IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Request for Comments on Patenting Artificial Intelligence Inventions

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Docket No. PTO-C-2019-0029

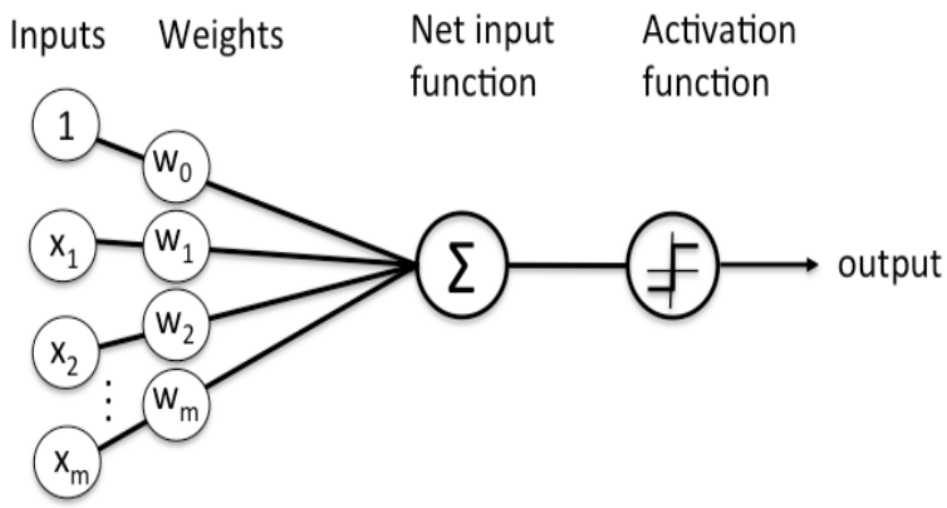
Comments of the Software and Information Industry Association

Nov. 8, 2019

SIIA is the principal U.S. trade association for the software and digital content industries. With over 800 member companies, SIIA is the largest association of software and content publishers in the country. Our members range from start-up firms to some of the largest and most recognizable corporations in the world. The innovative companies that make up SIIA's membership rely on patents to protect their inventions, but also depend on the ability to manufacture, develop, and sell their products free from improper assertions of exclusive rights.

We commend the PTO for inquiring into issues related to the patenting of inventions on artificial intelligence (AI) technology. Our members are actively involved in the use of artificial intelligence on many fronts—from journalism to fraud detection, money laundering investigations, and locating missing children. They use artificial intelligence to help people make use of an increasingly large pool of data sets and invest billions in its development, acquisition and use. As such, the rigorous application of statutory requirements for patenting by the PTO is of the utmost importance to our members to preserve and protect their ability to innovate. We join the comments of the ACT, the Internet Association and High Tech Inventors Alliance on this issue, and write to emphasize a few market conditions that provide a factual foundation as to *why* SIIA supports the more technical suggestions in the joint comments.

Artificial intelligence has been with us for some time. Today, when people refer to AI, they are typically referring to areas like "machine learning" or "deep learning." "Machine learning" refers to a process by which the computer improves the exercise of particular functions by correcting its errors. The computer accomplishes its objective through a process of trial and error as it assigns different weights to particular inputs received by individual "nodes," which can be analogized to human neurons. These nodes are the basis of "neural networks," which are more concisely visualized than explained:



Source: skymind.ai

Suppose, for example, a computer were trying to determine whether an email was spam. Each input (a word or phrase) would be assigned different weights and combined into a net input function, e.g. "spam" or "not spam" output. If the output is incorrect, then the algorithm adjusts the weights and performs the function again. Humans speed the process along by training the machine so it learns. Each error results in a correction until the computer gets it "right."

"Deep learning" simply refers to the number of layers of nodes through which a particular input has to pass before identifying a pattern—whether identifying spam or a particular image. Given the realities of current technology, modern deep learning can consist of hundreds of thousands of these nodes or more, updating themselves multiple times per second. These kinds of algorithms can identify patterns and correlations in unstructured data such as photographs, newspaper and journal articles, sound recordings and video.

