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14/148,046	01/06/2014	Douglas S. McNair	27098.193646	1068

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EXAMINER	
BARR, MARY EVANGELINE	

ART UNIT	PAPER NUMBER
3626	

NOTIFICATION DATE	DELIVERY MODE
06/18/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 14/148,046	Applicant(s) McNair et al.	
	Examiner Evangeline Barr	Art Unit 3626	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 04/30/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-21 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-21 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 04/30/2020 has been entered.

Status of the Application

3. **Claims 1-21** are currently pending in this case and have been examined and addressed below. This communication is a Non-Final Rejection in response to the "Remarks" and "Amendments to the Claims" filed on 04/30/2020.

- **Claims 1, 7 and 15** are currently amended.
- **Claims 2-6, 8-14 and 16-21** are as previously presented.

Information Disclosure Statement

4. The information disclosure statements (IDS) submitted on 03/25/2020 and 05/20/2020 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> 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.

6. **Claims 1-21** are rejected under 35 U.S.C. 101 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. Claims 1-21 are directed to the abstract idea of analyzing clinical information using statistical analysis and comparison to determine clinical recommendations.

As per Claims 1, 7 and 15, the limitations of determining a probable future clinical decision support event common in the second set of records and clustering the second set of records based on a change in conditions, discovering frequent item-sets, and associating the frequent item-sets with the probable future clinical decision support event, as drafted, are steps executed by a system that, under its broadest reasonable interpretation, covers managing personal behavior and interactions between people but for the recitation of generic computer components. That is, other than reciting the computer-readable storage devices having instructions embodied thereon and at the multi-agent system, nothing in the claim elements precludes the step from being a function which manages personal behavior or interactions by following rules or instructions. For example, determining a probable future clinical decision support event common in the reference population, clustering the reference population based on change in condition, discovering frequent item-sets and associating the frequent item-sets with the clinical decision support event involves following rules or instructions to carry out the methods of human activity which result in frequent item-sets associated with clinical decision support events based on comparison of the data of the reference population. Similarly, the

limitations of determining a reference predicate vector pattern, monitoring a change in a target vector element to determine an onset of the decision epoch such as the period of time occurring before an event, determining an altered course of care for the target patient, and displaying an alternative course of care for the patient, as drafted, under its broadest reasonable interpretation, covers a method of organizing human activity which includes following rules or instructions to determine a pattern from the reference population data and based on the pattern making a recommendation for a course of care for the patient. The steps of monitoring a change in data and determining an altered course of care for the target patient include managing personal behavior and interactions where the interaction is with the reference and target information. The displaying of an alternative course of care includes notifying a patient, healthcare professional or medical organization by providing an indication of the probable future clinical decision support event and alternative clinical recommendations which involves personal interaction with the patient, professional or organization to pass off the information including the recommendation to that particular person or group. As per the *October 2019 Update on Subject Matter Eligibility*, the sub-groupings of the certain methods of organizing human activity grouping encompass both activity of a single person, such as a person following a set of instructions or carrying out an activity, and activity that involves multiple people (such as a commercial or business interaction). Certain activity between a person and a computer may fall within the "certain methods of organizing human activity" grouping. As per the current limitations discussed above, the user interacts with the computer including following a set of instructions to result in a display of an alternative course of care for the target patient including the probable future clinical decision support event and alternative

recommendations. Determining potential probable future events for a patient and possible alternative recommendations based on the patient's health information and knowledge of previous patients' health information is an integral part of the business practices that doctors and healthcare providers provide to patients. If a claim limitation, under its broadest reasonable interpretation, covers managing personal behavior or relationships or interactions between people including teaching and following rules or instructions, but for the recitation of generic computer components, then it falls within the "Certain Methods of Organizing Human Behavior" grouping of abstract ideas. Accordingly, the claim recites an abstract idea.

