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EXAMINER
GUNN, JEREMY L

ART UNIT	PAPER NUMBER
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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. 16/263,601	Applicant(s) Li et al.	
	Examiner JEREMY L GUNN	Art Unit 3624	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 12/30/2020.

☐ 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) 1-6,8-15 and 17-20 is/are pending in the application.

5a) Of the above claim(s) 7 and 16 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-6,8-15 and 17-20 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: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA. Claims 1-6 and 8-20 have been reviewed and are under consideration by this office action.

Notice to Applicant

The following is a **Final Office** action. In response to Examiner's Non- Final Rejection of 10/06/2020, Applicant, on 12/20/2020, amended claims.

Status of Claims

Claims 1-6, 8-15, and 17-20 are pending in this application, while claims 7 and 16 have been cancelled. Claims 1-6, 8-15, and 17-20 are under examination and rejected as follows.

Response to Amendment

Applicant's amendments are received and acknowledged.

In light of the amended claims the original 112 Rejection is moot. The 112 rejection has been withdrawn. However, new 112 rejections have been necessitated by the amendment.

The 35 U.S.C. 101 rejection of claims 1-6, 8-15, and 17-20 is maintained.

The 35 U.S.C. 103 rejection of claims 1-6, 8-15, and 17-20 are withdrawn in view of the amendments to the claims and the Applicant's Remark's P. 25

Response to Arguments - 35 USC § 101

Applicant's arguments with respect to the 35 USC 101 rejections have been fully considered, but they are not persuasive.

The Applicant contends that the amended claims are do not fall in to the groupings of mental processes nor organizing human activity and further points to several limitation:

> Processing a query for performance driver information of a healthcare related system by aggregating performance indicators according to a performance driver hierarchy, monitoring migration of subjects between factors for utilization of different items to identify migration between factors with opposing utilization trends and relevant performance drivers from a large data space, and adjusting the identified performance drivers to optimize performance of a healthcare related system clearly do not fall into any of the above subject matter groupings of abstract ideas (mathematical concepts, methods of organizing human activity, and mental processes).

The Examiner respectfully disagrees and provides a brief analysis here. For full analysis please refer to the updated 101 Rejection below.

- *retrieving from a database, via a processor, healthcare related data pertaining to a query* (mental process as well as organizing human behavior – specifically business relations; retrieving data is applying part of the abstract idea that is being applied through the use of a generic computer via the processor and database (See MPEP 2106.05(f))).
- *monitoring utilization of the items of factors of comparable performance drivers and identifying groups of the factors with opposing utilization trends for the items* – (mental process as well as organizing human behavior – specifically business relations (i.e. monitoring processes to improve business drivers). Monitoring items with comparable performance drivers is a process capable of being performed in the

human mind and further falls in the category of organizing human activity, such as observing cashiers choosing paper bags over plastic bags when bagging groceries.).

- *adjusting, via the processor, use of the performance drivers based on the ranking to optimize performance of the healthcare related system* – (mental process as well as organizing human behavior; adjusting values based on rankings is an act capable of being performed in the human that is being applied to a generic computer via the processor (*See MPEP 2106.05(f)*)). Further the Examiner notes that adjusting the use of performance drivers further falls under certain methods of organizing human activity, specifically with regards to business relations.

The Applicant further contends the use of machine learning (such as training a model, determining relationships between data) does not fall under the abstract idea categories.

The Examiner respectfully disagrees. The use of machine learning is an additional element. The additional element of "machine learning" is being recited at a high level of generality, which merely amounts to using a general purpose computer as a tool to "apply" the abstract idea and/or is further merely an attempt to limit the abstract idea to a particular technological environment of using machine learning techniques to determine relationships steps of the abstract idea which fail to integrate the abstract idea into a practical application because the aforementioned elements are merely generic computer components (MPEP 2106.05(f),(h)).

The Applicant further contends that in Prong 2 of the analysis that even if there was a judicial exception, it is integrated in to practical application, further citing improvements to the functioning of a computer, query processing, and enables mining with sparse data.

The Examiner respectfully disagrees. The claim limitations provide an improvement to the abstract idea itself and do not constitute an improvement to the technology as a whole.

Further the Examiner notes that examination of the claims as a whole and in terms of each claim's limitations reveals that the claims are not directed to improving computer performance and do not recite any such benefit. The claims are directed to optimizing a performance drivers of a healthcare related system and merely use a computer to improve the performance of that determination—not the performance of a computer. (See MPEP 2106.05(a)(II)(i); A commonplace business method or mathematical algorithm being applied on a general purpose computer, Versata Dev. Group, Inc. v. SAP Am., Inc., 793 F.3d 1306, 1334, 115 USPQ2d 1681, 1701 (Fed. Cir. 2015)).

The 101 Rejections are updated and maintained.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-6, 8-15, and 17-20 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

Claims 1, 11, and 20 recites the limitation "monitoring utilization of the items of factors of comparable performance drivers and identifying groups of the factors with opposing utilization trends for the items." It is unclear how the how/if the "items of factors relate antecedently to the "wherein each factor is associated with… one or more items by the subjects."

For purposes of examination, the Examiner interprets the "items of factors" as a single metric relating to the performance drivers.

Dependent claims 2-6, 8-10, 12-15, and 17-19 are rejected similarly based upon their dependency to independent claims 1, 11, and 20.

Claim Rejections - 35 USC § 101

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.

Claims 1-6, 8-15, and 17-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to a judicial exception (i.e. an abstract idea) without reciting significantly more.

Regarding **Claims 1, 11, and 20**:

Step One - First, pursuant to step 1 in the January 2019 Guidance on 84 Fed. Reg. 53, the claim 1 is directed to a method, while claims 11 and 20 are directed towards an article of manufacture which are statutory categories. The Examiner further notes that Claim 20 recites computer readable storage medium which would generally include transitory signals per se. However, claim 20 is being interpreted in view of the specification as excluding transitory signals per se.

Step 2A, Prong One – Claim 1 recites a series of steps for a identifying and optimizing performance drivers of a healthcare related system comprising:

retrieving…, healthcare related data pertaining to a query for performance driver information of the healthcare related system:

analyzing... the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and

wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver,

and wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy

determining from the performance information, via the..., changes in the sets of performance indicators over time for the performance drivers and identifying performance drivers with determined changes satisfying a threshold;

determining, via the..., an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each factor is associated with utilization of one or more items by subjects;

identifying, via the ..., factors of the identified performance drivers with opposing utilization trends and determining an impact of the identified factors on the performance drivers by:

monitoring utilization of the items of factors of comparable performance drivers and identifying groups of the factors with opposing utilization trends for the items, wherein the

arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects;

determining the impact of the factor of the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

ranking, via the..., the identified performance drivers based on the impact of the determined changes and the impact of the identified factors; and

adjusting, via the... , use of the performance drivers based on the ranking to optimize performance of the healthcare related.... As drafted, this is, under its broadest reasonable interpretation, within the Abstract idea groupings of "Mental processes—concepts performed in the human mind" (observation, evaluation, judgment, opinion) and "Certain methods of organizing human activity" — commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations).

Step 2A, Prong Two - This judicial exception is not integrated into a practical application. Claims 1, 11, and 20 utilize the system of at least a processor, database, a computer system, a computer readable medium. The Examiner notes that Claim 20 recites computer readable medium that would generally not fall under a statutory category. However, the Applicant's specification sets forth limits to exclude transitory signals. **(See Applicant [0133];** A computer readable storage medium, as used herein, is not to be construed as being transitory

signals per se, such as radio waves... or electrical signals transmitted through a wire). The additional elements are performing the steps would be no more than mere instructions to apply the exception using a generic computer component. See MPEP 2106.05(f). Accordingly, the additional elements would not integrate the abstract idea into a practical application because it does not impose any meaningful limits on practicing the abstract idea. The claim also fails to recite any improvements to another technology or technical field, improvements to the functioning of the computer itself, use of a particular machine, effecting a transformation or reduction of a particular article to a different state or thing, and/or an additional element applies or uses the judicial exception in some other meaningful way beyond generally linking the use of the judicial exception to a particular technological environment, such that the claim as a whole is more than a drafting effort designed to monopolize the exception. See 84 Fed. Reg. 55. At this time, the claim is directed to an abstract idea.

Step 2B - The claim does not include additional elements that are sufficient to amount to significantly more than the judicial exception. As discussed above with respect to integration of the abstract idea into a practical application, the additional elements are just "apply it" on a computer. (*See MPEP 2106.05(f) – Mere Instructions to Apply an Exception – "Thus, for example, claims that amount to nothing more than an instruction to apply the abstract idea using a generic computer do not render an abstract idea eligible." Alice Corp., 134 S. Ct. at 235).* The specification further supports the "apply it" analysis as seen below:

[0040] Server systems 10 and client systems 20 may be implemented by any conventional or other computer systems preferably equipped with a display or monitor, a base (e.g., including at least one processor 16, 22, one or more memories 17, 23 and/or internal or external network interfaces or communications devices 18, 24 (e.g., modem, network cards,

etc.)), optional input devices (e.g., a keyboard, mouse or other input device), user interface 19, 25 (with a display 26)...

[0072] To characterize KPI data, supervised machine learning classifiers (e.g., rules-based, neural net, etc.) or unsupervised classifiers (e.g., clustering, etc.) may be used. Change characterization module 720 generates change patterns with confidence 1020.

[0123] The software of the present invention embodiments (e.g., healthcare data system 15, including PHI environment 70 and non-PHI environment 74, etc.) may be available on a non-transitory computer useable medium (e.g., magnetic or optical mediums, magneto-optic mediums, floppy diskettes, CD-ROM, DVD, memory devices, etc.) of a stationary or portable program product apparatus or device for use with stand-alone systems or systems connected by a network or other communications medium.

[0133] The computer readable storage medium can be a tangible device that can retain and store instructions for use by an instruction execution device. The computer readable storage medium may be, for example, but is not limited to, an electronic storage device, a magnetic storage device... A computer readable storage medium, as used herein, is not to be construed as being transitory signals per se, such as radio waves or other freely propagating electromagnetic waves, electromagnetic waves propagating through a waveguide or other transmission media (e.g., light pulses passing through a fiber-optic cable), or electrical signals transmitted through a wire.

The claim fails to recite any improvements to another technology or technical field, improvements to the functioning of the computer itself, use of a particular machine, effecting a transformation or reduction of a particular article to a different state or thing, adding unconventional steps that confine the claim to a particular useful application, and/or meaningful

limitations beyond generally linking the use of an abstract idea to a particular environment. See 84 Fed. Reg. 55. Viewed individually or as a whole, these additional claim element(s) do not provide meaningful limitation(s) to transform the abstract idea into a patent eligible application of the abstract idea such that the claim(s) amounts to significantly more than the abstract idea itself.

Regarding **Claims 2 and 12,** the claims further narrow the abstract idea by specifying constraints regarding the analyzing of data.

Regarding **Claims 3 and 13,** the claims further narrow the abstract idea by specifying machine learning be applied to adjust thresholds. The claims recite the additional element of a machine learning model. In Steps 2A/2B, these elements are "apply it" on a computer. Accordingly, the additional elements would not integrate the abstract idea into a practical application because it does not impose any meaningful limits on practicing the abstract idea.

Regarding **Claims 4 and 14,** the claims further narrow the abstract idea by specifying constraints regarding classifying changes into change patterns.

Regarding **Claims 5-6 and 15,** the claims further narrow the abstract idea by specifying classifying is performed by a classifier. The claims further recite the additional element of a classifier. The classifier is part of a module as seen in Figs. 7A and 10. The claims recite the additional element of a machine learn. In Steps 2A/2B, these elements are "apply it" on a computer. Accordingly, the additional elements would not integrate the abstract idea into a practical application because it does not impose any meaningful limits on practicing the abstract idea. The specification provides further support for the "apply it" rejection below.

[0122] The various functions of the computer or other processing systems may be distributed in any manner among any number of software and/or hardware modules or units,

processing or computer systems and/or circuitry, where the computer or processing systems may be disposed locally or remotely of each other and communicate via any suitable communications medium

Regarding **Claims 8 and 17,** the claims further narrows the abstract idea by determining relationships amongst performance drivers.

Regarding **Claims 9 and 18,** the claims further narrows the abstract idea by specifying constraints regarding the analyzing of data.

Regarding **Claims 10 and 19,** the claims further narrows the abstract idea by applying the updated data to determine biases and adjust thresholds. The claims further recite the use of machine learning. This element is rejected as "apply it" in Steps 2A/2B. The additional element of "machine learning" is being recited at a high level of generality, which merely amounts to using a general purpose computer as a tool to "apply" the abstract idea and/or is further merely an attempt to limit the abstract idea to a particular technological environment of using machine learning techniques to determine relationships steps of the abstract idea which fail to integrate the abstract idea into a practical application because the aforementioned elements are merely generic computer components (MPEP 2106.05(f), (h)).

The claims fail to recite any improvements to another technology or technical field, improvements to the functioning of the computer itself, use of a particular machine, effecting a transformation or reduction of a particular article to a different state or thing, adding unconventional steps that confine the claim to a particular useful application, and/or meaningful limitations beyond generally linking the use of an abstract idea to a particular environment. See 84 Fed. Reg. 55. Viewed individually or as a whole, these additional claim element(s) do not provide meaningful limitation(s) to transform the abstract idea into a patent eligible application

of the abstract idea such that the claim(s) amounts to significantly more than the abstract idea itself.

Examiner concludes that the additional elements in combination fail to amount to significantly more than the abstract idea based on findings that each element merely performs the same function(s) in combination as each element performs separately. The claim is not patent eligible.

For more information on 101 rejections, *see* MPEP 2106, January 2019 Guidance at https://www.govinfo.gov/content/pkg/FR-2019-01-07/pdf/2018-28282.pdf

Reasons for Overcoming Prior Art

None of the prior art of record, taken individually or in combination, teach or suggest all of the limitations of independent claims 1, 11, and 20 for monitoring utilization of the items of factors of comparable performance drivers and identifying groups of the factors with opposing utilization trends for the items; determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups; and determining the impact of the factors of the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends. The prior art references most closely resembling Applicant's claimed invention are as follows:

- *Basu et al. (US 8364519 B1) in view of D'Auria et al. (US 20130332194 A1) and Kothandaraman et al. (US 20200019822 A1),* as cited and described in detail in the last office action and failing to teach or reasonably suggest the combination of elements in the claims including at least monitoring utilization of the items of factors of comparable performance drivers and identifying groups of the factors with opposing utilization trends

for the items; determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups; and determining the impact of the factors of the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends

- *Barcenas (US 20130173355 A1)*; describing an entity that may generate its own composite metrics by grouping together a number of other composite or non-composite metrics. The facility provides an international collaborative performance management platform that aligns users on various metrics, objectives, and initiatives and identifies and highlights best practices information for those users to consume for purposes of increasing performance with respect to the various metrics, objectives, and initiatives.
- *Solilov et al., (US 20130132108 A1);* describing an example system includes a workflow decision engine to evaluate the contextual performance indicators based on a model and monitor measurements associated with the contextual performance indicators, the workflow decision engine to process feedback to update the context performance indicators.
- *Stern et al. (US 20180262618 A1);* describing a system to establish a suitable threshold for a particular performance indicator, e.g. to be used to determine whether the performance of an individual is on a downward trend. (This is different from a threshold that might be used to identify an individual whose performance is to be investigated, such as a T-score threshold.) Some performance indicators may increase with improving performance and others may decrease depending on what is being measured.

- *Siepmann et al. (US 20140282600 A1);* describes identifying a relationship between a discovered data pattern and a business problem, understanding how critical the discovered problem is, recognizing patterns in the business problem, tracking trends of increasing/decreasing problems, identifying relationships between clusters if object classes that have identified issues for correlation analyses.
- *Hagenbunch, (US 20200118653 A1);* describes classified trends based on computing rollup values along several dimensions for different time intervals resulting in a superset containing both original single-metric trends and computed aggregate trends and then classifying each trend using a set of mathematical tests, grouped datasets by aggregating trend classifications identified in an output for each group and identified trends for the group as a whole.

Additional relevant prior art describing systems and methods for monitoring KPI metrics and determining correlation between regarding parameters; aggregating data to determine correlation between monitored parameters; and accumulating data to create a historical record that is then used to track trends and correlations of the employee indicators and the performance indicator, include: Tzabari et al. (US 20180121390 A1), Yelisetti et al. (US 20180246944 A1), and Peterson et al. (US 20180330302 A1).

However the aforementioned prior art fails to clearly teach or suggest, individually or in combination, monitoring utilization of the items of factors of comparable performance drivers and identifying groups of the factors with opposing utilization trends for the items; determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups; and determining

the impact of the factors of the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends.

Furthermore, neither the prior art, nature of the problem, nor knowledge of a person having ordinary skill in the art provides for any predictable or reasonable rationale to combine prior art teachings to render the claimed invention obvious.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEREMY L GUNN whose telephone number is (571)270-1728. The examiner can normally be reached on Monday - Friday 6:30-4:30.

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, Jerry O'Connor can be reached on (571) 272-6787. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/J.L.G./
Examiner, Art Unit 3624

/Jerry O'Connor/
Supervisory Patent Examiner,
Group Art Unit 3624

REMARKS

Claims 7 and 16 have been canceled by a prior amendment without prejudice or disclaimer of the subject matter thereof, while claims 10 and 19 have been canceled by the subject amendment without prejudice or disclaimer of the subject matter thereof. Applicant reserves the right to pursue the subject matter of the canceled claims in the subject application and/or continuing applications.

Claims 1, 11, and 20 have been amended. In this Amendment, Applicant has amended claims 1, 11, and 20 and canceled claims 10 and 19 from further consideration in this application to facilitate expeditious prosecution of the application. Applicant is not conceding that the subject matter encompassed by the claims prior to this Amendment is unpatentable over the art and rejections cited by the Examiner. Applicant respectfully reserves the right to pursue claims in one or more continuing applications, including claims capturing the subject matter encompassed by claims 1, 10, 11, 19, and 20 prior to this Amendment and additional claims.

Claims 1 – 6, 8, 9, 11 – 15, 17, 18, and 20 are present in the subject application.

In the Final Office Action dated April 2, 2021, the Examiner has rejected claims 1 – 6, 8 – 15, and 17 - 20 under 35 U.S.C. §112(b) as being indefinite, and has rejected claims 1 – 6, 8 – 15, and 17 - 20 under 35 U.S.C. §101 as being directed to non-statutory subject matter. Favorable reconsideration of the subject application is respectfully requested in view of the following remarks.

INTERVIEW

Initially, Applicant's representative gratefully acknowledges the courtesies extended by Examiner Gunn during the recent telephone Interview of May 25, 2021. In order to expedite prosecution of the subject application, a proposed independent claim was submitted that recited the features of:

receiving, via the processor, feedback from a user pertaining to the ranked performance drivers and storing the feedback in a second database mapping the ranked performance drivers to corresponding characteristics;

training, via the processor, a supervised machine learning model with mappings from the second database to learn relationships between the characteristics of the ranked performance drivers and corresponding actions based on the feedback from the user;

determining, via the supervised machine learning model of the processor, relationships between the ranked performance drivers and the corresponding actions;

modifying the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

altering the ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjusting, via the processor, performance of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

As discussed in the Interview Summary submitted herewith, the Examiner indicated that the proposed claim overcame the rejection under 35 U.S.C. §112. Although no agreement was reached with respect to the rejection under 35 U.S.C. §101, the Examiner suggested to further clarify the iterative or continuous nature of training the machine leaning model with user feedback.

REJECTION UNDER 35 U.S.C. §112(b)

The Examiner has rejected claims 1 – 6, 8 – 15, and 17 - 20 under 35 U.S.C. §112(b) as being indefinite. This rejection is considered moot with respect to canceled claims 10 and 19.

The Examiner takes the position that it is unclear how the items of factors relate to the previously recited each factor.

This rejection is respectfully traversed since the claims are considered to be definite. However, in order to expedite prosecution of the subject application, independent claims 1, 11, and 20 have been amended in accordance with the Examiner's comments, and include features similar to those of the proposed claim which the Examiner acknowledged to overcome the rejection during the Interview. Accordingly, the claims are considered to overcome the rejection.

REJECTION UNDER 35 U.S.C. §101

The Examiner has rejected claims 1 – 6, 8 – 15, and 17 - 20 under 35 U.S.C. §101 as being directed toward non-statutory subject matter. This rejection is considered moot with respect to canceled claims 10 and 19.

The Examiner takes the position that the claims are directed to mental processes and certain methods of organizing human activity. The Examiner takes the further position that the claims do not recite significantly more than the abstract idea and, therefore, do not provide meaningful limitations to transform the abstract idea into a patent eligible application of the abstract idea.

This rejection is respectfully traversed. Initially, the 2019 Revised Patent Subject Matter Eligibility Guidance of January 7, 2019, 84 Fed. Reg. 50 (2019), specifies the revised procedure for determining subject matter eligibility. Specifically, the 2019 Revised Patent Subject Matter Eligibility Guidance is based on supporting case law of the Supreme Court and Federal Circuit cited therein, and indicates that the test for determining subject matter eligibility consists of the following steps:

1) determining whether the claimed subject matter falls within one of the statutory categories of patentable subject matter identified by 35 U.S.C. §101 (process, machine, manufacture, or composition of matter); and

2) when the claimed subject matter falls within one of the statutory categories, applying the Alice/Mayo test for judicial exceptions consisting of:

2A) determining whether the claim is directed to a law of nature, a natural phenomenon, or an abstract idea; and, if so

2B) determining whether any additional element or combination of elements in the claim is sufficient to ensure that the claim amounts to significantly more than the abstract idea.

Step 2A: Determining Whether the Claim is Directed to a Judicial Exception

With respect to Step 2A, the 2019 Revised Patent Subject Matter Eligibility Guidance specifies that the following two prong inquiry is to be applied to determine whether the claim is directed to a judicial exception:

i) evaluate whether the claim recites a judicial exception (i.e., an abstract idea, a law of nature, or a natural phenomenon); and, if so

ii) evaluate whether the judicial exception is integrated into a practical application.

Prong (i) – Determining Whether the Claim Recites a Judicial Exception

According to the 2019 Revised Patent Subject Matter Eligibility Guidance, the evaluation of prong (i) of Step 2A consists of determining whether specific claim limitations identified as an abstract idea fall within subject matter groupings of abstract ideas. These subject matter groupings include mathematical concepts, certain methods of organizing human activity, and mental processes.

If the claim does not recite a judicial exception (a law of nature, a natural phenomenon, or subject matter within the subject matter groupings of abstract ideas), then the claim is eligible (except in rare instances).

