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***Ex parte Hannun* - PTAB Decides that Claims Directed to Inferences Based on a Trained Neural Network Are Patent-Eligible**

In the U.S. Patent and Trademark Office, the Patent Trial and Appeal Board (PTAB) recently issued a currently non-precedential decision in *Ex parte Hannun*, and applied the USPTO January 7, 2019 updated Patent Eligibility Guidance (PEG) with respect to 35 U.S.C. § 101. (*Ex parte Hannun*, *Lee Linden*, *Benjamin Lewis*, and *Abheek Anand*, Appeal 2018-003323, Technology Center 2600).

The decision, which is favorable for applicants, illustrates that when claims are directed to processes that use a trained neural network and the Specification explains their technological characteristics and provided technological improvement, they will be more likely determined to be patent-eligible.

The decision reviewed a rejection under 35 U.S.C. § 101, of claims being patent-ineligible. As an example, claim 11 of the underlying patent, reproduced below, is illustrative of the claimed subject matter:

11. A computer-implemented method for transcribing speech comprising:
 - receiving an input audio from a user;
 - normalizing the input audio to make a total power of the input audio consistent with a set of training samples used to train a trained neural network model;
 - generating a jitter set of audio files from the normalized input audio by translating the normalized input audio by one or more time values;
 - for each audio file from the jitter set of audio files, which includes the normalized input audio:
 - generating a set of spectrogram frames for each audio file;
 - inputting the audio file along with a context of spectrogram frames into a trained neural network;
 - obtaining predicted character probabilities outputs from the trained neural network; and
 - decoding a transcription of the input audio using the predicted character probabilities outputs from the trained neural network constrained by a language model that interprets a string of characters from the predicted character probabilities outputs as a word or words.

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Standard for Patent Eligibility

The PTAB first noted the two-step test set forth by the U.S. Supreme Court in *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, reaffirming similar two-step considerations presented in the Supreme Court decision of *Mayo v. Prometheus*, 566 U.S. 66 (2012), where the test includes first determining whether the claims at issue are directed to a patent-ineligible concept, and if so, then considering the elements of the claims to determine whether they contain an inventive concept sufficient to transform the claimed abstract idea into a patent-eligible application. For example, concepts determined to be abstract ideas, and thus patent-ineligible include methods of organizing human activity, mathematical formulas, and mental processes.

Examiner's Findings and Conclusion

In the first step of the *Alice* inquiry, the Examiner had determined that the claims were directed to the abstract idea of “using the predicted character probabilities (mathematical formula) to decode a transcription of the input audio into words or text data.” The Examiner further determined that “[m]anipulating data, generating information based on prior information set and Decoding audio data using equations or mathematical formula are all plainly abstract idea category of judicial excepted subject matter” and the abstract ideas are categorized under “‘Methods of Organizing Human Activity’ since human can listen to an audio file and transcribe the audio data into text data which can all be done mentally.”

Under *Alice* Step 2, the Examiner had determined that the claims did not recite elements sufficient to amount to significantly more than the abstract idea.

Board's Review

In applying the guidance of *Alice* and the January 7, 2019 updated Patent Eligibility Guidance, the PTAB disagreed with the Examiner's conclusions and reversed the patent eligibility decision of the Examiner.

The PTAB found that the claims do not recite a method of organizing human activity or a mental process. For example, concluding that although transcription processes may be performed by humans, the claimed operations do not recite features of organizing human activity, such those corresponding to fundamental economic principles or practices, commercial or legal interactions, managing personal behavior or relationships or interactions between people .

As noted, the PTAB, in *Hannun* found that the claimed operations are not claiming mental processes, as the claimed operations cannot be “practically [] performed mentally.”

Hannun further found that although the claims use predicted character probabilities outputs from the claimed trained neural network to decide a transcription of the input audio, and though the specification discloses an algorithm to obtain the predicted character probabilities, the claimed operations do not claim such a mathematical algorithm.

Moreover, *Hannun* concluded that, even if the claims were considered to be directed to a mathematical concept, the alleged judicial exception would be integrated into a practical application, since the claims include features that were designed to achieve an improved technological result and provide improvements to a specific technical field, with *Hannun* specifically referring to the Specification technological and technological improvement discussions regarding DeepSpeech learning, i.e., a trained neural network, along with a language model.

Analogies

We note that the claims at issue in *Ex parte Hannun* appear to be related to a claim discussed in the January 7, 2019 updated Patent Eligibility Guidance (PEG) PTO Hypothetical Examples, where Example 38 thereof presents the hypothetical claim of:

A method for providing a digital computer simulation of an analog audio mixer comprising:

initializing a model of an analog circuit in the digital computer, said model including a location, initial value, and a manufacturing tolerance range for each of the circuit elements within the analog circuit;

generating a normally distributed first random value for each circuit element, using a pseudo random number generator, based on a respective initial value and manufacturing tolerance range; and

simulating a first digital representation of the analog circuit based on the first random value and the location of each circuit element within the analog circuit.

Here, this claim appears to present an implementing of a model, i.e., the model of an analog circuit, to simulate an analog circuit. This would appear to be similar to AI model implementations, such as with neural network inference operations, where parameters of the neural network may be loaded from a memory and then the neural network implemented with respect to an input. Accordingly, this *Hannun* decision would appear to emphasize that a more particular model, and especially a claimed neural network model implementation, may be more likely patent eligible.

Of note here, an Example 39 of the January 7, 2019 updated Patent Eligibility Guidance (PEG) PTO Hypothetical Examples, claims the training of a neural network, which was similarly found patent eligible, e.g., not directed to mental process or claiming a mathematical concept. While this example may specifically claim a neural network, the neural network is claimed in the context of collection of training data and training the neural network, which may have both different underlying operations from an implementation of a trained neural network and involve different technological improvements and/or practical applications from the implementation of the trained neural network.

So, while this Example 39 particularly claims a neural network, it may be less helpful with respect to the implementation of a trained neural network. Rather, the above noted *Hannun* decision, in combination with the Example 39 claimed model implementation, may be more helpful in supporting the patent eligibility of a claimed implementation of a neural network or neural network model.

Suggestions

As noted above, in determining patent eligibility, *Hannun* specifically looked to the Specification for explanation of the technological aspects of the claimed neural network, and for explaining the technological improvements of the same, for supporting a conclusion that the claims do not claim a mathematical relationship, formula, or calculation and a conclusion that any alleged abstract idea would be integrated into a practical application. Accordingly, it is still very desirable to include such detailed explanations in the Specification.

Also, from this *Hannun* decision and Federal Circuit decisions regarding patent eligibility involving mental process patent in-eligible decisions (such as *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366 (Fed. Cir. 2011)), as such AI type claims are claimed broader and broader there would appear to be a greater necessity for the Specification to provide more explanation of the technological improvements, balanced with potentially more parallel phrasing from the Specification or specificity of the claimed AI model, such as the claiming of the model as a particular neural network. Conversely, if a claim presents each feature with substantial breadth, and similarly very broadly claims the use or implementation of a model for some purpose, there may be a greater chance that such claims (even if they are found patent eligible by the PTO), to be later found patent in-eligible by District Courts or the Federal Circuit based on above example of *Cybersource* where the claimed operations were so broadly claimed that a human could practically perform the same mentally.

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