This judicial exception is not integrated into a practical application because the additional elements and combination of additional elements do not impose meaningful limits on the judicial exception. In particular, the claims only recite the additional elements – one or more computer-readable storage devices having computer-usable instructions embodied thereon to perform the steps of the claims. The computer-readable storage device in these steps is recited at a high-level of generality such that it amounts to no more than mere instructions to apply the exception using a generic computer component. Accordingly, this additional element does not integrate the abstract idea into a practical application because it does not impose any meaningful limits on practicing the abstract idea. The claim is directed to an abstract idea. The claim also includes a multi-agent system which executes the steps of the abstract idea which recited at a high-level of generality such that is amounts to no more than mere instructions to apply the exception. The claim also recites the additional elements of receiving a target set of clinical information, receiving a reference set of clinical information from a health records system, and receiving sensor information from a sensor coupled to a

target patient which is insignificant extra-solution activity, as in MPEP 2106.05(g), because the step of receiving clinical information from a health records system and a sensor is mere data gathering in conjunction with the abstract idea where the limitation amounts to necessary data gathering and outputting, (*i.e.*, all uses of the recited judicial exception require such data gathering or data output). See *Mayo*, 566 U.S. at 79, 101 USPQ2d at 1968; *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363, 115 USPQ2d 1090, 1092-93 (Fed. Cir. 2015) (presenting offers and gathering statistics amounted to mere data gathering). The claims also include the additional element of causing for display, within an interface, an alternative course of care which amounts to no more than mere instructions to apply the exception. The causing for display element includes notifying a user of the probable event and providing an indication of alternative recommendations which are directed to the abstract idea, as a method of organizing human activity. By using a computer-readable instructions to cause a display of this information which is to be passed from one user to another by use of an interface, the claim does not more than merely invoke computers to perform the abstract idea of notifying the user of recommendations. As per MPEP 2106.05(f), requiring the use of software to tailor information and provide it to the user on a generic computer has been found by the courts to be mere instructions to apply an exception. Because the additional elements do not impose meaningful limitations on the judicial exception, the claim is directed to an abstract idea.

The claims do not include additional elements that are sufficient to amount to significantly more than the judicial exception because the additional elements when considered both individually and as an ordered combination do not amount to significantly more than the abstract idea. As discussed above with the respect to integration of the abstract idea into a

practical application, the additional elements of a computer-readable storage device having computer-usable instructions to perform the method of the invention and a multi-agent system to execute the functions of the abstract idea amounts to no more than mere instructions to apply the exception using a generic computing component. The computer-readable devices are recited at a high level of generality and are recited as generic computer components. These elements recite a generic computing system by reciting a software application operating on a mobile computing device or other generic computing devices with possible use over a website with a user interface which are embodied as a system which executes or resides on a processor such as a computer, laptop, or other generic computing device (see Specification [0057]), which do not add meaningful limitations to the abstract idea beyond mere instructions to apply an exception. The multi-agent system is also recited at a high-level of generality. The multi-agent system is described as a multi-agent framework layer such as JADE or Cougaar, Zeus, etc. (Specification [0084]) which are already established software platforms such that they amount to generic computing components. The multi-agent system includes multiple agents which may handle a complex problem because each agent may generate analyses and those separate analyses are compared to make a determination regarding patient condition or recommended treatments (Specification [0062]), which applies the agents to the abstract idea which includes the data analyses of the claims. Mere instructions to apply an exception using a generic computer component cannot provide an inventive concept. The claims also include the additional elements of receiving a target set of clinical information, receiving a reference set of clinical information, and receiving sensor information from a sensor coupled to a target patient which are elements that are well-understood, routine and conventional computer functions in