In order to expedite prosecution of the subject application, independent claim 1 has been amended in accordance with the Examiner's comments during the Interview to further clarify the iterative nature of training the machine learning model, and recites the features of:

receiving, via the processor, feedback from a user **over time** and storing the feedback in a second database mapping specific performance drivers to corresponding characteristics;

training, via the processor, a supervised machine learning model **over time** with mappings from the second database to learn relationships between the characteristics of the specific performance drivers and corresponding actions **as the feedback from the user is received over time**;

determining, via the supervised machine learning model of the processor, relationships between the ranked performance drivers and the corresponding actions;

modifying, via the processor, the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

altering, via the processor, the ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjusting, via the processor, performance of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

Independent claims 11 and 20 have also been amended in order to expedite prosecution of the subject application, and recite similar features. Support for these features may be found throughout the specification (e.g., See Paragraphs 0044, 0046, 0104 – 0106, and 0123 of the published version of the subject application (U.S. Patent Application Publication No. 2020/0251205)).

The above features corresponding to machine learning do not fall into any of the above subject matter groupings of abstract ideas (mathematical concepts, methods of organizing human activity, and mental processes).

Accordingly, since the claims do not fall into any of the above subject matter groupings of abstract ideas, the claims are not directed to a judicial exception, and are considered to comply with 35 U.S.C. §101.

Prong(ii) – Determining Whether the Judicial Exception is Integrated into a Practical Application

According to the 2019 Revised Patent Subject Matter Eligibility Guidance, the evaluation of prong (ii) of Step 2A consists of identifying whether there are any additional elements recited in the claim beyond the judicial exception and evaluating those additional elements individually and in combination to determine whether they integrate the judicial exception into a practical application. **If the recited judicial exception is integrated into a practical application of the judicial exception, then the claim is eligible.**

This evaluation specifically excludes consideration of whether the additional elements represent well-understood, routine, and conventional activity. In other words, a claim that includes conventional elements may still integrate a judicial exception into a practical application, thereby satisfying the subject eligibility requirement of 35 U.S.C. §101.

Considerations that are indicative that an additional element (or combination of elements) may have integrated the judicial exception into a practical application include an additional

element that reflects an improvement in the functioning of a computer, or an improvement to another technology or technical field.

Initially, the claims do not recite a judicial exception as discussed above. However, even if the claims can somehow be construed to recite a judicial exception that falls within the above subject matter groupings, the claims integrate the judicial exception into a practical application to render the claims statutory.

As indicated in the specification, analysts or data scientists tasked with performance driver detection can be overwhelmed by finding actual performance drivers among millions of potential drivers. Further, healthcare data may be high dimensional and sparse, and therefore, searching the healthcare data space to process queries may result in performance drivers with varying signal strength. In addition, healthcare performance drivers also tend to be interrelated, thereby making it difficult to isolate primary underlying performance drivers and consuming computing resources (e.g., See Paragraphs 0003, 0035, and 0036 of the published version of the subject application (U.S. Patent Application Publication No. 2020/0251205)).

Accordingly, present invention embodiments improve query processing and computer performance by utilizing a hierarchical search strategy that allows the system to leverage domain-knowledge-based attribute hierarchies (trees) to search for impactful performance drivers. Impact may be estimated using sub-population level data, without using individual-level data. This not only improves computational speed and reduces analytic complexity, but also preserves data privacy in a non-PHI environment. In addition, present invention embodiments enable mining data with missing information, in particular, for sparse datasets in which

individual patient data is not available due to privacy concerns. Thus, present invention embodiments enhance query processing by a detection process that is fast, comprehensive, and objective. Further, the machine learning model is trained over time as user feedback is received to adjust actions to optimize the healthcare related system, thereby providing a dynamic system that learns over time (e.g., See Paragraphs 0044, 0046, 0056, 0093, 0118, and 0119 of the published version of the subject application (U.S. Patent Application Publication No. 2020/0251205)).

Thus, the claimed features clearly improve the technical field of query processing and improve the functioning of the computer by reducing query response time. Accordingly, the claims satisfy one or more of the above factors (e.g., improve the computer and/or another technology), and are considered to integrate any alleged judicial exception into a practical application, thereby complying with 35 U.S.C. §101.

CONCLUSION

In view of the foregoing, Applicant respectfully requests the Examiner to find the application to be in condition for allowance with claims 1 – 6, 8, 9, 11 – 15, 17, 18, and 20. However, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is respectfully requested to call the undersigned attorney or agent to discuss any unresolved issues and to expedite the disposition of the application.

Applicant hereby petitions for any extension of time that may be necessary to maintain the pendency of this application. The Commissioner is hereby authorized to charge payment of

any additional fees required for the above-identified application or credit any overpayment to Deposit Account No. 09-0460.

Dated: May 28, 2021

Respectfully submitted by:

/Stuart B. Shapiro/

Stuart B. Shapiro
Reg. No. 40169

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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) A method of identifying and optimizing performance drivers of a healthcare related system comprising:

retrieving from a first database, via a processor, healthcare related data pertaining to a query for performance driver information of the healthcare related system;

analyzing, via the processor, the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy;

determining from the performance information, via the processor, changes in the sets of performance indicators over time for the performance drivers and identifying performance drivers with determined changes satisfying a threshold;

determining, via the processor, an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects;

identifying, via the processor, the factors contributing to the determined impact to [[of]] the identified performance drivers with opposing utilization trends and determining an impact of the identified factors on the identified performance drivers by:

monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of the comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and

determining the impact of the identified factors [[of]] on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

ranking, via the processor, the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query;

receiving, via the processor, feedback from a user over time and storing the feedback in a second database mapping specific performance drivers to corresponding characteristics;

training, via the processor, a supervised machine learning model over time with mappings from the second database to learn relationships between the characteristics of the specific

performance drivers and corresponding actions as the feedback from the user is received over time;

determining, via the supervised machine learning model of the processor, relationships between the ranked performance drivers and the corresponding actions;

modifying, via the processor, the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

altering, via the processor, the ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjusting, via the processor, ~~use of the~~ performance ~~drivers~~ of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

2. (Original) The method of claim 1, wherein analyzing the healthcare related data comprises:

organizing the healthcare related data based on time windows;

assigning an event label to data records and grouping the data records into events based on the assigned event label;

mapping attributes of the data records according to hierarchical medical concepts; and

determining the sets of performance indicators based on the time windows and mapped attributes.

3. (Original) The method of claim 1, further comprising:

applying a machine learning model to adjust the threshold for the determined changes for identifying the performance drivers.

4. (Original) The method of claim 1, further comprising:

classifying the determined changes into change patterns, wherein the change patterns include multiresolution change detection results and each indicate a direction and a rate of change.

5. (Original) The method of claim 4, wherein the classifying is performed by a machine learning classifier.

6. (Original) The method of claim 4, wherein the classifying is performed by a rules-based classifier.

7. (Canceled)

8. (Original) The method of claim 1, further comprising:

determining relationships between the ranked performance drivers based on navigation within the hierarchy of performance drivers.

9. (Original) The method of claim 1, further comprising:

applying updated data to obtain performance drivers with changes satisfying the threshold and to determine the impact of the changes and the impact of factors contributing to the changes for the obtained performance drivers, wherein the updated data includes a more complete set of healthcare related data;

determining a bias in the determination of impact based on the updated data and modifying the impact determination of the changes and factors based on the bias; and

adjusting the threshold for the changes based on the bias.

10. (Canceled)

11. (Currently amended) A computer system for identifying and optimizing performance drivers of a healthcare related system, wherein the computer system comprises at least one processor configured to:

retrieve from a first database healthcare related data pertaining to a query for performance driver information of the healthcare related system;

analyze the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and

wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy;

determine from the performance information changes in the sets of performance indicators over time for the performance drivers and identify performance drivers with determined changes satisfying a threshold;

determine an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects;

identify the factors contributing to the determined impact to [[of]] the identified performance drivers with opposing utilization trends and determine an impact of the identified factors on the identified performance drivers by:

monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of the comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and

determining the impact of the identified factors [[of]] on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

rank the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query;

receive feedback from a user over time and store the feedback in a second database mapping specific performance drivers to corresponding characteristics;

train a supervised machine learning model over time with mappings from the second database to learn relationships between the characteristics of the specific performance drivers and corresponding actions as the feedback from the user is received over time;

determine, via the supervised machine learning model, relationships between the ranked performance drivers and the corresponding actions;

modify the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

alter the ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjust ~~use of the~~ performance ~~drivers~~ of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

12. (Previously presented) The computer system of claim 11, wherein the at least one processor is further configured to:

organize the healthcare related data based on time windows;

assign an event label to data records and group the data records into events based on the assigned event label;

map attributes of the data records according to hierarchical medical concepts; and

determine the sets of performance indicators based on the time windows and mapped attributes.

13. (Previously presented) The computer system of claim 11, wherein the at least one processor is further configured to:

apply a machine learning model to adjust the threshold for the determined changes for identifying the performance drivers.

14. (Previously presented) The computer system of claim 11, wherein the at least one processor is further configured to:

classify the determined changes into change patterns, wherein the change patterns include multiresolution change detection results and each indicate a direction and a rate of change.

15. (Previously presented) The computer system of claim 14, wherein the classifying is performed by a machine learning classifier.

16. (Canceled)

17. (Previously presented) The computer system of claim 11, wherein the at least one processor is further configured to:

determine relationships between the ranked performance drivers based on navigation within the hierarchy of performance drivers.

18. (Previously presented) The computer system of claim 11, wherein the at least one processor is further configured to:

apply updated data to obtain performance drivers with changes satisfying the threshold and to determine the impact of the changes and the impact of factors contributing to the changes for the obtained performance drivers, wherein the updated data includes a more complete set of healthcare related data;

determine a bias in the determination of impact based on the updated data and modify the impact determination of the changes and factors based on the bias; and

adjust the threshold for the changes based on the bias.

19. (Canceled)

20. (Currently amended) A computer program product for identifying and optimizing performance drivers of a healthcare related system, the computer program product comprising

one or more computer readable storage media collectively having program instructions embodied therewith, the program instructions executable by a computer to cause the computer to:

retrieve from a first database healthcare related data pertaining to a query for performance driver information of the healthcare related system;

analyze the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy;

determine from the performance information changes in the sets of performance indicators over time for the performance drivers and identify performance drivers with determined changes satisfying a threshold;

determine an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects;

identify the factors contributing to the determined impact to [[of]] the identified performance drivers with opposing utilization trends and determine an impact of the identified factors on the identified performance drivers by:

monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and

determining the impact of the identified factors [[of]] on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

rank the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query;

receive feedback from a user over time and store the feedback in a second database mapping specific performance drivers to corresponding characteristics;

train a supervised machine learning model over time with mappings from the second database to learn relationships between the characteristics of the specific performance drivers and corresponding actions as the feedback from the user is received over time;

determine, via the supervised machine learning model, relationships between the ranked performance drivers and the corresponding actions;

modify the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

alter the ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjust ~~use of the~~ performance ~~drivers~~ of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

46157 7590 09/29/2021
EDELL, SHAPIRO, & FINNAN, LLC
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EXAMINER	
GUNN, JEREMY L	
ART UNIT	**PAPER NUMBER**
3624	

DATE MAILED: 09/29/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/263,601	01/31/2019	Ta-Hsin Li	P201808073US01/0920.0653C	9173

TITLE OF INVENTION: SEARCHING AND DETECTING INTERPRETABLE CHANGES WITHIN A HIERARCHICAL HEALTHCARE DATA STRUCTURE IN A SYSTEMATIC AUTOMATED MANNER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	12/29/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

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EDELL, SHAPIRO, & FINNAN, LLC
9801 Washingtonian Blvd.
Suite 750
Gaithersburg, MD 20878

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/263,601	01/31/2019	Ta-Hsin Li	P201808073US01/0920.0653C	9173

TITLE OF INVENTION: SEARCHING AND DETECTING INTERPRETABLE CHANGES WITHIN A HIERARCHICAL HEALTHCARE DATA STRUCTURE IN A SYSTEMATIC AUTOMATED MANNER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	12/29/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
GUNN, JEREMY L	3624	705-007390

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/263,601	01/31/2019	Ta-Hsin Li	P201808073US01/0920.0653C	9173

46157 7590 09/29/2021

EDELL, SHAPIRO, & FINNAN, LLC
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EXAMINER	
GUNN, JEREMY L	
ART UNIT	PAPER NUMBER
3624	

DATE MAILED: 09/29/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/263,601	Applicant(s) Li et al.	
	Examiner JEREMY L GUNN	Art Unit 3624	AIA (FITF) Status Yes

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 05/28/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ 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.

3. ☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), 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.**

4. ☐ 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)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. 09/07/2021.
5. ☑ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

Continuation of 3. The allowed claim(s) is/are: 1-6,8-9,11-15,17-18, and 20.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA. Claims 1-6, 8-9, 11-15, 17-18, and 20 have been reviewed and are under consideration by this office action.

Status of Claims

This action is in reply to the amendment filed on 05/28/2021. Claims 1-6, 8-9, 11-15, 17-18, and 20 have been reviewed and are under consideration by this office action. Claims 1, 11, and 20 have been amended by Applicant. Claims 1, 11, and 20 are further amended with the Examiner's amendment provided below. Claims 9 and 19 have been cancelled and claims 7 and 16 had been previously cancelled. Claims 1-6, 8-9, 11-15, 17-18, and 20 are currently pending and are allowed.

Examiner's Amendment

An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given by applicant's representative Stuart Shapiro on 09/08/2021.

Please further amend the claims filed on 08/18/2021 as follows:

1. (CURRENTLY AMENDED) A method of identifying and optimizing performance drivers of a healthcare related system comprising:

retrieving from a first database, via a processor, healthcare related data pertaining to a query for performance driver information of the healthcare related system;

analyzing, via the processor, the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy;

determining from the performance information, via the processor, changes in the sets of performance indicators over time for the performance drivers and identifying performance drivers with determined changes satisfying a threshold;

determining, via the processor, an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from

one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects;

identifying, via the processor, the factors contributing to the determined impact to the identified performance drivers with opposing utilization trends and determining an impact of the identified factors on the identified performance drivers by:

monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of the comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and

determining the impact of the identified factors on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

ranking, via the processor, the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query;

~~receiving, via the processor, feedback from a user over time and storing the feedback in a second database mapping specific performance drivers to corresponding characteristics;~~

receiving, via the processor, updated data and feedback from a user over time;

adjusting the threshold based on the updated data, via the processor, and continually

detecting changes in the sets of performance indicators over time for the performance drivers to alter the identified performance drivers based on the adjusted threshold and modify the ranking of the identified performance drivers;

storing the feedback in a second database mapping the performance drivers of the modified ranking to corresponding characteristics;

training, via the processor, a supervised machine learning model over time with mappings from the second database to learn relationships between the characteristics of the ~~specific~~ performance drivers of the modified ranking and corresponding actions as the updated data and feedback from the user [[is]] are received over time;

determining, via the supervised machine learning model of the processor, relationships between the ~~ranked~~ performance drivers of the modified ranking and the corresponding actions;

modifying, via the processor, the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

altering, via the processor, the modified ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjusting, via the processor, performance of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

9. (CURRENTLY AMENDED) The method of claim 1, further comprising:

applying the updated data to obtain performance drivers with changes satisfying the threshold and to determine the impact of the changes and the impact of factors contributing to the changes for the obtained performance drivers, wherein the updated data includes a more complete set of healthcare related data;

determining a bias in the determination of impact based on the updated data and modifying the impact determination of the changes and factors based on the bias; and

adjusting the threshold for the changes based on the bias.

11. (CURRENTLY AMENDED) A computer system for identifying and optimizing performance drivers of a healthcare related system, wherein the computer system comprises at least one processor configured to:

retrieve from a first database healthcare related data pertaining to a query for performance driver information of the healthcare related system;

analyze the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and

wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy;

determine from the performance information changes in the sets of performance indicators over time for the performance drivers and identify performance drivers with determined changes satisfying a threshold;

determine an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects;

identify the factors contributing to the determined impact to the identified performance drivers with opposing utilization trends and determine an impact of the identified factors on the identified performance drivers by:

monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of the comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and

determining the impact of the identified factors on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

rank the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query;

~~receive updated data and feedback from a user over time and store the feedback in a second database mapping specific performance drivers to corresponding characteristics;~~

receive updated data and feedback from a user over time;

adjust the threshold based on the updated data and continually detect changes in the sets of performance indicators over time for the performance drivers to alter the identified performance drivers based on the adjusted threshold and modify the ranking of the identified performance drivers

store the feedback in a second database mapping the performance drivers of the modified ranking to corresponding characteristics;

training, via the processor, a supervised machine learning model over time with mappings from the second database to learn relationships between the characteristics of the ~~specific~~ performance drivers of the modified ranking and corresponding actions as the updated data and feedback from the user [[is]] are received over time;

determine, via the supervised machine learning model, relationships between the ~~ranked~~ performance drivers of the modified ranking and the corresponding actions;

modify the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

alter the modified ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjust performance drivers of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

18. (CURRENTLY AMENDED) The computer system of claim 11, wherein the at least one processor is further configured to:

apply the updated data to obtain performance drivers with changes satisfying the threshold and to determine the impact of the changes and the impact of factors contributing to the changes for the obtained performance drivers, wherein the updated data includes a more complete set of healthcare related data;

determine a bias in the determination of impact based on the updated data and modify the impact determination of the changes and factors based on the bias; and

adjust the threshold for the changes based on the bias.

