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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TAKEHIRO MORIYA, NOBORU HARADA, YUTAKA KAMAMOTO, YUSUKE HIWASAKI, and MASAHIRO FUKUI

Appeal 2017-008205
Application 14/007,844[1]
Technology Center 2600

Before JAMES R. HUGHES, DENISE M. POTHIER, and JAMES W. DEJMEK, *Administrative Patent Judges*.

DEJMEK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from a Final Rejection of claims 1, 5–7, 10–13, 16, and 20–23. Appellants have canceled claims 2–4, 8, 9, 14, 15, and 17–19. *See* Amend. 2–7 (filed May 2, 2016). We have jurisdiction over the remaining pending claims under 35 U.S.C. § 6(b).

We affirm.

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[1] Appellants identify Nippon Telegraph and Telephone Corporation as the real party in interest. App. Br. 1.

STATEMENT OF THE CASE

Introduction

Appellants' disclosed and claimed invention relates to variable-length encoding and, more particularly, encoding error values within surplus bits saved during the variable-length encoding process. *See* Spec. ¶¶ 6, 8. According to the Specification, for known encoding techniques, the length of an assigned code may be related to the amplitude of the encoding unit (e.g., single symbol). Spec. ¶ 4. In other words, shorter codes are assigned to encoding units having a smaller amplitude, whereas longer codes are assigned for larger amplitudes. Spec. ¶ 4. The Specification states that such an approach may reduce the number of bits per frame. Spec. ¶ 4. However, if the number of bits per frame is fixed, an inefficiency may result. Spec. ¶ 4. According to the Specification, "the encoding efficiency can be improved, and the quantization distortion can be reduced" by encoding the error values into surplus bits (i.e., the number of bits remaining from the predetermined number of bits after the bits required for the variable-length encoding have been allocated). Spec. ¶¶ 6, 8.

Claim 1 is representative of the subject matter on appeal and is reproduced below with the disputed limitation emphasized in *italics*:

> 1. An encoding method for encoding, with a predetermined number of bits, a frequency-domain sample sequence derived from an acoustic signal in a predetermined time interval, the encoding method comprising:
>
> an encoding step of encoding, by variable-length encoding, an integer corresponding to a value of each sample in the frequency-domain sample sequence to generate a variable-length code;
>
> an error calculation step of calculating error values each obtained by subtracting the integer corresponding to the value of

each sample in the frequency-domain sample sequence from the value of the sample; and

an error encoding step of encoding the error values with a number of surplus bits obtained by subtracting a number of bits of the variable-length code from the predetermined number of bits to generate error codes, the surplus bits being saved by performing the variable-length encoding,

wherein, among said error values, error values whose corresponding integers are not 0 are encoded with priority in the error encoding step.

The Examiner's Rejections

1. Claims 1, 5–7, 10–13, 16, and 20–23 stand rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Final Act. 3–5.

2. Claims 1, 7, 13, 16, and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Koishida et al. (US 2009/0248424 A1; Oct. 1, 2009) ("Koishida"); Shirakawa et al. (US 2010/0106511 A1; Apr. 29, 2010) ("Shirakawa"); and Atlas et al. (US 2002/0176353 A1; Nov. 28, 2002) ("Atlas"). Final Act. 6–15.

3. Claims 22 and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Koishida, Shirakawa, Atlas, and Moriya et al. (US 2005/0091051 A1; Apr. 28, 2005) ("Moriya"). Final Act. 15–18.

4. Claims 10 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Koishida, Shirakawa, Atlas, Moriya, and Geiger et al. (US 7,275,036 B2; Sept. 25, 2007) ("Geiger"). Final Act. 18–20.

5. Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Koishida, Shirakawa, Atlas, Moriya, Geiger, and Wang et al. (US 7,668,712 B2; Feb. 23, 2010) ("Wang"). Final Act. 20–26.

ANALYSIS[2]

Rejection under 35 U.S.C. § 101

Appellants dispute the Examiner's conclusion that the claims are directed to patent-ineligible subject matter under 35 U.S.C. § 101. App. Br. 7–14; Reply Br. 2–6. In particular, Appellants contend the claims are directed to an improvement in computer-related technology by improving encoding efficiency and reducing quantization distortion. App. Br. 8–11; Reply Br. 3–6. As discussed below, we are persuaded by Appellants' arguments.

