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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/870,079	04/25/2013	Ming-Yen Chen	250912-3210	7052
109673	7590	05/17/2018	EXAMINER	
McClure, Qualey & Rodack, LLP 3100 Interstate North Circle Suite 150 Atlanta, GA 30339			SKIBINSKY, ANNA	
			ART UNIT	PAPER NUMBER
			1631	
			NOTIFICATION DATE	DELIVERY MODE
			05/17/2018	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MING-YEN CHEN, CHUAN-WEI TING,
and CHING-YAO WANG¹

Appeal 2017-007026
Application 13/870,079
Technology Center 1600

Before ERIC B. GRIMES, FRANCISCO C. PRATS, and
JEFFREY N. FREDMAN, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method and device for measuring a pulse rate, which have been rejected as being directed to patent-ineligible subject matter. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ Appellants identify the Real Party in Interest as INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE. Appeal Br. 2.

STATEMENT OF THE CASE

The Specification states that “[t]he number and interval of [a] testee’s heart beats can be detected through the peaks of the pulse waveform.” Spec. ¶ 3. However, the peaks of the pulse waveform “do not occur at the time points at which the work is the maximum, and can be easily influenced by external factors such as ambient light, motion artifact, posture, and so on.” *Id.* ¶ 37. The Specification states that if “the pulse interval time sequence is obtained according to the maximum change rate points [] of the rising segments [] of the pulse waveform[], . . . the influence of external factors [is] greatly reduced and analysis precision is greatly increased.” *Id.*

Claims 1–12 are on appeal. Claim 1 is representative and reads as follows:

1. A computerized method for analyzing a physiological signal, comprising:
emitting a light to a testing portion with blood capillaries by a light emitter;
receiving a reflective light from the testing portion by a light receiver;
recording, by a sequence recorder, the reflective light to generate a pulse waveform representing a blood volume of a blood vessel over time;
analyzing a plurality of rising segments of the pulse waveform by a processor;
analyzing a maximum change rate point at each rising segment by the processor;
storing the maximum change rate points by a storage unit; and
establishing, by the processor, a pulse interval time sequence corresponding to a heart pulsation by recording a plurality of intervals between the maximum change rate points or an occurring time of each of the maximum change rate points.

DISCUSSION

The Examiner has rejected claims 1–12 under 35 U.S.C. § 101 on the basis that they “are directed to the abstract idea of analyzing rising segments of a pulse waveform and a maximum change rate at each rising segment, and establishing a pulse interval time sequence.” Ans. 3. “As a whole the method relies on the abstract ideas of data analysis, organizing information through mathematical correlations, and performing mathematical calculations which can be performed as mental steps or by using pen and paper.” *Id.* at 3–4.

The Examiner finds that the additional steps of claim 1—emitting light, receiving and recording reflected light, and storing the maximum change rate points—are not significantly more than the judicial exception to § 101 because they are routine and conventional, as shown by Karst,² which discloses a pulse oximeter. *Id.* at 4. The Examiner concludes that the “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.” *Id.*

We agree with the Examiner that claim 1 is directed to a patent-ineligible method. The Supreme Court has

set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts. First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, “[w]hat

² Karst et al., US 2010/0312128 A1, Dec. 9, 2010.

else is there in the claims before us?” To answer that question, we consider the elements of each claim both individually and “as an ordered combination” to determine whether the additional elements “transform the nature of the claim” into a patent-eligible application.

Alice Corp. Pty. Ltd. v. CLS Bank Int’l, 134 S. Ct. 2347, 2355 (2014)
(citations omitted).

Here, claim 1 is directed to the abstract idea of determining a pulse rate based on points of maximum rise in blood volume. So the next question is, what else is there in the claims before us?

Karst states that

[o]ne technique for measuring blood flow—by way of blood volume in tissue—is plethysmography. Photoplethysmography is an optical technique that uses an optical sensor to illuminate tissue and measure changes in light absorption. A pulse oximeter is an example of one type of optical sensor typically placed at a finger tip to measure transmissive absorption or against the forehead to measure reflective absorption. A conventional pulse oximeter monitors the perfusion of blood to the dermis and subcutaneous tissue of the skin.

Karst ¶ 36. Thus, Karst provides evidence that it was routine and conventional to emit light to a finger tip or forehead and receive reflective light in order to measure blood volume.

Karst also states that “[a]n example of a signal generated by an optical sensor is shown in FIG. 1B as a photoplethysmograph (PPG) comprising multiple cardiac cycles (n, n+1). Each cardiac cycle appears as a peak (max) in the PPG signal. . . . A PPG signal . . . is generally processed to determine heart rate.” *Id.* Thus, claim 1’s steps of (a) recording the reflective light to generate a pulse waveform over time and (b) establishing a heart rate (or

pulse interval time sequence) based on the reflective light were also routine and conventional.

Karst provides evidence, therefore, that the routine and conventional method of measuring a heart rate using a pulse oximeter generated and recorded the same data as the method of claim 1 but analyzed it differently: the conventional method relied on the peak of the PPG signal to mark each cardiac cycle, whereas the method of claim 1 uses the point of maximum rise in blood volume.

