Federal Circuit concluded the claims at issue in *Ancora* were not abstract under step one of *Alice* analysis because those claims were "directed to a solution to a computer-functionality problem: an improvement in computer functionality that has 'the specificity required to transform a claim from one claiming only a result to one claiming a way of achieving it.'" *Ancora*, 908

F.3d at 1349; *see also Data Engine Techs. LLC v. Google LLC*, 906 F.3d 999, 1007–1008 (Fed. Cir. 2018) (Claims directed to "a specific method for navigating through three-dimensional electronic spreadsheets" are "not directed to an abstract idea."); *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1363 (Fed. Cir. 2018) (The claims "are directed to an improvement in the functioning of computers, particularly those with small screens," not to an abstract idea.); *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1259 (Fed. Cir. 2017) (Claims are "directed to an improved computer memory system, not to the abstract idea of categorical data storage."). Like the claims at issue in *Ancora*, as well as those in *Data Engine*, *Core Wireless*, and *Visual Memory*, the pending claims specifically identify how an improvement in computer functionality is achieved and a particular improved result. *See* Final Act. 5–6.

As with the claims at issue in *Diehr*, we determine that the use of a mathematical equation, i.e., the SparseTopk algorithm, is required to complete the methods, systems, instructions stored on computer readable media, and apparatus recited in the pending claims. *Thales Visionix*, 850 F.3d at 1349. Similar to the claims at issue in *Enfish*, we find that the pending claims describe new and useful techniques for performing content searches based on a concept space and providing content recommendations to users based on such searches—an improvement in computer-related technology. *Id.*; *see also* App. Br. 8–9. Thus, the *use* of a mathematical equation to achieve the particular application recited in the pending claims "does not doom the claims to abstraction." *Thales Visionix*, 850 F.3d at 1349.

We are persuaded that the Examiner erred in finding the pending claims directed to an abstract idea.

B. Alice Step Two

Because we determine the pending claims are not directed to an abstract idea, we need not proceed to step two of the *Alice* analysis. *Alice*, 134 S.Ct. at 2355; *see Enfish*, 822 F.3d at 1339. The pending claims are patent eligible under 35 U.S.C. § 101.

We are persuaded the Examiner erred in determining that the claims are directed to an abstract idea. Consequently, we are persuaded that the Examiner erred in rejecting claims 1–3, 5–8, 10–12, 14–16, 18–21, 23–25 and 27–30, and we do not sustain the rejection thereof.

V. DECISION

For the above reasons, we reverse the Examiner's decision rejecting claims 1–3, 5–8, 10–12, 14–16, 18–21, 23–25, and 27–30.

REVERSED