Under the Supreme Court's two-step framework, if a claim falls within one of the statutory categories of patent eligibility (i.e., a process, machine, manufacture or composition of matter) then the first inquiry is whether the claim is directed to one of the judicially-recognized exceptions (i.e., a law of nature, a natural phenomenon, or an abstract idea). *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014). If so, the second step is to determine whether any element, or combination of elements, amounts to significantly more than the judicial exception. As part of "directed to" inquiry of step one, we must "look at the 'focus of the claimed advance over the prior art' to determine if the claim's 'character as a whole' is directed to excluded subject matter." *Affinity Labs of Tex. v. DirecTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016). In *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335–36 (Fed. Cir. 2016), our reviewing

[2] Throughout this Decision, we have considered the Appeal Brief, filed December 15, 2016 ("App. Br."); the Reply Brief, filed May 11, 2017 ("Reply Br."); the Examiner's Answer, mailed March 24, 2017 ("Ans."); and the Final Office Action, mailed June 16, 2016 ("Final Act."), from which this Appeal is taken.

court framed the question as "whether the focus of the claims is on [a] 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." If the claims are not directed to an abstract idea, the inquiry ends. *See McRO, Inc. v. Bandai Namco Games Am.*, 837 F.3d 1299, 1312 (Fed. Cir. 2016).

Although the Examiner is correct that the claims recite performing mathematical calculations as part of the encoding process (*see* Final Act. 3; Ans. 26–27), the focus of Appellants' claims are to improving the efficiency of variable-length encoding by further encoding error values within surplus bits saved during the variable-length encoding process. *See* Spec. ¶ 8. Thus, the claims are directed to an improvement of the variable-length encoding process itself. The improvement to the encoding process itself is similar to *Enfish*, where the court found the focus of the claims was to an improvement to computer functionality itself (i.e., a specific improvement in the way computers operate), rather than on economic or other tasks for which a computer is used in its ordinary capacity. *Enfish*, 822 F.3d at 1336. Accordingly, we conclude the claims are not directed to an abstract idea.

For the reasons discussed *supra*, we are persuaded of Examiner error. Accordingly, we do not sustain the Examiner's rejection of claims 1, 5–7, 10–13, 16, and 20–23 under 35 U.S.C. § 101.

Rejections under 35 U.S.C. § 103

In rejecting, *inter alia*, the independent claims (i.e., claims 1, 7, 13, 16, and 22), the Examiner relies on the combined teachings and suggestions of Koishida, Shirakawa, and Atlas. *See* Final Act. 6–15. Generally, the

Examiner finds Koishida teaches a frequency-domain sample sequence derived from an acoustic sample and encoding the samples using variable-length encoding. *See* Final Act. 6–7 (citing Koishida ¶¶ 47, 105–106, and Fig. 6). Additionally, the Examiner finds Koishida teaches an error calculation step and encoding the calculated error values with a number of surplus bits. Final Act. 7 (citing Koishida ¶¶ 99, 106, and Fig. 6). The Examiner finds Shirakawa teaches the surplus bits are saved by performing variable-length encoding. Final Act. 7 (citing Shirakawa ¶¶ 33, 35). The Examiner relies on Atlas to teach "error values whose corresponding integers are not 0 are encoded with priority in the error encoding step." Final Act. 7–8 (citing Atlas ¶¶ 12, 82).

Appellants' arguments are directed to the teachings of Atlas. *See, e.g.*, App. Br. 14–19. We begin our analysis with a brief review of Atlas.

Atlas is generally directed to "encoding and decoding an input signal in relation to its most perceptually relevant aspects." Atlas ¶ 11. Atlas describes a "perceptual signal" as one that includes audio and/or video data that can be used to produce audible sound and/or a visual display. Atlas ¶ 11.

> A two-dimensional transform is applied to the input signal to produce a magnitude matrix and a phase matrix representing the input signal. The magnitude matrix has as it's [sic] two dimensions spectral frequency and modulation frequency. A first column of coefficients of the magnitude matrix represents a mean spectral density (MSD) function of the input signal. Relevant aspects of the MSD function are encoded at a beginning of a data packet (for later use by a decoder to recreate the input signal), based on an encoding of the magnitude and phase matrices appended within the rest of the data packet.

Atlas ¶ 11. Atlas further discloses the most relevant components of a signal and its bit allocations are determined by processing the MSD function through a core perceptual model. Atlas ¶ 12. The magnitude and phase matrices are quantized by applying the bit allocations to the matrices. Atlas ¶ 12.