But a method of analyzing data in a different way is still nothing more than data analysis. “Information as such is an intangible. Accordingly, . . . collecting information, including when limited to particular content (which does not change its character as information), [is] within the realm of abstract ideas.” *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016) (citations omitted). “In a similar vein, . . . analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, [are] essentially mental processes within the abstract-idea category.” *Id.* at 1354. And “merely presenting the results of abstract processes of collecting and analyzing information, without more (such as identifying a particular tool for presentation), is abstract as an ancillary part of such collection and analysis.” *Id.*

Electric Power Group is directly applicable here: “The advance [the claims] purport to make is a process of gathering and analyzing information of a specified content, then displaying the results, and not any particular assertedly inventive technology for performing those functions. They are therefore directed to an abstract idea.” *Id.*

Appellants argue that “the claims are not simply directed to mathematical analysis, but instead are specifically directed to improvements to an electrical non-invasive bio-information measurement device, to greatly reduce the influence of external factors and to increase signal analysis precision of heart rate measurement.” Appeal Br. 5. Appellants point to the Specification’s statement that “[t]he peaks of the pulse waveform do not occur at the time points at which the work is the maximum, and can be easily influenced by external factors such as ambient light, motion artifact, posture, and so on,” while “[t]he maximum change rate points represent the time points at which the work is the maximum in the ejection stage,” “so that the influence of external factors are greatly reduced and analysis precision is greatly increased.” *Id.*, citing Spec. ¶ 37.

Appellants cite *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016), as holding that “[s]oftware can make non-abstract improvements to computer technology just as hardware improvements can” and there is “no reason to conclude that all claims directed to improvements in computer-related technology, including those directed to software, are abstract.” Appeal Br. 6. Appellants argue that, “[i]n this case, the plain focus of the claims is on an improvement to the functionality of an electrical bio-information measurement device, not on economic or other tasks for which a computer is used in its ordinary capacity.” *Id.* Therefore, Appellants conclude, “the claims are not directed to an abstract idea within the meaning of Alice [*Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347 (2014)]. Rather, they are directed to a specific improvement to an electrical bio-information measurement device.” *Id.*

We do not find Appellants’ argument persuasive. The patents at issue in *Enfish* were “directed to an innovative logical model for a computer database.” *Enfish*, 822 F.3d at 1330. “Contrary to conventional logical models, the patented logical model includes all data entities in a single table, with column definitions provided by rows in that same table. The patents describe this as the ‘self-referential’ property of the database.” *Id.*

“The patents teach that multiple benefits flow from this design,” including “faster searching of data than would be possible with the relational model” and “more effective storage of data other than structured text, such as images and unstructured text.” *Id.* at 1333. “Finally, the patents teach that the self-referential model allows more flexibility in configuring the database.” *Id.*

The court stated that “the first step in the *Alice* inquiry in [*Enfish*] asks whether the focus of the claims is on the specific asserted improvement in computer capabilities . . . or, instead, on a process that qualifies as an ‘abstract idea’ for which computers are invoked merely as a tool.” *Id.* at 1335–36. The court held that “the plain focus of the claims is on an improvement to computer functionality itself, not on economic or other tasks for which a computer is used in its ordinary capacity,” and therefore the claims “are not directed to an abstract idea within the meaning of *Alice*. Rather, they are directed to a specific improvement to the way computers operate, embodied in the self-referential table.” *Id.* at 1336.

The claims of the instant application, by contrast, are not directed to “an improvement to computer functionality itself.” *Id.* Rather, the method of claim 1 uses a processor to “analyz[e] a plurality of rising segments of the

pulse waveform” and to “analyz[e] a maximum change rate point at each rising segment.” Claim 1. The maximum change rate points are then stored by a storage unit and the processor “record[s] a plurality of intervals between the maximum change rate points or an occurring time of each of the maximum change rate points.” *Id.*

The Specification describes these steps as follows: “a plurality of valleys W21 and a plurality of peaks W22 of the pulse waveform W2 are analyzed by the processing unit 120” (Spec. ¶ 33); “each segment between valley W21 and its next adjacent peak W22 is recorded by the processing unit 120 as a rising segment W23 to obtain a plurality of rising segments W23” (*id.* ¶ 34); “a maximum change rate point W24 at each rising segment W23 is analyzed by the processing unit 120. . . . [T]he maximum first derivative function point W24' is the maximum change rate point W24” (*id.* ¶ 35); and “[t]he processing unit 120 further obtains a pulse interval time sequence according to the maximum change rate points W24” based on either the intervals between, or the occurring time of, the maximum change rate points W24 (*id.* ¶ 36).

Thus, in claim 1, the processor simply analyzes the peaks and valleys of a pulse waveform, determines the first derivative function curve of the segments between a valley and the next peak, stores the maximum change rate points, and determines the time intervals between those points or the time at which each of those points occurred. Claim 1 does not focus “on an improvement to computer functionality itself.” *Enfish*, 822 F.3d at 1336. Rather, the processor recited in claim 1 carries out “tasks for which a computer is used in its ordinary capacity,” *id.*; specifically, analyzing data to

determine maximum and minimum values, calculating a derivative function curve based on those values, storing the maximum derivative points, and determining when those maximum points occur over time.

In summary, claim 1 is directed to an abstract idea and adds nothing more than routine and conventional steps to the abstract idea. The claimed method is therefore not eligible for patenting. We affirm the rejection of claim 1 under 35 U.S.C. § 101. Claims 2–12 fall with claim 1. Appeal Br. 6.

SUMMARY

We affirm the rejection of claims 1–12 under 35 U.S.C. § 101.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED