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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANETTE KUBLER and WILLFRIED WIENHOLT

Appeal 2017-008579
Application 11/764,815
Technology Center 3600

Before KALYAN K. DESHPANDE, CHARLES J. BOUDREAU,
and SHARON FENICK, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants¹ appeal under 35 U.S.C. § 134(a) from the Examiner’s Final Rejection of claims 1–10 and 12–19, which are all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.²

¹ Appellants identify Siemens Aktiengesellschaft as the real party in interest. App. Br. 2.

² This Decision refers to the Examiner’s Final Office Action mailed June 3, 2016 (“Final Act.”); Appellants’ Appeal Brief filed November 3, 2016 (“App. Br.”); the Examiner’s Answer mailed March 23, 2017 (“Ans.”); Appellants’ Reply Brief filed May 22, 2017 (“Reply Br.”); and the original Specification filed June 19, 2007 (“Spec.”).

STATEMENT OF THE CASE

The Claimed Invention

Appellants' invention relates to urban planning and identifying interdependencies among urban development factors. Spec. 1:9–11, 1:25–28. In particular, the invention relates to “identifying dependency loops . . . in an urban development graph.” *Id.* at 1:5–7.

Claims 1, 6, and 12 are independent. Claim 1, reproduced below, is illustrative of the subject matter on appeal:

1. A method for planning urban development, said method comprising:

inputting urban development factors, via an interface, into an urban development link matrix template displayed on a display of an apparatus for analyzing dependency loops in an urban development graph, the apparatus including at least one non-transitory computer readable medium storing instructions translatable by at least one processor;

inputting weighting factors, via the interface, into the apparatus;

generating an urban development link matrix (UDLM) by the apparatus using the urban development factors and the weighting factors;

storing the generated urban development link matrix (UDLM) in a memory of the apparatus;

evaluating the stored urban development link matrix (UDLM) using a calculating unit of the apparatus employing an ant algorithm to identify dependency loops in and generate an urban development graph, the urban development graph having nodes each representing one of the inputted urban development factors, and

identifying key factors for development of an urban infrastructure based on the evaluation of the UDLM and prioritizing investment based on the key factors identified, and

identifying each loop as self-regulating or unstable,

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wherein said nodes are connected to each other via weighted edges describing dependencies between said nodes, and

wherein said evaluating step includes calculating an objective function value for each loop of said urban development graph and sorting the loops according to the respective calculated objective function values of said loops.

App. Br. 10 (App. A).

Rejections on Appeal

Claims 1–10 and 12–19 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Final Act. 2–6.

Claims 1–10 and 12–19 stand rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Bachelts et al.^{3,4} in view of Simons et al.⁵ and Ouimet.⁶ Final Act. 9–18.

Claims 1–10 and 12–19 stand rejected under 35 U.S.C. § 112(a) or pre-AIA 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement. Final Act. 6–8.⁷

³ Mark Bachelts et al., *Using a Systems Approach to Unravel Feedback Mechanisms Affecting Urban Transport Choices*, Canterbury Regional Council (and University of Canterbury) (1999) (“Bachelts”).

⁴ The Examiner refers to Bachelts as “Exhibit U” in the Final Office Action and Answer.

⁵ U.S. Patent No. 6,044,222 (Mar. 28, 2000) (“Simons”).

⁶ U.S. Patent Pub. No. 2002/0107819 A1 (Aug. 8, 2002).

⁷ A further rejection, of claims 1–5 and 16–18 as being indefinite under 35 U.S.C. § 112(b) or pre-AIA 35 U.S.C. § 112, second paragraph (Final Act. 8), has been withdrawn. Ans. 16–17.

ANALYSIS

Rejection Under 35 U.S.C. § 101

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter, or [a] new and useful improvement thereof.” 35 U.S.C. § 101. However, the Supreme Court has long interpreted § 101 to “contain[] an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable.” *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014) (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)).

In *Alice*, the Supreme Court reiterated the two-step framework previously set forth in *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (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*, 573 U.S. at 217. The first step in this analysis is to “determine whether the claims at issue are directed to one of those patent-ineligible concepts,” e.g., to an abstract idea. *Id.* Concepts determined to be abstract ideas include certain methods of organizing human activity, such as fundamental economic practices (*id.* at 219–20; *Bilski v. Kappos*, 561 U.S. 593, 611 (2010)); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). If it is determined that the claims are directed to a patent-ineligible concept, the second step of the analysis requires consideration of the elements of the claims “individually and ‘as an ordered combination’” to determine whether there are additional elements that “‘transform the nature of the claim’ into a patent-eligible application.” *Alice*, 573 U.S. at 217 (quoting *Mayo*, 566 U.S. at 78, 79). In other words, the claims must contain an “inventive concept,” or some element or combination of elements “sufficient to

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ensure that the patent in practice amounts to significantly more than a patent upon the [abstract idea] itself.” *Id.* at 217–18 (quoting *Mayo*, 566 U.S. at 72–73).

