

NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

ZENTIAN LTD.,
Appellant

v.

APPLE INC.,
Appellee

2024-2205

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in Nos. IPR2023-
00035, IPR2023-01194.

Decided: September 25, 2026

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Before DYK, MAYER, and PROST, *Circuit Judges*.

PROST, *Circuit Judge*.

Zentian Ltd. (“Zentian”) appeals from a final written decision of the Patent Trial and Appeal Board (“Board”) in an inter partes review (“IPR”) determining all claims of U.S. Patent No. 10,062,377 (“the ’377 patent”) unpatentable for obviousness. We affirm.

BACKGROUND

I

The ’377 patent relates to speech-recognition systems. It describes dividing an audio input into time frames, and then, for each time frame, converting the audio signal into a “feature vector.” ’377 patent col. 12 ll. 50–57. Such a conversion may be done by splitting the signal into N components. The feature vector would then “represent[] a point in an N-dimensional space.” *Id.* at col. 13 ll. 19–20. As part of recognizing speech, the system calculates a “distance” between the feature vector and states of an acoustic model to determine the likelihood that the feature vector corresponds to a given state. *See, e.g., id.* at col. 13 ll. 1–2; *see also id.* at col. 4 ll. 9–14.

Claim 1 of the ’377 patent is representative of the issues in this appeal. It recites:

A speech recognition system comprising:

[a] a first programmable device programmed to calculate a feature vector from a digital audio stream, [b] *wherein the feature vector comprises a plurality of extracted and/or derived quantities from said digital audio stream during a defined audio time frame;*

[c] a second programmable device programmed to calculate distances indicating the similarity between a feature vector and a plurality of acoustic states of an acoustic model [d] wherein said feature vector is received by the second programmable device after it is calculated by the first programmable device; and

[e] a third programmable device programmed to identify spoken words in said digital audio stream using Hidden Markov Models and/or Neural Networks [f] wherein said word identification uses one or more distances that were calculated by the second programmable device, [g] *wherein said identification of spoken words uses one or more distances calculated from a first feature vector*; and

[h] a search stage for using the calculated distances to identify words within a lexical tree, the lexical tree comprising a model of words.

Id. at claim 1 (emphasis and bracketed letters added).

II

Apple Inc. (“Apple”) petitioned for IPR of all claims (i.e., claims 1–6) of the ’377 patent. Apple’s petition maintained that prior-art reference Jiang¹ disclosed feature vectors and the additional step of “encod[ing] the feature vectors into one or more codewords using vector quantization techniques and a codebook derived from training data.” J.A. 180 (alteration in original) (quoting Jiang col. 7 ll. 1–10). The petition explained that vector quantization was a “well-known technique” that involved “clustering

¹ U.S. Patent No. 6,374,219 (“Jiang”).

feature vectors into similar codewords” in order to “reduce computation requirements.” J.A. 180 (citing J.A. 788–90) (further explaining that a codeword was “an index into a codebook that stores a value representative of a cluster of data in its original form”). Thus, in Apple’s view, a codeword was “a representative feature vector.” J.A. 180 (citing J.A. 788–90). Apple’s petition further argued that Jiang disclosed calculating distances between codewords and states of an acoustic model.

Zentian’s patent owner response disputed that Jiang disclosed claim element 1[g], which requires using one or more distances calculated “from a first feature vector.” In Zentian’s view, Jiang’s “vector-quantized codewords [we]re not the original underlying feature vectors.” *See* J.A. 4624. Under that view, then, “computations ‘from codewords’” were not “computations ‘from feature vectors.’” J.A. 4624 (emphasis in original).

In its final written decision, the Board noted that, although the parties had not provided an explicit claim construction of “feature vector,” their respective positions “raised implicit claim constructions.” *Apple Inc. v. Zentian Ltd.*, No. IPR2023-00035, 2024 WL 2946335, at *4 (P.T.A.B. June 11, 2024) (“*Decision*”). So, the Board construed the term—mindful that one of Zentian’s “central issues” was the alleged difference between Jiang’s use of codewords and claim 1’s use of feature vectors in making distance calculations. *See id.* The Board characterized the parties’ dispute as whether the claimed feature vectors are limited to “pure” feature vectors—i.e., quantities *actually extracted* from the digital audio stream (Zentian’s position)—or whether they also include quantities *derived* from the stream as “representations thereof” (Apple’s position). *See id.* at *5 (emphasis in original). The Board concluded it was the latter, given claim element 1[b]’s definition of a feature vector as “compris[ing] a plurality of *extracted and/or derived* quantities from said digital audio stream.” *Id.* at *4–5 (emphasis added) (quoting ’377 patent claim 1).