20. (CURRENTLY AMENDED) A computer system for identifying and optimizing performance drivers of a healthcare related system, wherein the computer system comprises at least one processor configured to:

retrieve from a first database healthcare related data pertaining to a query for performance driver information of the healthcare related system;

analyze the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy;

determine from the performance information changes in the sets of performance indicators over time for the performance drivers and identify performance drivers with determined changes satisfying a threshold;

determine an impact of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects;

identify the factors contributing to the determined impact to the identified performance drivers with opposing utilization trends and determine an impact of the identified factors on the identified performance drivers by:

monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of the comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers;

determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and

determining the impact of the identified factors on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends;

rank the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query;

~~receive feedback from a user over time and store the feedback in a second database mapping specific performance drivers to corresponding characteristics~~;

receive, via the processor, updated data and feedback from a user over time;

adjust the threshold based on the updated data and continually detect changes in the sets of performance indicators over time for the performance drivers to alter the identified performance drivers based on the adjusted threshold and modify the ranking of the identified performance drivers

store the feedback in a second database mapping the performance drivers of the modified ranking to corresponding characteristics;

train a supervised machine learning model over time with mappings from the second database to learn relationships between the characteristics of the ~~specific~~ performance drivers of the modified ranking and corresponding actions as the updated data and feedback from the user [[is]] are received over time;

determine, via the supervised machine learning model, relationships between the ~~ranked~~ performance drivers of the modified ranking and the corresponding actions;

modify the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model;

alter the modified ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and

adjust performance of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system.

Reasons for Allowance

Rejections under 35 U.S.C. 103 were previously withdrawn in the Final Rejection dated 04/02/221. The Examiner has further added the most relevant non-patent literature and foreign reference regarding the application to the PTO-892 as neither further teaches the amended limitations neither individually nor in combination.

The rejection under 35 USC 101 has been withdrawn based on Examiner's amendments in light of the USPTO PEG 2019 guidance. The Revised Guidance states that an additional element that reflects an improvement in the functioning of a computer is indicative that the additional element integrates the exception into a practical application. In Prong 2 of Step 2A, the Revised Guidance states that the claims should be evaluated to determine whether the claim as a whole integrates the recited judicial exception into a practical application of the exception. Amended claims 1, 11, and 20 recites a combination of additional elements including "retrieving from a first database, via a processor, healthcare related data pertaining to a query for performance driver information of the healthcare related system; analyzing, via the processor, the healthcare related data to produce performance information pertaining to performance indicators for performance drivers that affect performance of the healthcare related system, wherein the performance information includes plural sets of the performance indicators determined over time with each set associated with a corresponding performance driver, and wherein the performance indicators are aggregated according to arrangement of the performance drivers in a hierarchy; determining from the performance information, via the processor, changes in the sets of performance indicators over time for the performance drivers and identifying performance drivers with determined changes satisfying a threshold; determining, via the processor, an impact

of the determined changes in the performance indicators to the identified performance drivers and contributions to the determined impact from one or more factors, wherein each of the factors is associated with utilization of one or more items by subjects; identifying, via the processor, the factors contributing to the determined impact to the identified performance drivers with opposing utilization trends and determining an impact of the identified factors on the identified performance drivers by: monitoring utilization of the items of the factors of comparable performance drivers and identifying groups of the factors of the comparable performance drivers with opposing utilization trends for the items, wherein the arrangement of the performance drivers in the hierarchy indicates the comparable performance drivers; determining quantities of subjects migrating between the factors with a decreasing utilization trend and the factors with an increasing utilization trend within each of the identified groups, wherein the migration of subjects is determined from population-based data to preserve privacy of individual subjects; and determining the impact of the identified factors on the identified performance drivers based on migration of the quantities of subjects between the factors with opposing utilization trends; ranking, via the processor, the identified performance drivers based on the impact of the determined changes and the impact of the identified factors to produce results for the query; receiving, via the processor, updated data and feedback from a user over time; adjusting the threshold based on the updated data, via the processor, and continually detecting changes in the sets of performance indicators over time for the performance drivers to alter the identified performance drivers based on the adjusted threshold and modify the ranking of the identified performance drivers; storing the feedback in a second database mapping the performance drivers of the modified ranking to corresponding characteristics; training, via the processor, a supervised machine learning model over time with mappings from the second database to learn relationships

between the characteristics of the performance drivers of the modified ranking and corresponding actions as the updated data and feedback from the user are received over time; determining, via the supervised machine learning model of the processor, relationships between the performance drivers of the modified ranking and the corresponding actions; modifying, via the processor, the impact of the determined changes and the impact of the identified factors of the identified performance drivers based on the relationships determined by the supervised machine learning model; altering, via the processor, the modified ranking of the identified performance drivers based on the modified impact of the determined changes and the modified impact of the identified factors; and adjusting, via the processor, performance of actions based on the corresponding actions of the ranked performance drivers in the altered ranking to optimize performance of the healthcare related system." Claims 1, 11, and 20 as a whole integrate the abstract idea into a practical application. Thus, amended claims 1, 11, and 20 recite limitations that integrate the abstract idea into a practical application based on the disclosure in Applicants specification.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEREMY L GUNN whose telephone number is (571)270-1728. The examiner can normally be reached on Monday - Friday 6:30-4:30.

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, Jerry O'Connor can be reached on (571) 272-6787. 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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

/J.L.G./
Examiner, Art Unit 3624

/Jerry O'Connor/
Supervisory Patent Examiner,
Group Art Unit 3624