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New Benchmark USPTO Study: AI Patents Are On the Rise

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On October 27, 2020, the United States Patent and Trademark Office ("USPTO") released a new study finding that the number of patents and patent applications relating to artificial intelligence ("AI") in the U.S. has increased significantly in recent years. Between 2002 and 2018, annual AI patent application filings grew over 100%, from around 30,000 to more than 60,000.

Definition of AI

According to the definition that the U.S. National Institute of Standards and Technology ("NIST") uses, AI technologies and systems are defined as comprising software and/or hardware that can learn to solve complex problems, make predictions or undertake tasks that require human-like sensing (such as vision, speech, and touch), perception, cognition, planning, learning, communication, or physical action. However, for the purposes of patent applications and grants, the study defines AI as encompassing eight categories:

- **Knowledge processing** – representing and driving facts about the world and using this information in automated systems (e.g., AI algorithm using a pre-defined "knowledge base" to automatically detect accounting errors).

- **Speech recognition** – techniques to understand a sequence of words given an acoustic signal (e.g., Siri, Alexa, and the like).

- **AI hardware** – physical computer components designed to meet the considerable computing power needed to handle AI processes through increased processing efficiency and/or speed (e.g., hardware mimicking the synapses in a biological brain).

- **Evolutionary computation** – contains a set of computational routines using aspects of nature and, specifically, evolution (e.g., predicting available petroleum reserves with a mutating algorithm).

- **Natural language processing** – understanding and using data encoded in written language (e.g., using text to build an ontology by simulating human memory approaches).

- **Machine learning** – contains a broad class of computational models that learn from data (e.g., AI algorithm to optimize an e-commerce platform by classifying product descriptions, reviews, and other product features).

- **Computer vision** – extracts and understands information from images and videos (e.g., automating the detection of abnormalities in images taken during colonoscopies).

- **Planning and control** – contains processes to identify, create, and execute activities to achieve specified goals (e.g., method for detecting and addressing potential problems in processing plants

through sensed environmental conditions).

Diffusion of AI

The study deployed its own AI algorithm to examine all U.S. patent applications published from 1976 through 2018. It found that patents containing AI appeared in just 9% of technologies in 1976, expanding to more than 42% of technologies in 2018. While the growth of AI patent applications came from all AI-related technologies, "planning and control" and "knowledge processing" were the two categories with the greatest increase in AI use.

The number of individual inventor-patentees active in AI also expanded dramatically during this period: from 1% in 1976 to 25% in 2018. In terms of the growth in AI activity by organizations, most of the top 30 AI companies were in the information and communications technology sector. The top three U.S. companies granted patents from 1976 to 2018 were IBM, Microsoft and Google.

While AI inventor-patentees between 1976 and 2000 tended to be concentrated in larger cities and technology hubs such as Silicon Valley, the study found that, from 2000 to 2018, there was a marked diffusion of AI into other areas of the country. For example, AI inventions are focused in a wide variety of technologies in different states and regions: Maine and South Carolina – digital data processing and data processing adapted for businesses; Oregon – fitness training and equipment; Montana – analysis of the chemical and physical properties of materials; Wisconsin –medical instruments and processes for diagnosis, surgery, and identification; Iowa, Kansas, Missouri, Nebraska, and Ohio – AI technologies relating to telephonic communications; and North Dakota – applying AI technologies to agriculture.

The full study may be accessed online using this link.

Considerations

While the study shows an increase in AI-related patent applications and broad diffusion of AI across various technologies, there still are challenges presented by AI-related patent applications.

First, the subject matter eligibility challenges already applicable to many software-based inventions also apply to AI-related inventions. For example, some AI-related inventions are designed to perform actions that humans previously performed. A patent claim directed to such an invention may be classified as directed to an abstract idea (e.g., mental process) by the USPTO under 35 U.S.C. 101. As with other computer related and software based inventions, one approach to avoiding or overcoming abstract subject matter rejections during prosecution of AI-related subject matter may be to draft AI-related applications to expressly include information about the technical improvements associated with the claimed AI-related system and how the outputs of such AI-related systems are used for real-world impact on other systems. Careful claiming of AI-related inventions will also help to minimize the impact of subject matter eligibility challenges.

Second, as for AI-generated inventions that are created by AI with little or no human contribution, applicants should be aware of the DABUS decision[1] confirming that inventorship is limited to natural human beings. As such, listing only human inventors in all AI patent applications will be a better approach for the foreseeable future.

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[1] Decision on Petition dated April 22, 2020, U.S. Application Serial No. : 16/524, 340, available at https://www.uspto.gov/initiatives/artificial-intelligence/artificial-intelligence-reports.