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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/079,268	03/24/2016	CHARLES J. CAMP	SJO920150115US1	2459
124717	7590	02/04/2020	EXAMINER	
Russell Ng PLLC (IBM TUC/BOU/SJO) 8729 Shoal Creek Blvd., Suite 100 Austin, TX 78757			SHANMUGASUNDARAM, KANNAN	
			ART UNIT	PAPER NUMBER
			2158	
			NOTIFICATION DATE	DELIVERY MODE
			02/04/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* CHARLES J. CAMP, CHARALAMPOS POZIDIS,  
NIKOLAOS PAPANDREOU, ROMAN A. PLETKA,  
THOMAS MITTELHOLZER, THOMAS PARNELL,  
and  
TOBIAS BLAETTLER

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Appeal 2018-003680  
Application 15/079,268<sup>1</sup>  
Technology Center 2100

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Before JOSEPH L. DIXON, HUNG H. BUI, and JON M. JURGOVAN,  
*Administrative Patent Judges.*

JURGOVAN, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellant seeks review under 35 U.S.C. § 134(a) from a Final Rejection of claims 1–23, which are all the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.<sup>2</sup>

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<sup>1</sup> We use the word “Appellant” to refer to “applicant[(s)]” as defined in 37 C.F.R. § 1.42. The real party in interest is International Business Machines Corporation. (Appeal Br. 2.)

<sup>2</sup> Our Decision refers to the Specification (“Spec.”) filed March 24, 2016, the Final Office Action (“Final Act.”) mailed March 24, 2017, the Appeal Brief (“Appeal Br.”) filed August 23, 2017, the Examiner’s Answer (“Ans.”)

### CLAIMED INVENTION

The claims are directed to a method and system for “updating prefix codes utilized for pseudo-dynamic data compression based on a workload of a data storage system” by augmenting a number of prior prefix codes S for pseudo-dynamic compression, where the augmenting includes “determining a new set S’ of prefix codes for pseudo-dynamic compression from a training data set selected from a workload of the data storage system and storing the new set S’ in the data storage system with the prior set S.” (Spec. ¶ 1; Abstract.)

Claims 1, 8, and 15 are independent. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A method for updating parameters for data compression, the method comprising:

storing, in a data storage system, a prior set S of prefix codes for pseudo-dynamic compression as well as data compressed utilizing prefix codes in the prior set S;

while storing in the data storage system data compressed utilizing prefix codes in the prior set S, augmenting a number of prefix codes for pseudo-dynamic compression in the data storage system by:

determining a new set S’ of multiple prefix codes for pseudo-dynamic compression from a training data set selected from a workload of the data storage system, wherein the determining includes determining each of the multiple prefix codes in the new set S’ from a respective one of a plurality of clusters of data pages from the training data set;

storing the new set S’ in the data storage system with the prior set S; and

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mailed December 21, 2017, and the Reply Brief (“Reply Br.”) filed February 21, 2018.

performing pseudo-dynamic compression on input data to be stored within the data storage system in a multi-step process including:

encoding the input data utilizing a lossless data compression encoder to produce an encoded sequence of data;

encoding, by a prefix encoder, the encoded sequence of data utilizing prefix codes selected from the prefix codes stored in the data storage system to produce compressed data; and

storing the compressed data obtained from the prefix encoder in the data storage system.

(Appeal Br. 18–24 (Claims App.).)

### REJECTIONS<sup>3</sup> & REFERENCES

(1) Claims 1–14, 21, and 22 stand rejected under 35 U.S.C. § 101 as directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more. (Final Act. 3.)

(2) Claims 1, 7, 8, 14, 15, and 21–23 stand rejected under 35 U.S.C. § 103 based on Kelly et al. (US 2016/0124983 A1, published May 5, 2016) (“Kelly”) and Ottesen et al. (US 2004/0223651 A1, published Nov. 11, 2004) (“Ottesen”). (Final Act. 4–7.)

(3) Claims 2–6, 9–13, and 16–20 stand rejected under 35 U.S.C. § 103 based on Kelly, Ottesen, and Berger et al. (US 5,973,626, issued Oct. 26, 1999) (“Berger”). (Final Act. 7–12.)

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<sup>3</sup> Claims 15–20 and 23 were rejected under 35 U.S.C. § 101, for not falling within at least one of the four categories of patent eligible subject matter because “claim 15 recites a ‘program product’ that can be considered non-statutory signals.” (Final Act. 2–3.) However, this rejection was withdrawn as noted in the Examiner’s Answer, and is no longer pending on appeal. (Ans. 14.)

## ANALYSIS

### *Rejection of Claims 1–14, 21, and 22 under 35 U.S.C. § 101*

Patent eligibility is a question of law that is reviewable *de novo*. *Dealertrack, Inc. v. Huber*, 674 F.3d 1315, 1333 (Fed. Cir. 2012). Accordingly, we review the Examiner’s § 101 determinations concerning patent eligibility under this standard.

Patentable subject matter is defined by 35 U.S.C. § 101, as follows:

[w]hoever 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.

In interpreting this statute, the Supreme Court emphasizes that patent protection should not preempt “the basic tools of scientific and technological work.” *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) (“*Benson*”); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012) (“*Mayo*”); *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014) (“*Alice*”). The rationale is that patents directed to basic building blocks of technology would not “promote the progress of science” under the U.S. Constitution, Article I, Section 8, Clause 8, but instead would impede it. Accordingly, laws of nature, natural phenomena, and abstract ideas, are not patent-eligible subject matter. *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1346 (Fed. Cir. 2017) (citing *Alice*, 573 U.S. at 216).

The Supreme Court set forth a two-part test for subject matter eligibility in *Alice* (573 U.S. at 217–18). The first step is to determine whether the claim is directed to a patent-ineligible concept. *Id.* (citing *Mayo*, 566 U.S. at 76–77). If so, then the eligibility analysis proceeds to the second step of the *Alice/Mayo* test in which we “examine the elements of the

claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221 (internal quotation marks omitted) (quoting *Mayo*, 566 U.S. at 72, 79). There is no need to proceed to the second step, however, if the first step of the *Alice/Mayo* test yields a determination that the claim is directed to patent-eligible subject matter.

The Patent Office has recently revised its guidance for how to apply the *Alice/Mayo* test in the *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50–57 (January 7, 2019) (“the Revised Guidance”).

Under the Revised Guidance, we first look to whether the claim recites:

- (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, mental processes, or certain methods of organizing human activity such as a fundamental economic practice or managing personal behavior or relationships or interactions between people); and
- (2) additional elements that integrate the judicial exception into a practical application (*see* Manual of Patent Examining Procedure (“MPEP”) § 2106.05(a)–(c), (e)–(h)).

84 Fed. Reg. at 51–52, 55.

A claim that integrates a judicial exception into a practical application applies, relies on, or uses the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception. 84 Fed. Reg. at 54. When the judicial exception is so integrated, then the claim is not directed to a judicial exception and is patent-eligible under § 101. 84 Fed. Reg. at 54. Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then evaluate whether the claim provides an inventive concept. 84 Fed. Reg. at 56; *Alice*,

573 U.S. at 217–19, 221. Evaluation of the inventive concept involves consideration of whether an additional element or combination of elements (1) adds a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field, which is indicative that an inventive concept may be present; or (2) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception, which is indicative that an inventive concept may not be present.

Applying Step 1 of the Revised Guidance (which is unchanged from the prior guidance) to the present case, we determine independent claim 1 recites a “method for updating parameters for data compression,” which is a form of “process,” thereby falling within one of the categories enumerated under § 101 and satisfying Step 1 of the Revised Guidance. We also determine independent claim 8 recites a “data processing system,” which is a form of “machine,” thereby falling within one of the categories enumerated under § 101 and satisfying Step 1 of the Revised Guidance.

We proceed to apply Step 2A of the Revised Guidance to determine if claim 1 is “directed to” a judicial exception. As discussed *supra*, the *first prong of Step 2A* under the Revised Guidance is to determine whether the claim recites a judicial exception including (a) mathematical concepts; (b) certain methods of organizing human activity; and (c) mental processes.

We find that independent claim 1 (and independent claim 8 reciting similar limitations) does not recite any of the three judicially-expected groupings of abstract ideas identified in the Revised Guidance. First, claim 1 does not recite any of the methods of organizing human activity identified in the Revised Guidance. For example, claim 1 does not recite fundamental

economic principles or practices, commercial or legal interactions, or managing personal behavior or relationships or interactions between people. *See* Revised Guidance, 84 Fed. Reg. at 51–52. Second, claim 1 does not recite a mathematical concept, such as a specific mathematical algorithm or formula. *See Parker v. Flook*, 437 U.S. 584, 586 (1978); *Diamond v. Diehr*, 450 U.S. 175, 187 (1981). Instead, claim 1 recites “augmenting a number of prefix codes for pseudo-dynamic compression” by “determining a new set S’ of multiple prefix codes for pseudo-dynamic compression from a training data set selected from a workload of the data storage system” and “determining each of the multiple prefix codes in the new set S’ from a respective one of a plurality of clusters of data pages from the training data set.” While these limitations involve or are based on mathematical relationships, formulas, or calculations, the mathematical relationships, formulas, or calculations are not explicitly recited in the claim.

Third, although the Examiner found that the claim could be performed mentally because “there is nothing stopping the human brain from performing the actions of the invention. . . . [and] replacing one set of data with another can be performed mentally” (*see* Ans. 3), we agree with Appellant that claim 1 recites “steps that cannot be performed solely mentally” (Reply Br. 6–7). For example, claim 1’s steps—including “storing, in a data storage system, a prior set S of prefix codes for pseudo-dynamic compression as well as data compressed utilizing prefix codes in the prior set S,” “augmenting a number of prefix codes for pseudo-dynamic compression in the data storage system by: determining a new set S’ of multiple prefix codes for pseudo-dynamic compression,” “determining each of the multiple prefix codes in the new set S’ from a respective one of a

plurality of clusters of data pages from the training data set [of the data storage system's workload],” “storing the new set S' in the data storage system with the prior set S,” “performing pseudo-dynamic compression on input data to be stored within the data storage system” by multiple encoding steps including “encoding the input data utilizing a lossless data compression encoder,” and “storing the compressed data obtained from the prefix encoder in the data storage system”—exist exclusively in the realm of computers and cannot practicably be performed in the human mind or with pen and paper, and thus do not amount to a mental process. (Reply Br. 5–7.)

We also disagree with the Examiner's finding that claim 1 is “directed to a judicial exception” of “collecting and comparing prefix information.” (Final Act. 3; *see also* Ans. 4.) Claim 1 recites a “method for updating parameters for data compression” that includes, *inter alia*, (i) “augmenting a number of prefix codes for pseudo-dynamic compression in the data storage system” by “determining a new set S' of multiple prefix codes for pseudo-dynamic compression from a training data set selected from a workload of the data storage system” and “determining each of the multiple prefix codes in the new set S' from a respective one of a plurality of clusters of data pages from the training data set,” (ii) “performing pseudo-dynamic compression on input data to be stored within the data storage system” by “encoding the input data utilizing a lossless data compression encoder to produce an encoded sequence of data,” “encoding, by a prefix encoder, the encoded sequence of data utilizing prefix codes selected from the prefix codes stored in the data storage system to produce compressed data,” and “storing the compressed data obtained from the prefix encoder in the data storage system.” As can be seen, claim 1 does not merely recite “collecting

and comparing prefix information” or data manipulation in an abstract sense (Final Act. 3 and Ans. 4), but rather relates to data compression and storage on physical storage media and optimization of the data’s compression based on workloads of a data storage system. (*See* Appeal Br. 18 (claim 1); *see also* Spec. ¶¶ 1–2, 6, 43, 51, 61.) That is, the claimed steps all relate to pseudo-dynamic data compression and optimization of compression codes that improve the utilization of storage capacity in a data storage system, which is not an abstract idea. (Reply Br. 5, 7–10; Appeal Br. 6, 9–10.)

Accordingly, in light of the Revised Guidance, we determine that claim 1, and independent claim 8 reciting similar limitations, do not recite an abstract idea that would make them patent-ineligible under 35 U.S.C. § 101.

For these reasons, we do not sustain the Examiner’s rejection of claims 1 and 8, and dependent claims 2–7, 9–14, 21, and 22, as directed to patent-ineligible subject matter under 35 U.S.C. § 101.