the field of data management because they are claimed at a high level of generality and include receiving or transmitting data, which has been found to be well-understood, routine and convention computer functions by the Court (MPEP 2106.05(d)(II)(i) Receiving or transmitting data over a network, *e.g.*, using the Internet to gather data, *Symantec,* 838 F.3d at 1321, 120 USPQ2d at 1362 (utilizing an intermediary computer to forward information); *TLI Communications LLC v. AV Auto. LLC,* 823 F.3d 607, 610, 118 USPQ2d 1744, 1745 (Fed. Cir. 2016) (using a telephone for image transmission); *OIP Techs., Inc., v. Amazon.com, Inc.,* 788 F.3d 1359, 1363, 115 USPQ2d 1090, 1093 (Fed. Cir. 2015) (sending messages over a network); *buySAFE, Inc. v. Google, Inc.,* 765 F.3d 1350, 1355, 112 USPQ2d 1093, 1096 (Fed. Cir. 2014) (computer receives and sends information over a network); but see *DDR Holdings, LLC v. Hotels.com, L.P.,* 773 F.3d 1245, 1258, 113 USPQ2d 1097, 1106 (Fed. Cir. 2014) ("Unlike the claims in *Ultramercial,* the claims at issue here specify ***how*** interactions with the Internet are manipulated to yield a desired result—a result that overrides the routine and conventional sequence of events ordinarily triggered by the click of a hyperlink." (emphasis added)). Looking at the limitations as an ordered combination adds nothing that is not already present when looking at the elements taken individually. There is no indication that the combination of elements improves the functioning of the computer or improves another technology. The claims do not amount to significantly more than the underlying abstract idea.

Claims 2-6, 8-14 and 16-21 are dependent from Claims 1, 7 and 15 and include all the limitations of Claims 1, 7 and 15. The dependent claims include limitations which further

specify or limit the elements of the independent claim, and hence are nonetheless directed towards fundamentally the same abstract idea.

The dependent claims do not include additional elements that have not been previously addressed in the independent claims and thus do not integrate the abstract idea into a practical application and additionally do not provide an inventive concept by reciting significantly more than the abstract idea. Therefore, when taken individually or as an ordered combination, Claims 1-21 are nonetheless rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter.

Response to Arguments

7. Applicant's arguments, see Pages 11-19, section Rejections based on 35 U.S.C. §101, filed 04/30/2020, with respect to the rejection of Claims 1-21 under 35 U.S.C. §101 have been fully considered, but they are not persuasive.

Applicant argues that the present claims integrate the claim into a practical application because the elements of the claim provide for a particular machine. Applicant further argues that the multi-agent system of the claims is a particular machine because it is specifically identified and described in detail throughout the specification and is not a general purpose computer. Examiner respectfully disagrees. Examiner notes that as per MPEP 2106.05(b), while the application of a judicial exception by or with a particular machine is an important clue, it is not a stand-alone test for eligibility. It is important to note that a general purpose computer that applies a judicial exception, such as an abstract idea, by use of conventional computer functions does not qualify as a particular machine. *Ultramercial, Inc. v. Hulu, LLC,* 772 F.3d 709, 716-17, 112 USPQ2d 1750, 1755-56 (Fed. Cir. 2014). *See also TLI Communications LLC v. AV*

Automotive LLC, 823 F.3d 607, 613, 118 USPQ2d 1744, 1748 (Fed. Cir. 2016) (mere recitation of concrete or tangible components is not an inventive concept); *Eon Corp. IP Holdings LLC v. AT&T Mobility LLC,* 785 F.3d 616, 623, 114 USPQ2d 1711, 1715 (Fed. Cir. 2015) (noting that *Alappat*'s rationale that an otherwise ineligible algorithm or software could be made patent-eligible by merely adding a generic computer to the claim was superseded by the Supreme Court's *Bilski* and *Alice Corp.* decisions). If applicant amends a claim to add a generic computer or generic computer components and asserts that the claim recites significantly more because the generic computer is 'specially programmed' (as in *Alappat,* now considered superseded) or is a 'particular machine' (as in *Bilski*), the examiner should look at whether the added elements provide significantly more than the judicial exception. Merely adding a generic computer, generic computer components, or a programmed computer to perform generic computer functions does not automatically overcome an eligibility rejection. *Alice Corp. Pty. Ltd. v. CLS Bank Int'l,* 134 S. Ct. 2347, 2358-59, 110 USPQ2d 1976, 1983-84 (2014). As per the present claims, the judicial exception is applied with a multi-agent system. The specification describes the multi-agent system as a multi-agent framework layer such as JADE or Cougaar, Zeus, etc. (Specification [0084]) which are already established software platforms such that they amount to generic computing components and not a particular machine. The multi-agent system includes multiple agents which may handle a complex problem because each agent may generate analyses and those separate analyses are compared to make a determination regarding patient condition or recommended treatments (Specification [0062]), which does not provide for a particular machine but rather applies the agents to the abstract idea which

includes the data analyses of the claims. Therefore, the present claims do not provide a particular machine and thus do not integrate the abstract idea into a practical application.

Applicant argues that the present claims improve computer-related technology because they include new functions that no other components performed before. Examiner respectfully disagrees. No matter how much of an advance in data analysis of patient data to determine and provide recommendations in order to make decisions or take proper action regarding a patient's health care that the claims recite, the advance lied in the realm of abstract ideas, with no plausibly alleged innovation in the non-abstract application realm. An advance of that nature is ineligible for patenting. This improvement in the abstract idea by performing new functions to provide recommendations regarding actions for a patient's care is an improvement in that abstract idea itself and not an improvement in computer-related technology. Abstract ideas need not be old or long-prevalent and even newly discovered novel judicial exceptions are still exceptions. Therefore, the claims do not provide an improvement to a computer-related technology and thus do not integrate the abstract idea into a practical application.

Applicant argues that the present claims are not directed to certain methods of organizing human activity because they do not merely recite a business, legal, or personal behavior process that humans physically engage in. Examiner respectfully disagrees. As per the rejection above, the steps of the present claims recite functions which include managing personal interactions including following rules or instructions. As per the *October 2019 Update on Subject Matter Eligibility*, the scope of the certain methods of organizing human activity grouping includes the sub-groupings including fundamental economic principles or practices, commercial or legal interactions, and managing personal behavior, relationships or interactions

between people. The sub-grouping of interactions between people encompass both activity of a single person and activity that involves multiple people, which includes activity between a person and a computer. The functions of the present claims include interactions between a person and a computer as well as activity of a single person as it relates to the data received through mere data gathering, where the person follows rules and instructions for the interaction with the computer and data in order to analyze and manipulate the data. Therefore, the present claims recite limitations which are directed to an abstract idea.

Applicant argues that the present claims are integrate the abstract idea into a practical application similar to Example 42 which imposes a meaningful limit on the judicial exce ption, such that the claim is more than a drafting effort designed to monopolize the judicial exception. In Example 42, the claims integrate the abstract idea into a practical application because the combination of additional elements recites a specific improvement over prior art systems by allowing remote users to share information in a real time standardized format regardless of format in which the information was input by the user. Applicant argues that the present claim similarly applies the abstract idea in some other meaningful way because it specifically recites how the multi-agent system automatically and dynamically determines an altered course of care for a patient. Examiner respectfully disagrees that the present claims provide a meaningful limit on the judicial exception similar to that of Example 42. The present claims do not provide additional limitations which in combination provide an improvement over prior art systems. The additional limitations of the claims, as per the rejection above, are identified as receiving a target set of clinical information, receiving a reference set of clinical information from a health records system, receiving sensor information from a sensor coupled to a target

patient as well as displaying, within an interface, an alternative course of care which amounts to no more than mere instructions to apply the exception. Additionally, the computer hardware components identified in the rejection above are also identified additional elements. The combination of the receiving and displaying elements do not provide for applying the judicial exception in another meaningful way. These elements amount to mere data gathering and outputting, as described in the rejection above, which does not integrate the abstract idea into a practical application.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evangeline Barr whose telephone number is (571)272-0369. The examiner can normally be reached on Monday to Friday 8:00 am to 4:00 pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fonya Long can be reached on 571-270-5096. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/EVANGELINE BARR/
Primary Examiner, Art Unit 3626

REMARKS

The Non-Final Office Action mailed June 18, 2020 has been received and reviewed. Prior to the present communication, claims 1-21 were pending in the subject Application. Each of claims 1, 8, and 15 has been amended herein such that claims 1-21 remain pending and in condition for allowance. Reconsideration of the subject application is respectfully requested in view of the amendments and the following remarks.

Rejections based on 35 U.S.C. § 101

Claims 1-21 were rejected by the Office under 35 U.S.C. § 101 because the claimed invention is purportedly directed to a judicial exception (i.e., a law of nature, a natural phenomenon or an abstract idea) without significantly more. Applicant respectfully traverses this rejection.

i. the claims are integrated into a practical application.

Under prong 2, examiners should evaluate whether the claim as ***a whole*** integrates the recited judicial exception into a practical application. A claim integrates a judicial exception into a practical application when it applies, relies on, or uses 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.

Applicant submits that each of the claims as a whole integrate any *purported* judicial exception into a practical application. For example, the claims are directed to an improvement in computerized-clinical decision support. The Federal Circuit recently stated that claims that "focus on a specific means or method that improves" the technology and "are not directed to a result or effect that itself is the abstract idea and merely invoke generic processes and

machinery" are directed to an improvement and not an abstract idea.[1] In Cardionet v. Infobionic, the Court found the claims to be directed to a practical application because the "written description identifies a number of advantages gained by the elements recited in the claimed ... device."[2] There the claimed invention more accurately detected the occurrence of atrial fibrillation and atrial flutter through variability determination logic, relevance determination logic, and an event generator.[3]

Similar to the Court's decision in Cardionet, the as filed specification describes a number of advantages gained by the elements recited in the claims over conventional computerized-clinical decision support systems. For example, the claims offer an improvement to decision support technology by training and utilizing a machine learning agent that discovers and validates latent relationships in a health care dataset and employs these relationships while monitoring future datasets and vector patterns associated with a sensor information to monitor a change in a target vector element associated with the sensor information, determine an onset of a decision epoch for a probable future clinical decision support event, and automatically and dynamically determines an altered course of care for a target patient.

Thus the claimed invention provides an improvement to conventional computerized-clinical decision support systems. For instance, claim 1 recites, in part:

> training a machine learning agent of the multi-agent system to determine a reference predicate vector pattern associated with a decision epoch for the probable future clinical decision support event based on the reference set of clinical information and on the one or more reference sensor indications of a reference patient in the reference population, wherein the decision epoch represents a future time instance that is also occurring prior to the probable future clinical decision support event;
>
> receiving, at the multi-agent system, sensor information from a sensor coupled to at least one target patient;

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[1] *Cardionet v. Infobionic,* Case 19-1149, At 13 (U.S. Court of Appeals for the Federal Circuit, Decided April 17, 2020)

[2] *Id.* at 15

[3] *Id.* at 16

> based on a change in a target vector element associated with the sensor information, determining, utilizing the trained machine learning agent of the multi-agent system, an onset of the decision epoch based on determining a distance metric between the target vector element and a reference predicate vector from the reference predicate vector pattern;
>
> based on the onset of the decision epoch, automatically and dynamically determining, at the multi-agent system, an altered course of care for the at least one target patient from the target population of patients; and

These claims, like those in Cardionet, provide a clear improvement to computerized-decision support technology and not simply a method of organizing human activity. Applicant therefore submits that even if, *ad arguendo*, the claims recite a judicial exception, each of the claims, as a whole, integrates the judicial exception into a practical application that solves an existing problem of conventional computerized-decision support systems. Withdrawal of the 35 U.S.C. § 101 rejection and allowance of the claims is respectfully requested.

ii. under step 2B, the claims amount to significantly more than an abstract idea at least because the claims recite a combination of elements that is not well-understood, routine or conventional.

Because part 2A of the analysis indicates that the claims are not directed to an abstract idea, the inquiry into patent eligibility should end here. But even if the claims of the present Application were found to be directed to an abstract idea under part 2A, the claims nevertheless recite additional features sufficient to ensure the claims amount to significantly more than an abstract idea, itself.

An inventive concept that ensures a claim as a whole amounts to significantly more than a judicial exception can be found in claim elements other than what is well-understood, routine, and conventional in the field, or unconventional steps that confine the claim to a particular useful application.[4] USPTO guidance indicates that "an examiner should conclude that an element

[4] MPEP § 2106.05.

(or combination of elements) represents well-understood, routine, conventional activity **only** when the examiner can readily conclude that the element(s) is widely prevalent or in common use in the relevant industry."[5] "Such a conclusion **must** be based upon a factual determination that is supported" by one or more of the following:

> 1. A citation to an express statement in the specification or to a statement made by an applicant during prosecution that demonstrates the well-understood, routine, conventional nature of the additional element(s) . . . .
>
> 2. A citation to one or more of the court decisions discussed in MPEP § 2106.05(d)(II) as noting the well-understood, routine, conventional nature of the additional element(s).
>
> 3. A citation to a publication that demonstrates the well-understood, routine, conventional nature of the additional element(s) . . . .
>
> 4. A statement that the examiner is taking official notice of the well-understood, routine, conventional nature of the additional element(s) . . . .[6]

Each of Applicant's claims recites a combination of elements that is not well-understood, routine, and conventional. The claims recite an improvement in conventional computerized-decision support systems. In particular, the claims are directed to specific ways of improving the problems and inefficiencies with conventional systems. For example, the machine learning agent can be trained and utilized to identify decision points (decision epochs or critical junctures) in care treatment and to alert caregivers that the patient is at or approaching a decision point, and providing a recommendation; anticipating likely future condition states, health-care resources needed, and costs associated with different treatment courses for a patient; and determining a recommended sequence of care based on learned outcomes from other patients

[5] Memorandum dated 4/19/2018 to Patent Examiner Corps ("Berkheimer Memo), p. 3 (emphasis in original).
[6] *Id.* at p. 3-4 (emphasis added).

having similar concepts and other patient information (including resources available to the patient). These features were not employed in conventional systems and are not well-understood, routine, and conventional.

Based on the foregoing, even if it is determined that the claims are directed to an abstract idea, it is respectfully submitted that the claims recite additional elements, that when considered both individually and as an ordered combination, transform the nature of the claims into a patent-eligible application of any identified abstract idea. The claims are therefore directed to patent-eligible subject matter. Applicant respectfully requests withdrawal of the rejection under 35 U.S.C. § 101.

CONCLUSION

For at least the reasons stated above, the pending claims are believed to be in condition for allowance. Applicant respectfully requests withdrawal of the pending rejections and allowance of the claims. If any issues remain that would prevent issuance of this application, the Examiner is urged to contact the undersigned – 816-474-6550 or awingrove@shb.com (such communication via email is herein expressly granted) – to resolve the same. It is believed that all fees due have been paid. However, if this belief is in error, the Commissioner is hereby authorized to charge any amount required to Deposit Account No. 19-2112, with reference to Attorney Docket No. 27098.193646.

Respectfully submitted,

/ANTHONY B. WINGROVE/

Anthony B. Wingrove
Reg. No. 60,317

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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) One or more computer-readable storage devices having computer-usable instructions embodied thereon that, when executed by a processor, perform a method for discovering and validating latent relationships in a health care dataset, the method comprising:

receiving, at a multi-agent system, a target set of clinical information associated with a target population of patients from a first set of records of a first health-records system, the target set of clinical information including a first plurality of codified clinical concepts;

receiving, at the multi-agent system, a reference set of clinical information associated with a reference population of patients from a second set of records of a second health records system, the reference set of clinical information including a second plurality of codified clinical concepts;

based on the reference set of clinical information and one or more reference sensor indications of a reference patient in the reference population, determining, at the multi-agent system, a probable future clinical decision support event that is common after at least a first time period after the one or more reference sensor indications in the second set of records for the reference population of patients and clustering the second set of records for the reference population of patients based on a change in condition;

discovering, at the multi-agent system, frequent item-sets among the second set of patients that are clustered based on the change in condition;

associating, at the multi-agent system, the frequent item-sets with the probable future clinical decision support event;

~~determining, at~~ training a machine learning agent of the multi-agent system[[,]] to determine a reference predicate vector pattern associated with a decision epoch for the probable future clinical decision support event based on the reference set of clinical information and on the one or more reference sensor indications of a reference patient in the reference population, wherein the decision epoch represents a future time instance that is also occurring prior to the probable future clinical decision support event;

receiving, at the multi-agent system, sensor information from a sensor coupled to at least one target patient;

