How AI is affecting the patent system

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JUNE 28, 2023

AI emerges from its long winter into a season of rapid growth

Ever since the term "artificial intelligence" (AI) was first coined by John McCarthy in 1956, the field has experienced long periods in which the hype around AI's potential far exceeded its ability to deliver. In the last few years, and especially since the release of ChatGPT by OpenAI, AI has begun to deliver substantial practical results in the form of new products and services that are being adopted in many industries at breakneck speed.

Although much of the public spotlight has been directed to the ability of large language models (LLMs) to provide natural language answers to natural language queries, AI also is being used to facilitate invention in fields ranging from pharmaceuticals to robotics to autonomous vehicles. Such uses of AI to turbocharge innovation have significant potential ramifications for the patent system.

For example, AI is being used to streamline the traditionally complex, time-consuming, and expensive process of drug discovery. In a 2021 interview, Dave Johnson, Chief Data and Artificial Intelligence Officer at Moderna, said that, in the development of Moderna's COVID-19 vaccine, the use of robotic automation, process automation, and AI algorithms enabled the company to go from producing "about 30 mRNAs... in a given month to... about a thousand in a month period without significantly more resources and much better consistency in quality." "AI and the COVID-19 Vaccine: Moderna's Dave Johnson," Me, Myself, and AI, Podcast, MIT Sloan Management Review and Boston Consulting Group, July 13, 2021 (https://bit.ly/3CQ4ZMC).

Key challenges raised by AI for the patent system

Patent laws worldwide were developed in the context of manual inventive processes to spur human inventors to engage in inventive activity and to disclose their inventions to the public. The ability of AI to at least partially automate the inventive process raises a variety of questions about how to apply the legal standards for patentability to inventions that have been developed with the assistance of AI.

For example, Stephen Thaler has named an AI system called DABUS (Device for the Autonomous Bootstrapping of Unified Sentience) as the sole inventor on patents filed around the world, thereby forcing patent offices and courts to determine whether patent laws permit AI systems to be named inventors on patent applications. Although all of Thaler's attempts so far have failed, his efforts have spurred significant public discussion on the topic of AI inventorship.

For example, the United States Patent and Trademark Office (USPTO) issued a formal request for public comments on a variety of questions related to AI inventorship and patentability earlier this year. Those questions asked, among other things, whether an invention created using assistance from an AI system could be patentable, whether AI inventorship raises any significant ownership issues, whether the USPTO should expand its guidance on inventorship to address AI, and whether any statutory changes should be made in light of the issues raised by AI contributions to inventions.

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The USPTO is expected to publish the comments that it received in response to its requests soon and has been holding regular public stakeholder meetings on a variety of AI-related topics.

The primary way in which AI assists in inventing is by generating, evaluating, and filtering candidate inventions — such as candidate drugs in the Moderna example cited above. AI does not replace human inventors in such situations. Instead, strategically inserting AI into the inventive process results in a human-computer team which can generate better inventions more quickly than humans could produce alone. AI can be seen as an extension of previous invention-facilitation tools, including computer-aided design (CAD), 3D printing, and even conceptual tools, such as everything in the long history of mathematics.

If a human inventor who uses AI can invent more effectively than a human inventor without AI, what impact should the use of AI in inventing have on patent law's nonobviousness requirement? After all, if a particular technical or scientific field — such as that of drug development — is inhabited by inventors with Ph.Ds, patent law recognizes that the bar for obviousness is higher than if patent law's

hypothetical "person having ordinary skill in the art" (PHOSITA) only had a bachelor's degree.

If AI is widely used to assist in inventing in a particular field, then should the USPTO and courts hold inventions in that field to a higher nonobviousness standard than they would otherwise be held? In other words, should widespread use of AI in inventing raise the bar for nonobviousness? I am not aware of any decided cases on this point, but I suspect that it will not be long before a patent examiner or a defendant in a patent infringement suit attempts to apply a heightened nonobviousness standard to a patent claim as the result of AI's use in the inventive process.

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One feature of many AI systems is that it is difficult or impossible for humans to understand their outputs or how such systems produce those outputs. This is referred to as the "inscrutability of AI."

For example, in the case of a neural network that has been trained to distinguish images of cats from images of dogs, no human may be capable of examining the neural network to understand or explain how it distinguishes cats from dogs. In contrast, traditional software is created by human programmers who write source code that can be understood by other programmers.

The inability to understand and describe AI systems and their outputs poses problems for those who wish to satisfy patent law's written description and enablement requirements when writing patent applications for AI-related inventions. This problem, however, is not insurmountable in general, although it may be challenging to address in particular cases. For example, in the chemical and biological arts it is common for inventors to have invented a material (e.g., a chemical composition) that can be shown to perform a certain function, even though the inventors do not know, and cannot explain how, the material performs that function.

Patent law permits such inventions to be patented in various ways, such as by using product-by-process claims (which claim a product in terms of the process that was used to produce it) and method of use claims (in which a method in which a product is used is claimed, even if the mechanism of action of the product itself is not known). AI-related patents may benefit from the same techniques, which will require patent attorneys and examiners to apply practices typically found in the chemical and biological arts to inventions that are otherwise thought of as falling solely within the computer-related arts.

Conclusions

The rise of large language models has captured the attention of many, but the general public and many in the legal profession have not yet begun to recognize the vast applications of AI in automating the inventive process. The USPTO, however, has caught on to this growing trend and is making efforts to seek public input on the use of AI in inventing and on potential ways in which patent law and the USPTO's policies might benefit from being updated in light of developments in AI.

AI raises some challenging, but not insurmountable, questions for the legal standards that apply to inventorship, nonobviousness, written description, and enablement. Now is the time to grapple with these challenges so that we can tackle them proactively and deliberately, rather than reactively, so that the patent system can continue to promote innovation based on an accurate understanding of how today's inventions are being created.

About the author

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This article was first published on Reuters Legal News and Westlaw Today on June 28, 2023.