*Rejection of Claims 1–23 under 35 U.S.C. § 103*

With respect to independent claim 1, the Examiner finds Kelly’s technique of adding new prefixes to a dictionary table teaches the claimed “determining a new set S’ of multiple prefix codes” and “storing the new set S’ in the data storage system with the prior set S [of prefix codes].” (Final Act. 4 (citing Kelly ¶¶ 17–19, Fig. 1).) The Examiner further finds the combination of Kelly and Ottesen teaches the claimed “performing pseudo-dynamic compression on input data to be stored within the data storage system in a multi-step process.” (Final Act. 4–5; Ans. 8–9.) In particular, the Examiner finds Kelly’s compression by inserting prefixes in the table performs a “pseudo-dynamic compression on input data to be stored within

the data storage system in a multi-step process” that includes (1) “encoding the input data utilizing a data compression encoder to produce an encoded sequence of data” and (2) “encoding, by a prefix encoder, the encoded sequence of data utilizing prefix codes selected from the prefix codes stored in the data storage system to produce compressed data,” as recited in claim 1. (Final Act. 4–5 (citing Kelly ¶¶ 23, 26–27, 30).) The Examiner also finds Ottesen performs “lossless encryption and compression” using an “encoder [that] is lossless.” (Final Act. 5 (citing Ottesen ¶ 29) (emphasis omitted).) We do not agree.

We agree with Appellant that Kelly and Ottesen, alone or in combination, fail to teach or suggest performing a *multi-step pseudo-dynamic compression process that doubly encodes input data* by (1) *encoding the input data utilizing a lossless data compression encoder to produce an encoded sequence of data*, and (2) *encoding, by a prefix encoder, the encoded sequence of data utilizing prefix codes* selected from the prefix codes stored in the data storage system to produce compressed data, as recited in claim 1. (Appeal Br. 12; Reply Br. 18.)

As Appellant explains, Kelly merely discloses “a single operation on raw data to produce compressed and encrypted data. . . . This single operation is the lossless dictionary based encryption (e.g., LZW) disclosed, for example, in ¶ [0017] of *Kelly*.” (Reply Br. 18 (citing Kelly ¶¶ 5, 17).) For example, Kelly sets a first prefix as the first character of the string in a file, reads successive characters from the input data (file) and creates concatenated prefixes that are inserted into a dictionary table, then performs “a determination . . . whether there is more file data to compress” and “[i]f there is not, then [] all of the data in the file has been securely compressed

and the securely compressed file is completed.” (See Kelly ¶¶ 19–20; see also Kelly ¶¶ 23 (“upon determining that a concatenated prefix is not in the table, e.g., flow branches NO from decision operation 210, the index of the prefix is output to the securely compressed file” and “flow continues to operation 218 where the concatenated prefix is added to the table,” “the concatenated prefix is truncated to the most recently read input (e.g., character, number, string, byte, etc.),” and “the method 200 continues until there is no more data to be compressed from the file or data stream”), 26–27, 30.) Thus, Kelly compresses input data in a single operation that creates prefixes as the input data is read and compressed. (See Kelly ¶¶ 17–18.) In contrast, Appellant’s claimed *multi-step compression doubly encodes data* by (1) a lossless compression to produce *an encoded sequence of data* followed by (2) encoding *the encoded sequence of data* with a prefix encoder utilizing previously determined prefix codes.

Ottesen does not make up for the above-noted deficiencies of Kelly, as Ottesen merely mentions a “lossless compression or encryption” and “a lossless Lempel-Ziv-Welch (LZW) compression algorithm” (see Ottesen ¶ 29), but does not describe a *multi-step compression process that doubly encodes data* by a lossless compression to produce *an encoded sequence of data* followed by encoding *the encoded sequence of data* with a prefix encoder utilizing prefix codes, as recited in claim 1. (Reply Br. 18; Appeal Br. 12.)

The Examiner also has not shown that the additional teachings of Berger make up for the above-noted deficiencies of Kelly and Ottesen. Thus, for the reasons set forth above, we do not sustain the Examiner’s obviousness rejection of independent claim 1, and independent claims 8 and

15 reciting similar limitations. We also do not sustain the Examiner's obviousness rejection of dependent claims 2–7, 9–14, and 16–23. Because the above-discussed issues are dispositive as to the obviousness rejections of all claims on appeal, we do not reach additional issues raised by Appellant's arguments as to the § 103 rejections of claims 1, 2 and 6.

### CONCLUSIONS

The Examiner's rejection of claims 1–14, 21, and 22 under 35 U.S.C. § 101 is REVERSED.

The Examiner's rejection of claims 1–23 under 35 U.S.C. § 103 is REVERSED.

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1–14, 21, 22	101	Eligibility		1–14, 21, 22
1, 7, 8, 14, 15, 21–23	103	Kelly, Ottesen		1, 7, 8, 14, 15, 21–23
2–6, 9–13, 16–20	103	Kelly, Ottesen, Berger		2–6, 9–13, 16–20
<b>Overall Outcome</b>				1–23

REVERSED