Applications for this technology abound, and we are facing a healthy environment for innovation, development and implementation. Venture capital investment in the software and internet industries has hit $45 billion, and our members invest billions in technological improvements.[1] That industry environment in general is even more robust when it comes to AI: between January 2015 and January 2018,

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[1] National Venture Capital Association, Venture Monitor, 4Q 2018, https://files.pitchbook.com/website/files/pdf/4Q_2018_PitchBook_NVCA_Venture_Monitor.pdf.

the number of AI startups has increased by 113%, as compared to 28% for startups generally.[2] Similarly, venture capital funding for AI increased by 350% between 2013 to 2017, a rate over three times higher than that for venture capital investing generally.[3] Job growth in the field is large and accelerating.[4] And the technology itself has achieved remarkable milestones. For example:

- An AI system achieved humanlike translation quality when translating Chinese news stories into English.[5]
- An AI system examined 29,450 clinical images of 2,032 different diseases and achieved diagnostic parity with board-certified dermatologists.[6]
- An AI system generated a 70% success rate in detecting prostate cancer by examining specimens—exceeding the 61% rate of board-certified pathologists.[7]

Most businesses lack the ability to design and implement custom AI solutions, but the demand for this technology is vast. Access to these tools is quickly becoming democratized, and that democratization has been advanced by three factors. First, the advent of cloud computing has enabled "off the shelf" open source solutions that can be trained and implemented by corporations and small businesses.[8] Second, solutions are advancing such that a customer can simply use their own data and ask an AI service to use machine learning to create a custom-trained model.[9] Third, hardware is improving through the development of

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2 AI Index 2018 Annual Report, at 31, available at http://cdn.aiindex.org/2018/AI%20Index%202018%20Annual%20Report.pdf.

3 *Id.* at 32.

4 *See id.* at 33.

5 Microsoft reaches a historic milestone, using AI to match human performance in translating news from Chinese to English (Mar. 14, 2018) available at https://blogs.microsoft.com/ai/chinese-to-english-translator-milestone/.

6 Dermatologist-level classification of skin cancer with deep neural networks, Nature (Jan 2017), available at https://www.nature.com/articles/nature21056.

7 Improved Grading of Prostate Cancer with Deep AI Learning, Google AI Blog, https://ai.googleblog.com/2018/11/improved-grading-of-prostate-cancer.html.

8 *See,e.g.,* https://www.tensorflow.org/tutorials/quickstart/beginner.

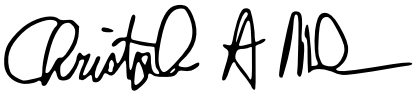
9 *See, e.g.*, https://azure.microsoft.com/en-us/services/cognitive-services/custom-vision-service/. Microsoft is not alone in providing these

specialized chips that can supply the computing power necessary for deep learning analysis.[10] And finally, in many instances, a user will not to train an AI network at all—they can incorporate tools like voice recognition or language translation into an existing product via pre-existing APIs. [11]

The combination of growth and democratization means that before long, ordinary businesses will be, with increasing frequency, training these networks by feeding them unstructured data and creating new products. Failure to rigorously apply the statutory requirements for patenting to inventions related to AI will result in the same kinds of problems that led to low quality patents being granted that simply perform tasks "on a computer" or "over the Internet." Without robust examination, the democratization of AI will be hampered by patents that simply "use deep learning" or "apply artificial intelligence," resulting in the same sort of litigation abuses. The PTO has all the tools that it needs through existing law to prevent this from happening.

Thank you for considering our views.

Respectfully submitted,



Christopher A. Mohr

VP for Intellectual Property and General Counsel

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services. E.g., https://www.clarifai.com; see also https://cloud.google.com/automl/ (requiring minimal machine learning knowledge).

[10] See, e.g., https://www.intel.ai/#gs.dvcap3, https://www.theverge.com/2018/7/26/17616140/google-edge-tpu-on-device-ai-machine-learning-devkit.

[11] Microsoft, Google, and other companies have created these interfaces. See https://nordicapis.com/5-best-speech-to-text-apis/.