~~monitoring~~ based on~~, at the multi-agent system,~~ a change in a target vector element associated with the sensor information, determining, utilizing the trained machine learning agent of the multi-agent system, ~~to determine~~ an onset of the decision epoch based on determining a distance metric between the target vector element and a reference predicate vector from the reference predicate vector pattern;

based on the onset of the decision epoch ~~monitoring~~, automatically and dynamically determining, at the multi-agent system, an altered course of care for the at least one target patient from the target population of patients; and

causing for display, by the multi-agent system, within an interface, the altered course of care for the at least one target patient from the target population of patients by:

(1) notifying one of the following of the probable future clinical decision support event : (i) a target patient among the target population of patients, (ii) a health care professional, and (iii) a medical organization; and

(2) providing an indication of one or more alternative clinical recommendations within the decision epoch.

2. (Previously Presented) The computer readable storage devices of claim 1 wherein performing a statistical comparison comprises:

performing cluster-based matching of the frequent item-sets and the target set of clinical information to determine one or more clusters;

determining at least one measure quantifying difference for at least one cluster; and

determining a statistical measure of association based on the quantifying difference.

3. (Previously Presented) The computer readable storage devices of claim 1, wherein the probable future clinical decision support event comprises a health condition.

4. (Previously Presented) The computer readable storage devices of claim 1, wherein the probable future clinical decision support event comprises a combination of health conditions or clinical procedures.

5. (Previously Presented) The computer readable storage devices of claim 1, wherein the clinical concepts are codified using a standardized clinical nomenclature.

6. (Previously Presented) The computer readable storage devices of claim 1, wherein the target and reference sets of clinical information are encoded using different nomenclatures.

7. (Currently Amended) Computer-readable storage devices having computer-executable instructions embodied thereon that, when executed, facilitate a method for providing clinical decision support, the method comprising:

receiving, at a multi-agent system, a reference set of clinical information associated with a reference population of patients from a plurality of health-records systems, the reference set of clinical information including codified clinical concepts;

based on the reference set of clinical information and one or more reference sensor indications of a reference patient in the reference population, determining, at the multi-agent system, a probable future clinical decision support event that is common after at least a first time period after the one or more reference sensor indications to patients in the reference population of patients and clustering a set of records for the reference population of patients based on a change in condition;

determining, at the multi-agent system, one or more sets of frequently-occurring clinical concepts among the clustered set of the reference population of patients; and

associating, at the multi-agent system, the frequently-occurring clinical concepts with a decision epoch;

~~determining, at~~ training a machine learning agent of the multi-agent system[[,]] to determine a reference predicate vector pattern associated with a decision epoch for the probable future clinical decision support event based on the reference set of clinical information and on the one or more reference sensor indications of a reference patient in the reference population, wherein the decision epoch represents a future time instance that is also occurring prior to the probable future clinical decision support event;

receiving, at the multi-agent system, sensor information from a sensor coupled to at least one target patient;

~~monitoring~~ based on~~, at the multi-agent system,~~ a change in a target vector associated with the sensor information, determining, utilizing the trained machine learning agent of the multi-agent system, ~~to determine~~ an onset of the decision epoch for the at least one target patient based on determining a distance metric between the target vector element and a reference predicate vector from the reference predicate vector pattern;

based on the onset of the decision epoch, automatically and dynamically determining, at the multi-agent system, an altered course of care for the at least one target patient from the target population of patients; and

causing for display, at the multi-agent system, within an interface, the altered course of care for the at least one target patient by:

(1) notifying one of the following of the probable future clinical decision support event : (i) the at least one target patient , (ii) a health care professional, and (iii) a medical organization; and

(2) providing an indication of one or more alternative clinical recommendations within the decision epoch.

