



By Email

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Andrei Iancu
Under Secretary of Commerce for Intellectual Property
Director of United States Patent and Trademark Office
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Re: Request for Comments on Patenting Artificial Intelligence Inventions

Dear Director Iancu:

I write on behalf of Askeladden L.L.C. (“Askeladden”) in response to the Office’s Request for Comments on Patenting Artificial Intelligence Inventions, 84 FR 44889.

We greatly appreciate the Office’s interest in gathering information on patent-related issues regarding artificial intelligence inventions to determine whether further examination guidance is needed. We also appreciate the Office’s consideration of our answers and comments to the provided questions below.

Askeladden’s Patent Quality Initiative

Askeladden is an education, information and advocacy organization which, through its Patent Quality Initiative (“PQI”), is dedicated to improving the understanding, use, and reliability of patents in financial services and elsewhere. Through the PQI, Askeladden strives to improve patent quality and to address questionable patent holder behaviors. Askeladden files amicus briefs that highlight issues critical to patent quality and petitions the Office to take a second look at patents under *inter partes* review (IPR) that it believes are invalid. In addition, Askeladden works to strengthen and support the patent examination process by coordinating educational briefings on the evolution of technology in financial services.

Askeladden is a wholly owned subsidiary of The Clearing House Payments Company L.L.C. Since its founding in 1853, The Clearing House has delivered safe and reliable payments systems, facilitated bank-led payments innovation, and provided thought leadership on strategic payments issues. Today, The Clearing House is the only private-sector ACH and wire operator in the United States, clearing and settling nearly \$2 trillion in U.S. dollar payments each day, representing half of all commercial ACH and wire volume. It continues to leverage its unique capabilities to support bank-led innovation, including launching RTP®, a real-time payment system that modernizes core payments capabilities for all U.S. financial institutions. Askeladden pursues its PQI independently of the business and activities of The Clearing House.

Askeladden's Comments on Patenting Artificial Intelligence Inventions

While the patenting of inventions pertaining to artificial intelligence raises a number of thought-provoking questions including those raised by the Office, the overarching focus should continue to be prioritizing patent quality and ensuring that all issued claims pertaining to artificial intelligence meet all requirements for patentability. Our detailed comments with respect to questions raised by the Office are set forth below.

1. What are elements of an AI Invention?

There are a wide variety of innovations that can be based on or pertain to artificial intelligence. The most common form of artificial intelligence is so-called “machine learning” techniques. Unlike traditional “heuristic” models in which the algorithm is defined by a human programmer, in a machine learning system, the computer is programmed to perform a specific task without an explicit instruction. The computer examines a large sampling of data and ascertains a mathematical model to determine the result on its own.

In such a system, the inputs are a “training set” of samples. In order to enable proper statistical analysis or pattern recognition, these training sets usually include a very large number of samples. Each sample in the training set has the data input (or variables) and a tag (reflecting whether the desired outcome is met by the sample). A specific machine learning model (e.g., a neural network or deep neural network) is applied to the training set to select a desired output.

By way of example in the financial service industry, a machine learning network could be set up to determine whether a proposed transaction is potentially fraudulent. Thus, a training set of thousands, or hundreds of thousands, of prior transactions labelled as “fraudulent” or “clear” can be used. A specific neural network algorithm can then be applied to the training set so that when a new transaction is presented, the machine learning system can test it to predict whether it will likely be “fraudulent” or “clear”.

This is a very simple form of machine learning example in practice.

Innovation involving machine learning can come in new forms of machine learning algorithms and protocols. However, as machine learning becomes more common place, future innovation is more likely to be found in how machine learning tools are implemented, than in the tools itself. This innovation may involve human selection of not only what machine learning algorithm to apply, but also human selection of the data fields for each sample that populates the training set, as well as the labels placed on each sample and the sought for output.

Innovation can also be expected in how the data to be tested is gathered, manipulated, and presented to the machine learning tool, and how the output is then used to perform a task. In some instances, machine learning tools may also be used to create new optimized designs of artwork or products, which may be either new ornamental designs or new utility products.