The USPTO recently published revised guidance on the application of § 101. USPTO’s January 7, 2019 Memorandum, *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (“Revised Guidance”). Under that guidance, we first look to whether the claim recites:

- (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human interactions, or mental processes) (“Step 2A, Prong 1”); and
- (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)) (“Step 2A, Prong 2”).

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

- (3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, and 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 Revised Guidance

The Examiner determines that claims 1–10 and 12–19 are directed to an abstract idea. Final Act. 4. The Examiner finds the claims to be “directed towards a mathematical relationship or formula” and “aligned with ‘managing relationships between people or transactions’” and “managing human behavior.” *Id.*; Ans. 19 (internal quotation marks omitted). The Examiner further determines that the claims merely recite generic computer components and extra-solution data-gathering activity, and thus do not amount to significantly more than the abstract idea itself. Final Act. 5–6; Ans. 20–21.

Appellants argue that the claims “highlight the practical application of the methods recited” and “are directed at a concrete process for planning urban development, including a very specific computer-implemented process and technique.” App. Br. 5; Reply Br. 2. Appellants further argue that, “[a]lthough the additional limitations recited may not amount to significantly more than the broad concept, when looking at the additional limitations as an ordered combination, the invention as a whole amounts to significantly more than simply organizing and comparing data.” App. Br. 7; Reply Br. 3–4.⁸

Under Step 2A, Prong 1, we agree with the Examiner that the claims recite a judicial exception, i.e., an abstract idea. In particular, we agree with the Examiner that the claims recite a mathematical concept. *See* Final Act. 4; Ans. 19. We additionally determine that the claims recite mental processes.

For example, claim 1 recites “generating an urban development link matrix (UDLM) by the apparatus using the urban development factors and the weighting factors,” “evaluating the stored urban development link matrix (UDLM) using a calculating unit of the apparatus . . . to identify dependency loops in and generate an urban development graph, the urban development graph having nodes each representing one of the inputted urban development factors,” “identifying key factors for development of an urban infrastructure based on the evaluation of the UDLM and prioritizing investment based on the key factors identified,” “identifying each loop as self-regulating or unstable,” and “wherein said nodes are

⁸ Appellants additionally argue that the Examiner has not explained how the claims correspond to a concept the courts have identified as an abstract idea, in accordance with the USPTO’s May 4, 2016 Memorandum, *Formulating a Subject Matter Eligibility Rejection and Evaluating the Applicant’s Response to a Subject Matter Eligibility Rejection*. App. Br. 6; Reply Br. 2. We note, however, that the May 4, 2016 Memorandum is superseded by the January 7, 2019 Memorandum. *See* Revised Guidance at 51.

connected to each other via weighted edges describing dependencies between said nodes.” Under their broadest reasonable interpretation, these “generating,” “evaluating,” “identifying,” and “prioritizing” limitations cover performance of the limitations in the mind, but for the recitation of generic components. That is, other than reciting “by the apparatus” and “using a calculating unit of the apparatus,” nothing in the claim precludes these steps from practically being performed in the mind or manually. For example, but for the “apparatus” and “calculating unit” language, the claim encompasses *mentally* and manually generating a UDLM using the urban development factors and the weighting factors, *mentally* evaluating the UDLM to identify dependency loops in, and to *mentally* and manually generate, an urban development graph, the urban development graph having nodes each representing one of the urban development factors, wherein said nodes are connected to each other via weighted edges describing dependencies between said nodes, *mentally* identifying key factors for development of an urban infrastructure based on the evaluation of the UDLM and *mentally* prioritizing investment based on the key factors identified, and *mentally* identifying each loop as self-regulating or unstable. Although Appellants argue that “an urban development graph UDG . . . *can be* quite complex so that it is impossible for a user without automatic calculation of the dependency loops to recognize dependencies between the different factors f” (App. Br. 7; Reply Br. 4) (emphasis added) (citing Spec. 7:26–31; Fig. 4), the claim still encompasses generating a UDLM and a UDG that are *not* too complex to mentally identify dependency loops and key factors. Thus, these limitations are mental processes.

Claim 1 further recites “wherein said evaluating step includes calculating an objective function value for each loop of said urban development graph and sorting the loops according to the respective calculated objective function values of said loops.” In reciting “calculating an objective function value for each loop of said

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urban development graph,” the claim recites a mathematical concept. *See* Spec. 6:33–7:15 (disclosing mathematical formulas for objective function OF in different embodiments).

Under its broadest reasonable interpretation, the “calculating” limitation also covers performance of the limitation in the mind. That is, nothing in the claim precludes the “calculating” step from practically being performed in the human mind. For example, the claim encompasses *mentally* and/or manually calculating an objective function value for each loop of the urban development graph. *See, e.g.,* Spec. 8:11–12 (disclosing an embodiment in which “the objective function OF is a measure for the length of a dependency loop”). Thus, this limitation is also mental process.

Under its broadest reasonable interpretation, the “sorting” limitation also covers performance of that limitation in the mind. That is, nothing in the claim precludes the “sorting” step from practically being performed in the human mind. For example, the claim encompasses *mentally* and/or manually sorting the loops according to the respective calculated objective function values of said loops. This limitation is also a mental process.

Thus, these limitations recite mathematical concepts and mental processes as identified in the Revised Guidance, and, thus, an abstract idea.

Under Step 2A, Prong 2, we determine that the claims do not integrate the abstract idea into a practical application. For example, claim 1 additionally recites “inputting urban development factors, via an interface, into an urban development link matrix template displayed on a display of an apparatus for analyzing dependency loops in an urban development graph, the apparatus including at least one non-transitory computer readable medium storing instructions translatable by at least one processor,” “inputting weighting factors, via the interface, into the apparatus,” and “storing the generated urban development link matrix (UDLM) in

a memory of the apparatus.” We agree with the Examiner that the steps of “inputting urban development factors, via an interface, into an urban development link matrix template displayed on a display of an apparatus . . .” and “inputting weighting factors, via the interface, into the apparatus” amount to mere data gathering and insignificant extra-solution activity, as they are recited at a high level of generality, i.e., as a general means of gathering the “urban development factors” and “weighting factors”—data necessary to perform the “generating,” “evaluating,” “identifying,” and “prioritizing” steps. *See* Final Act. 5–6; Ans. 20. Likewise, the “storing” step is also insignificant extra-solution activity because it is recited at a high level of generality, i.e., as a general means of storing the UDLM needed to perform the “evaluating,” “identifying,” and “prioritizing” steps. *See* Revised Guidance at 55; MPEP § 2106.05(g).

We further agree with the Examiner that the claims merely recite generic computer components. *See* Final Act. 5; Ans. 20–21. For example, claim 1’s recited “apparatus,” “interface,” “display,” “non-transitory computer-readable medium,” “processor,” “memory,” and “calculating unit” are recited at a high level of generality, i.e. as generic components performing generic computer functions of receiving and displaying inputted data and storing and processing computer instructions and data. These generic limitations merely apply the abstract idea using generic computer components. *See* Revised Guidance at 55; MPEP § 2106.05(f). As noted by the Examiner, they do not reflect an improvement in the functioning of a computer, or to any other technology or technical field. *See* Final Act. 5; Ans. 21; *see also* Revised Guidance at 55; MPEP § 2106.05(a). Nor do they include any particular machine that is integral to the claim. *See* Revised Guidance at 55; MPEP § 2106.05(b).

Thus, contrary to Appellants’ argument that the claims “highlight the practical application of the methods recited” (App. Br. 5; Reply Br. 2), these

additional limitations do not integrate the abstract idea into a practical application because they do not impose any meaningful limits on practicing the abstract idea.

Accordingly, we agree with the Examiner that the claims are directed to an abstract idea.

Under Step 2B, we discern no specific limitation beyond the judicial exception, i.e., the abstract idea, that is not well-understood, routine, and conventional in the field. For example, claim 1 additionally recites “employing an ant algorithm.” The “ant algorithm” limitation simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the abstract idea. Indeed, Appellants indicate that ant algorithms “are known techniques for solving various combinatorial optimization problems, often used in computer science to design routing and networking systems to find the shortest path for directing data and information,” and point to the Examiner’s citation of Ouimet as demonstrating such. App. Br. 7 (citing Final Act. 10).

Reevaluating the extra-solution activity of “inputting urban development factors,” “inputting weighting factors,” and “storing the generated urban development link matrix (UDLM)” (*see* Revised Guidance at 56), we find nothing unconventional in these steps of data gathering and data storing. Although Appellants argue that, “when looking at the additional limitations as an ordered combination, the invention as a whole amounts to significantly more than simply organizing and comparing data” (App. Br. 7; Reply Br. 3–4), Appellants provide no evidence of how the ordered combination is unconventional or amounts to significantly more than the abstract idea to which the claim is otherwise directed. These steps require no more than generic computer components performing generic functions that are well-understood, routine, and conventional activities previously known to the industry. As discussed above under Step 2A, Prong 2, the

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recited “apparatus,” “interface,” “display,” “non-transitory computer-readable medium,” “processor,” “memory,” and “calculating unit” in claim 1 amount to no more than mere instructions to apply the abstract idea using generic computer components. Mere instructions to apply an abstract idea on a generic computer do not provide an inventive concept. *Alice*, 573 U.S. at 223–24.