8. (Previously Presented) The computer readable storage devices of claim 7, further comprising:

receiving a set of clinical information associated with a first patient, the clinical information including codified clinical concepts;

determining a number of the indicators in the set of clinical information; and

based on the number of indicators, determining a likelihood that the first patient has the probable future clinical decision support event.

9. (Previously Presented) The computer readable storage devices of claim 8, further comprising presenting the determined likelihood to a user.

10. (Previously Presented) The computer readable storage devices of claim 8, further comprising determining a recommended clinical order for the patient based on the determined likelihood that the first patient has the probable future clinical decision support event.

11. (Previously Presented) The computer readable storage devices of claim 10, wherein a recommended clinical order is determined based on the reference set of clinical information associated with a reference population.

12. (Previously Presented) The computer readable storage devices of claim 7, wherein determining one or more sets of frequently-occurring clinical concepts is determined using a software agent.

13. (Previously Presented) The computer readable storage devices of claim 7, further comprising generating an update for a condition care program associated with the probable future clinical decision support event, the update including the one or more event indicators.

14. (Previously Presented) The computer readable storage devices of claim 7, further comprising determining the presence of the one or more event indicators in a specific patient's health record; and based on the determined presence of the one or more event indicators, determining a probability that a specific patient has the probable future clinical decision support event.

15. (Currently Amended) Computer-readable storage devices having computer-executable instructions embodied thereon that, when executed, facilitate a method for providing clinical decision support, the method comprising:

receiving, at a multi-agent system, patient information from a population of patients having a clinical condition, the patient information including patient records comprising one or more codified clinical concepts;

determining, at the multi-agent system, a set of frequently occurring clinical concepts in a clustered set of the patient records for the patients in the population that are clustered based on a change in condition;

based on the patient information and one or more reference sensor indications of a reference patient in the patient population, determining, at the

multi-agent system, a probable future clinical decision support event that is common within the patient population, the probable future clinical decision support event occurring after at least a first time period after the one or more reference sensor indications.

~~determining, at~~ training a machine learning agent of the multi-agent system[[,]] to determine a reference predicate vector pattern associated with a decision epoch for the probable future clinical decision support event based on the reference set of clinical information and on the one or more reference sensor indications of a reference patient in the reference population, wherein the decision epoch represents a future time instance that is also occurring prior to the probable future clinical decision support event;

receiving, at the multi-agent system, sensor information from a sensor coupled to at least one target patient;

~~monitoring~~ based on~~, at the multi-agent system,~~ a change in a target vector element associated with the sensor information, determining, utilizing the trained machine learning agent of the multi-agent system, ~~to determine~~ an onset of the decision epoch for the target patient based on determining a distance metric between the target vector element and a reference predicate vector from the reference predicate vector pattern;

based on the onset of the decision epoch ~~monitoring~~, automatically and dynamically determining, at the multi-agent system, an altered course of care for the at least one target patient from the target population of patients; and

causing for display, at the multi-agent system, within an interface, the altered course of care for the target patient by:

(1) notifying one of the following of the probable future clinical decision support event : (i) the target patient, (ii) a health care professional, and (iii) a medical organization; and

(2) providing an indication of a one or more alternative clinical recommendations within the decision epoch.

16. (Previously Presented) The computer readable storage devices of claim 15, further comprising determining a statistical degree of association between one or more clinical concept in a set of potential risk factors and a clinical condition.

17. (Previously Presented) The computer readable storage devices of claim 16, further comprising ranking the risk factors based on the statistical degree of association with the clinical condition.

18. (Previously Presented) The computer readable storage devices of claim 15, further comprising generating an update for a condition care program associated with the clinical condition, the update including one or more of the risk factors.

19. (Previously Presented) The computer readable storage devices of claim 18, further comprising determining the presence of one or more event indicators in a specific patient's health record; and based on the determined presence of the one or more event indicators, determining a probability that a specific patient has the clinical condition.

20 (Previously Presented) The computer readable storage devices of claim 15, wherein the clinical condition comprises a clinical decision support event.

21. (Previously Presented) The computer readable storage devices of claim 1, wherein the decision epoch concludes based on an offset of the target predicate vector element.