> The coefficients of the quantized matrices are prioritized based on the spectral frequency and modulation frequency location of each of the magnitude and phase matrix coefficients. The prioritized coefficients are then encoded into the data packet in priority order, so that the most perceptually relevant coefficients are adjacent to the beginning of the data packet and the least perceptually relevant coefficients are adjacent to an end of the data packet.

Atlas ¶ 12. Thus, the most perceptually relevant information is prioritized such that it may be sent, stored, or otherwise used. Atlas ¶ 13. Atlas further discloses the least perceptually relevant information may be truncated or not added to the data packet for further processing (e.g., transmission or storage). Atlas ¶ 13.

Appellants assert Atlas fails to teach or suggest "error values whose corresponding integers are not 0 are encoded with priority in the error encoding step." App. Br. 15–19; Reply Br. 6–11. In particular, Appellants argue Atlas does not teach that its most relevant coefficients correspond to error values whose corresponding integers are not 0. App. Br. 16–17; *see also* Reply Br. 9–10. Additionally, Appellants contend:

> Atlas uses perceptually relevant coefficients themselves for giving priority because Atlas aims to encode perceptually relevant objects. On the other hand, a non-limiting embodiment of the present invention uses quantization values for giving priority because the present invention aims to encode the sequence of error values such that quantization error becomes statistically small.

App. Br. 18. Appellants argue the Examiner mischaracterizes the claims and that a person of ordinary skill in the art would understand that the error value obtained in the error calculation step represents the quantization error (i.e., the residual) in the encoding step. Reply Br. 6–8.

In response, the Examiner finds, and we agree, Atlas teaches priority is given to perceptually relevant coefficients. Ans. 28; Final Act. 8 (citing Atlas ¶ 12). The Examiner finds a coefficient having a value of 0 suggests the sample is perceptually irrelevant (i.e., no perceivable output). Ans. 28; *see also* Atlas ¶ 13. Thus, the Examiner reasons a perceptually relevant coefficient would likely not be 0. Ans. 28. Accordingly, the Examiner finds, and we agree, Atlas teaches or reasonably suggests samples (i.e., error values) whose corresponding integers are not 0 are encoded with priority.

Further, we disagree with Appellants that the Examiner has mischaracterized the claim. The Examiner relies on Atlas to teach priority encoding. Ans. 28. Koishida teaches the encoding is performed the input signal as well as on the residual. *See* Koishida ¶ 106 ("The encoder **610** also includes processing blocks for producing and encoding a residual (or difference of the compressed audio in the base layer **642** from the input audio **610**)."). The residual in Koishida represents the quantization error. Thus, the combined teachings of Koishida and Atlas teach "error values [(i.e., Koishida's residual values)] whose corresponding integers are not 0 are encoded with priority," as recited in claim 1.[3]

[3] Nonobviousness cannot be established by attacking references individually where, as here, the ground of unpatentability is based upon the teachings of a combination of references. *In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

Additionally, Appellants assert that the combined teachings of Koishida and Atlas would not result in error values whose corresponding integers are not 0 being encoded with priority in the error coding step. App. Br. 17; Reply Br. 10–11. In particular, Appellants argue that, at best, one of ordinary skill in the art would have been motivated to modify the encoding Koishida to use the prioritization of Atlas only with respect to the input audio signal and not on the error values (i.e., the residual values of Koishida). App. Br. 17.

We disagree. As discussed above, the Examiner finds Koishida teaches the encoding is performed on the input signal as well as on the residual. Ans. 28; *see also* Koishida ¶ 106, Fig. 6. Thus, an ordinarily skilled artisan would understand the priority encoding of Atlas could also be performed on the residual (i.e., error values). Ans. 28.

For the reasons discussed *supra*, we are unpersuaded of Examiner error. Accordingly, we sustain the Examiner's rejection of independent claim 1. For similar reasons, we also sustain the Examiner's rejection of independent claims 7, 13, 16, and 22, which recite similar limitations and were not argued separately. *See* App. Br. 19; *see also* 37 C.F.R. § 41.37(c)(1)(iv)(2016). Additionally, we sustain the Examiner's rejections of claims 5, 6, 10–12, 20, 21, and 23, which depend directly or indirectly from independent claims 1, 7, and 22 and were not argued separately. *See* App. Br. 19.

DECISION

We reverse the Examiner's decision rejecting claims 1, 5–7, 10–13, 16, and 20–23 under 35 U.S.C. § 101.

We affirm the Examiner's decision rejecting claims 1, 5–7, 10–13, 16, and 20–23 under 35 U.S.C. § 103(a).

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv). *See* 37 C.F.R. § 41.50(f).

AFFIRMED