Accordingly, considering the claim elements individually and as an ordered combination, we agree with the Examiner that they do not amount to significantly more than the abstract idea to transform the nature of the claims into patent-eligible subject matter.

For the foregoing reasons, we sustain the Examiner’s rejection under 35 U.S.C. § 101 of independent claim 1, as well as independent claims 6 and 12 having commensurate limitations and dependent claims 2–5, 7–10, and 13–19, which are not separately argued.

Rejection Under 35 U.S.C. § 103

The Examiner relies on *Bachels* for the limitation “identifying each loop as self-regulating or unstable,” as recited in independent claims 1, 6, and 12. Final Act. 10, 18 (citing *Bachels* 2–3); Ans. 9, 22. Appellants argue that the prior art fails to teach this limitation. App. Br. 8; Reply Br. 4.

We agree with Appellants that *Bachels* fails to teach “identifying each loop as self-regulating or unstable.” The portion of *Bachels* cited by the Examiner discusses developing “qualitative systems models” for urban planning, in particular, “[q]ualitative feedback loops,” but does not disclose identifying whether the feedback loops are self-regulating or unstable. *Bachels* 2–3.

According to the Examiner, “self-regulating relat[es] to qualitative systems modelling” and “stable relat[es] to linear systems approach.” Final Act. 10, 18; Ans. 9, 22. To the extent that the Examiner finds qualitative systems models (*see*

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Bachels 2–3) to be “self-regulating” loops, and linear planning approaches (*see* Bachels 1, 11) to be “*unstable*” loops, we disagree with this interpretation of “self-regulating” and “unstable,” as it is inconsistent with the Specification’s disclosure. *See* Spec. 7–8 (disclosing that “self-regulating dependency loops or unstable loops can be identified” while discussing example of closed dependency loop L in Figure 5, in which *increased* traffic congestion negatively impacts productivity and economic growth, which lowers affluence and car ownership, ultimately resulting in *reduced* traffic congestion).

Although Bachels discloses a systems model showing “positive unchecked feedback” (Bachels 4) and proposes introducing “‘balancing’ or negative feedback policies” to counter it (Bachels 8–9), we do not find any suggestion in Bachels of *identifying each* dependency loop as self-regulating or unstable, as claimed.

Accordingly, we do not sustain the Examiner’s rejection of claims 1–10 and 12–19 under 35 U.S.C. § 103(a) as being unpatentable over Bachels, Simons, and Ouimet.

Rejection Under 35 U.S.C. § 112

The Examiner determines that claims 1–10 and 12–19 are based on a disclosure that is not enabling with respect to the “ant algorithm” (*see* independent claims 1 and 12) and “evolutional algorithm” (*see* independent claims 6 and 12) limitations. Final Act. 6–8. The Examiner finds that the Specification only mentions the recited “ant algorithm” and “evolutional algorithm” without disclosing “how to implement” them. *Id.*; *see* Spec. 10:31–33. According to the Examiner, “there is no single ‘ant algorithm’ but are, instead, a family of algorithms.” Final Act. 7.

Appellants argue that the claims are enabled because “[a] person having ordinary skill in the art . . . would be able to apply the recited algorithms.” App.

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Br. 8. Specifically, Appellants argue that “both ant algorithms . . . and evolutionary algorithms are known techniques for solving various combinatorial optimization problems, often used in computer science to design routing and networking systems to find the shortest path for directing data and information.” *Id.* at 7. Appellants point to the Examiner’s citation of Ouimet as demonstrating such. *Id.* (citing Final Act. 10).

To meet the enablement requirement of 35 U.S.C. § 112, the disclosure, as filed, must be sufficiently complete to enable one of ordinary skill in the art to make and use the claimed invention “without undue experimentation.” *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). “An inventor need not, however, explain every detail since he is speaking to those skilled in the art.” *In re Howarth*, 654 F.2d 103, 105 (CCPA 1981).

We are persuaded by Appellants that the claims are sufficiently enabled because ant algorithms and evolutionary algorithms are known types of algorithms that one of ordinary skill in the art would have understood how to implement without undue experimentation. For example, Ouimet, which is relied on by the Examiner for its teaching of ant and evolutionary algorithms (Final Act. 11, 16), describes these algorithms as “common optimization algorithms” for complex planning models. Ouimet ¶ 29; *see also id.* ¶ 71 (describing ant algorithms, among others, as “general optimization methods”). The Examiner acknowledges that using ant and evolutionary algorithms is a “known technique” that “would have yielded predictable results.” Ans. 23–24.

Accordingly, we do not sustain the Examiner’s rejection of claims 1–10 and 12–19 for lack of enablement under 35 U.S.C. § 112.

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DECISION

Because we have affirmed at least one ground of rejection with respect to each claim on appeal, the Examiner's rejection of claims 1–10 and 12–19 is affirmed. *See* 37 C.F.R. § 41.50(a)(1).

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