However, while there may be any number of opportunities to innovate in relation to AI, in order to obtain patent protection, the applications covering such innovations must of course still meet **all** statutory requirements including utility, patent-eligibility, novelty, non-obviousness, enablement, adequate written description, etc.

2. *What are the different ways that a natural person can contribute to conception of an AI invention and be eligible to be a named inventor?*

The patent law has historically recognized that the inventor is the person, or persons, who contribute to the conception of the invention. *See, e.g., Burroughs Wellcome Co. v. Barr Lab., Inc.*, 40 F.3d 1223, 1227-28 (holding that “conception is the touchstone of inventorship”). The inventor is distinguished from someone who merely follows the inventor’s instructions and acts as the “hands of the inventor.”

Thus, in terms of the “human” aspects of machine learning, a human can be involved in designing the system, and the specific type of machine learning algorithm and protocol used as part of system. A “human” can also be involved in selecting the data elements, sample sets, and “tags” that make up the “training set.” In addition, a “human” can be involved in the selecting the desired output of the system. Each of these “human” selections can contribute to the conception of a machine learning invention.

A human may also be involved in designing how the machine learning process will be used as part of a larger process, both in gathering the information that is fed into the machine learning process, as well as how the output is used thereafter.

3. *Do current patent laws and regulations regarding inventorship need to be revised to take into account inventions where an entity or entities other than a natural person contributed to the conception of an invention?*

The current law requires conception or “the formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention.” *Burroughs Wellcome Co. v. Barr Labs.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994).

While United States patent law does not expressly require a threshold of human input in the invention process, it frames the questions of inventorship in terms of human creation. Under the current Patent Act, the term “inventor” is defined as “the **individual** or, if a joint invention, the **individuals** collectively who invented or discovered the subject matter of the invention.” 35 U.S.C. § 100(f). Further, in discussing limitations upon inventorship based on prior art, 35 U.S.C. §102 explains that “a **person** shall be entitled to a patent unless....” This language is at least suggestive that an inventor is an “individual” or a “person”. Recently, in *Return Mail v. United States Postal Service*, 139 S. Ct. 1853 (2019), the Supreme Court recognized that the scope of the term “person” varies across the uses of the term in the current Patent Act. *Cf. Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018) (recognizing that the Copyright Act did not clearly

authorize animals to be an “author”, and thus a macaque monkey did not have standing to sue for copyright ownership of a photograph taken by the animal).

Under the current statutory framework, the law does not clearly allow for non-human inventors (whether it be animals or machines).

Further, even if Congress were to explicitly enact a statute authorizing machines to be inventors under the Patent Act, there are serious open questions as to whether Congress has Constitutional Authority to pass such a law, at least under the Patents and Copyright Clause of the U.S. Constitution, Art. I, Section 8, Cl. 8, which only authorizes “inventors” to secure protection for their “discoveries”. Under an Original Intent interpretation, it is not likely our founding fathers would have thought of a machine as an “inventor”.

4. Should an entity or entities other than a natural person, or company to which a natural person assigns an invention, be able to own a patent on the AI invention?

If something meets the requirements of patentability such that a patent is issued, it follows that someone should own that issued patent. However, who (or what) may own a patent when the AI is considered to be the inventor raises an area of concern. Generally, where there is a human inventor, either the inventor or an entity to which the natural person assigned the invention, owns the resulting patent. Under current law, as described above in Question 3, without a human inventor, there can be no patent to own.

However, it is a well-known practice in U.S. law that the owner of a business or an employer can have “shop rights” in the inventions or other intellectual property developed by its employees while under their employ. *See, e.g., McElmurry v. Ark. Power & Light Co.*, 995 F.2d 1576 (Fed. Cir. 1993) (holding that an employer had acquired a shop right in the employee’s device because it was developed at the employer’s facilities and at the employer’s expense). It does not take much creative thought to expand this concept to having the owner of a machine that develops a new product to be the owner of the output of that machine. For example, when a fully automated factory, like an automobile factory owned by Ford or General Motors, produces a car out of a fully automated assembly line, no one would doubt that the owner of the assembly line would own the resulting car to come out of the assembly line.