In particular, the Board sought to give distinct meaning to the different claim terms “extracted” and “derived.” *Id.* at *5. It also reasoned that, “[g]iven such a definition,” “a vector quantized feature vector, or codeword, . . . still represents a multitude of values ‘derived . . . from said digital audio stream.’” *Id.* (quoting ’377 patent claim 1).

Ultimately, the Board concluded that “[a] codeword, or representative feature vector, ‘comprises a plurality of . . . derived,’ or vector quantized, ‘quantities from said digital audio stream’ within the meaning of claim 1.” *Id.* (quoting ’377 patent claim 1); *see also id.* at *6 (“Thus, we determine that a ‘feature vector,’ as defined by independent claim 1, comprises a plurality of extracted qualities^[2] from the digital audio stream during the defined audio time frame, and/or derived quantities that are representative of the digital audio stream during the defined audio time frame, *such as the derived values of a codeword.*” (emphasis added)). Given its understanding of “feature vector,” the Board found that Jiang disclosed claim element 1[g]—and further, that all claims of the ’377 patent are unpatentable for obviousness. *Id.* at *11–12, *19–20.

Zentian timely appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

We review the Board’s claim construction de novo and any fact findings underlying its construction for substantial evidence. *See, e.g., Restem, LLC v. Jadi Cell, LLC,*

² Apple notes that the Board’s reference to extracted “qualities” (as opposed to “quantities”) appears to be a typo. Appellee’s Br. 29 n.1. Zentian does not dispute that characterization. Whatever the case, nothing in this appeal turns on any distinction between qualities and quantities in this context.

130 F.4th 941, 944 (Fed. Cir. 2025). What the prior art discloses is a fact question that we review for substantial evidence. *E.g.*, *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1378 (Fed. Cir. 2023). Substantial evidence “is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.” *Novartis AG v. Torrent Pharms. Ltd.*, 853 F.3d 1316, 1324 (Fed. Cir. 2017) (cleaned up).

I

Zentian’s appeal challenges the Board’s construction of “feature vector.” At bottom, Zentian maintains that the Board erred by permitting the construction to encompass codewords, which (in Zentian’s view) are mere “representations” of the digital audio stream’s quantities. Instead, Zentian argues, the Board should have limited the term’s scope to encompass only quantities actually drawn from the digital audio stream. *See, e.g.*, Appellant’s Br. 1, 19 (arguing that the proper construction is what the Board called “pure” feature vectors, which “are multiple quantities extracted directly from a digital audio stream”); *id.* at 25 (“In sum, the Board erred when it defined the term ‘feature vector’ to include not only a ‘pure feature vector,’ but also ‘representations thereof’ such as ‘codewords.’”).

We agree with the Board that the proper construction of “feature vector” includes Jiang’s codewords. Mainly, we conclude—much like the Board did—that the language of claim 1 itself resolves this dispute in Apple’s favor. *See Decision*, 2024 WL 2946335, at *4–5; *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc) (“[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms.”). In particular, claim element 1[b] states that “the feature vector comprises a plurality of *extracted and/or derived* quantities from said digital audio stream.” ’377 patent claim 1 (emphasis added). Because we presume that different claim terms have different meanings, *e.g.*, *Helmsderfer v. Bobrick*

Washroom Equip., Inc., 527 F.3d 1379, 1382 (Fed. Cir. 2008), we presume that “derived” means something different from “extracted.” We therefore see no error in the Board’s conclusion that the term “feature vector” is “not limited to *pure* feature vectors, which are quantities extracted from the digital audio stream, but [instead] also include[s] quantities *derived* from the stream, which are representations thereof.” *Decision*, 2024 WL 2946335, at *5 (first emphasis in original; second emphasis added).

Accordingly, whether considered as a claim-construction issue or as a factual issue of whether Jiang’s codewords qualify as the construed “feature vectors,”³ we affirm the Board’s determination that those codewords come within the term’s scope—i.e., that they “comprise[] a plurality of . . . *derived* quantities from said digital audio stream,” *see* ’377 patent claim 1 (emphasis added), even if they do not comprise quantities actually drawn (or extracted) from that stream.

II

Zentian resists this conclusion, but its arguments are unpersuasive.

First, in support of one of its arguments, Zentian directs us to René Magritte’s *The Treachery of Images*. This famous painting depicts a tobacco pipe and includes text

³ Although the parties generally brief this issue as one of claim construction, some of their positions sound more like a factual dispute over the term’s application to Jiang. Regardless, “where, like here, the outcome is the same whether reviewed *de novo* as a[] . . . claim construction, or for substantial evidence as only a factual comparison to the prior art, the distinction becomes inconsequential.” *See Hafeman v. Google LLC*, 177 F.4th 1191, 1200 (Fed. Cir. 2026).

beneath that depiction that says (translated from the original French): “This is not a pipe.” *See* Appellant’s Br. 21. Zentian argues that, “[j]ust as a painting of a pipe is not a pipe, ‘representations’ of feature vectors [i.e., codewords] are not feature vectors.” *Id.*; *see also* Reply Br. 6 (“A codeword that *represents* a feature vector is no more a feature vector than a painting that *represents* a pipe is a pipe.” (emphasis in original)).

The trouble with this analogy is that, as the Board found—and as substantial evidence supports—“vector quantized feature vectors, or codewords, are representative of the digital audio stream *and are feature vectors* under the instant claim construction.” *Decision*, 2024 WL 2946335, at *12 (emphasis added); *see also id.* at *5. That is, just because a codeword is “representative” does not mean it is not *also* a “feature vector.” The better analogy, then, is “choosing one pipe to represent a group of similar pipes.” *See* Appellee’s Br. 31.

Second, Zentian argues that, because codewords are determined in advance—“well before[] the creation of the subject [digital] audio stream”—they cannot comprise quantities derived *from* the digital audio stream, as claim element 1[b] requires. *See* Appellant’s Br. 21. The Board, however, found that, “although codewords may be determined in advance, they are still used in Jiang to derive representative, vector quantized versions of the computed feature vectors.” *Decision*, 2024 WL 2946335, at *12. In other words, selecting the appropriate codeword—the one that “most closely resembles” the quantities of a given digital audio stream, *see* Appellee’s Br. 32—means that the codeword is comprised of quantities that are “derived from” that audio stream. Zentian has no persuasive response to this point, nor has it shown that the Board’s findings and conclusions on this issue lacked substantial evidence or were otherwise erroneous.

Third (and relatedly), Zentian argues that the Board’s construction erroneously deleted from claim element 1[b] the requirement of being “derived . . . *from*.” Zentian seizes upon a statement by the Board that a feature vector comprises “derived quantities *that are representative of* the digital audio stream,” *Decision*, 2024 WL 2946335, at *6 (emphasis added), and argues that the emphasized language—“that are representative of”—erroneously replaced a deleted “from.” *See, e.g.*, Reply Br. 1. We are unpersuaded. The Board’s decision as a whole makes clear that it correctly understood that the relevant quantities must be derived *from* the digital audio stream. *See, e.g., Decision*, 2024 WL 2946335, at *5 (noting that feature vectors may be “representations of the digital audio stream, i.e., quantities *derived therefrom*” (some emphasis added; some omitted)); *id.* at *12 (finding that a codeword “represents multiple quantities *derived from* the [digital] audio stream” (emphasis added)).

Finally, Zentian maintains that a codeword has only a “single value” and so cannot comprise a *plurality* of quantities, as claim element 1[b] requires. Appellant’s Br. 22. Apple, however, explains that, while codewords may have a single-value “index” to identify themselves in a codebook, they still comprise a plurality of quantities. The Board shared that understanding when it stated: “Although a vector quantized codeword may be represented by a single value, it still represents multiple quantities derived from the audio stream, accessible through that single value.” *Decision*, 2024 WL 2946335, at *12. Here again, Zentian has not demonstrated that the Board erred.

CONCLUSION

We have considered Zentian’s remaining arguments and find them unpersuasive. For the foregoing reasons, we affirm.

AFFIRMED