The output of machine learning systems can be thought of in a comparable manner as the output of the assembly line, and should be owned by the owner of the system (or leaser of the system in the case of a cloud computing environment, for example). Under this reasoning, even if the AI generated the output, whether or not patentable, ownership rights should flow to a natural person or entity, other than the AI itself, presumably the person or entity that commissioned or owned the system generating the output. This theory of ownership has already been adopted in at least the United Kingdom where the Copyright, Designs, and Patents Act 1988, Section 9(3), explains that “in the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.” The Act further defines “computer-generated” in relation to a work to

mean that “the work is generated by computer *in circumstances such that there is no human author of the work.*”

5. Are there any patent eligibility considerations unique to AI inventions?

Certainly, restraints on patent eligibility that exist under the *Alice/Mayo* line of cases for other forms of computer-implemented inventions should apply to AI inventions. For example, it should not be sufficient to make an invention eligible where an AI invention is merely being used as “tool” like any other computer being used as a “tool”. High-level, over-generalized claims which merely say “apply AI” should also be insufficient to transform an abstract idea or law of nature into a patent-eligible invention.

6. Are there any disclosure-related considerations unique to AI inventions? Does there need to be a change in the level of detail an applicant must provide in order to comply with the written description requirement, particularly for deep-learning systems that may have a large number of hidden layers with weights that evolve during the learning/training process without human intervention or knowledge?

When claiming the use of a machine learning process, at a minimum, the disclosure should provide sufficient details for one of ordinary skill in the art to identify the appropriate data fields and tagging to be used to generate a training set, the correct type of machine learning algorithm to be applied, and the correct output to be selected. One would also expect the disclosure to include, but not be limited to, information on:

- how to select, build, or otherwise obtain the samples that make up the training set,
- how the input to the machine learning algorithm is obtained and presented to the algorithm, and
- what to do with the output of the machine learning algorithm after it has been obtained.

7. How can patent applications for AI inventions best comply with the enablement requirement, particularly given the degree of unpredictability of certain AI systems?

The purpose of the enablement requirement is to ensure the claimed invention is described with sufficient detail so that a person of ordinary skill in the art will understand how to make and use the claimed invention. However, reproducing the invention created by AI may be challenging because it may make use of models and algorithms that are constantly evolving as part of a training process. The applicant must give sufficient detail as to how the algorithm was created (e.g., what samples were included in the training set, and what variables and tags were used in the inputs, etc.) so as to enable a person of ordinary skill in the art to replicate the creation of the algorithm, and the application of such algorithm to the extent it has been claimed.

8. *Does AI impact the level of a person of ordinary skill in the art? If so, how?*

As with other technology areas, the level of a person of ordinary skill in the art for an AI-related invention will depend upon the scope of the invention and will be properly determined based on relevant factors.

9. *Are there any prior art considerations unique to AI inventions?*

To ensure quality examination of patent applications relating to AI inventions, it is necessary to ensure that examiners have access to relevant sources of prior art. Because of the nature of AI inventions, the ability to search for relevant prior art to determine if the invention complies with statutory requirements may involve unique challenges. Sources of prior art may reside in a wide variety of locations, like GitHub (or other software repositories), white papers, lecture notes at Universities (now widely distributed via the Internet). As with all technology areas, establishing access and indexing of prior art sources relevant to AI is important for maintaining quality.

10. *Are there any new forms of intellectual property protections that are needed for AI inventions, such as data protection?*

In general, the combination of patent, copyright, and trade secret protections will largely be sufficient to protect AI-related innovation. As with all emerging technologies, however, new challenges may arise as the technology continues to evolve that may require additional tools for protection.

Askeladden offers no comments on Questions 11 and 12.

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Askeladden is grateful for the opportunity to submit comments in response to the Office's Request for Comments on Patenting Artificial Intelligence Inventions. Askeladden remains committed to working towards an improved patent system together with the Office.

Very truly yours,

Sean Reilly

General Counsel
Askeladden L.L.C.