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RE: Comments to Open Consultation, Artificial Intelligence Call for Views: Patents, Published 7 September 2020

To the United Kingdom Intellectual Property Organization (UKIPO):

My name is Ryan Abbott, I am Professor and Chair of Law and Health Sciences at the University of Surrey in the United Kingdom, and Adjunct Assistant Professor of Medicine at the David Geffen School of Medicine at UCLA. I am a Solicitor Advocate in England and Wales and a registered Patent Attorney with the US Patent and Trademark Office (USPTO).

Advances in AI pose new challenges to intellectual property systems designed to incentivize and protect acts of human creativity. These developments will require us to not only reconsider how existing blackletter law can accommodate new technological developments, but also the normative foundations of our intellectual property systems.

I encourage UKIPO to take note of the substantial academic scholarship that exists with respect to AI and IP, some of which dates back to at least the 1960s. A partial list of such scholarship is available at http://artificialinventor.com/resources/. This website primarily describes efforts by an international group of patent attorneys, including myself, to obtain patents for AI-generated inventions in the UK and internationally as part of the Artificial Inventor Project. The website also serves as a general resource on AI-generated inventions.

Throughout this response I refer to academic works I have written on the subject of AI and IP, largely available for download on SSRN (http://ssrn.com/author=1702576). These publications address some of the questions in the Call for Views in significant detail, including with respect to both patent and copyright:

1. Ryan Abbott, *The Reasonable Robot: Artificial Intelligence and the Law* (CUP 2020) (Abbott 2020a)

2. Ryan Abbott, *Artificial Intelligence, Big Data and Intellectual Property: Protecting Computer-Generated Works in the United Kingdom, In* RESEARCH HANDBOOK ON

INTELLECTUAL PROPERTY AND DIGITAL TECHNOLOGIES (Tanya Aplin ed., 2020b) (Abbott 2020b)

3. Ryan Abbott, *The Artificial Inventor Project,* WIPO Magazine (2019) (Abbott, 2019a)

4. Ryan Abbott, *Everything is Obvious*, 66 UCLA. L. REV. 2 (2019) (Abbott, 2019b)

5. Ryan Abbott, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 B.C. L. REV. 1079 (2016) (Abbott, 2016a)

6. Ryan Abbott, *Hal the Inventor: Big Data and its Use by Artificial Intelligence, In* BIG DATA IS NOT A MONOLITH, (Cassidy R. Sugimoto, Hamid Ekbia and Michael Mattioli eds., 2016) (Abbott, 2016b)

While AI poses a wide variety of challenges and opportunities for the IP system in general, I will restrict my comments in this letter to "AI-generated inventions" which I will define as a "patentable invention generated by an AI in circumstances such that the AI, if a natural person, would be a patent inventor." I will not address issues such as whether AI or software should be patentable, the appropriate scope of protections for "computer-implemented inventions", database protections, or patent infringement "by" AI.

Question 1: What role can/does the patent system play in encouraging the development and use of AI technologies?

The patent system plays a role in the development and use of AI technologies through providing protection for certain computer-implemented inventions. In addition, permitting patents on AI-generated inventions would further encourage the development and use AI as discussed more fully below.

Question 2: Can current AI systems devise inventions? Particularly:
(a) to what extent is AI a tool for human inventors to use?
(b) could the AI developer, the user of the AI, or the person who constructs the datasets on which AI is trained, claim inventorship?
(c) are there situations when a human inventor cannot be identified?

AI systems can play a wide variety of roles in the inventive process. Where AI is a "tool" used by human inventors, there are different ways in which a natural person may contribute as a patent inventor to inventive AI output. In these situations, the person (or persons) who uses, programs, or develops an AI may qualify as an inventor according to existing criteria for inventorship.

It is possible that, particularly where a large number of individuals have contributed to an AI system, and where the AI's developers and users may be different individuals, it will be difficult or impossible to identify a human inventor. There are also case studies and reports of AI-generated works where applicants have reported no natural person

has made an inventive contribution.[1]

Question 3: Should patent law allow AI to be identified as the sole or joint inventor?

Patent protection should be provided for AI-generated works to encourage innovation. Patents encourage innovation under an incentive theory. The theory goes that people will be more inclined to invent if they can receive patents to exploit commercial embodiments of their inventions. Perhaps more importantly, entities investing in research and development will be more inclined to invest in inventive activities if there is a clear path for resultant inventions to receive protection and subsequently generate a positive return on investment.

In the case of AI, even though machines do not care about patents, people who build, own, and use AI do. Allowing patents for AI-generated works would make inventive AI more valuable and incentivize the development of AI. This would reward effort upstream from the stage of invention and result in even more innovation. Patents on AI-generated inventions would have substantial value independent of patents on AI or computer-implemented inventions. Allowing patents for AI-generated inventions would also avoid an inefficient outcome where a company has the option of more efficiently using an AI to generate inventive output but has to rely on human researchers to obtain patent protection.

Patents for AI-generated inventions would also achieve the other economic goals attributed to the patent system: incentivizing the disclosure of information and the commercialization and development of new inventions. AI-generated inventions may even be especially deserving of protection because inventive AI may be the only means of achieving certain discoveries that require the use of tremendous amounts of data or that deviate from conventional design wisdom.

If patents are to be granted for AI-generated inventions, particularly in cases in which no natural person qualifies as an inventor, this raises the questions of who, or what, should qualify as an inventor and who should own any subsequent patents.

The optimal response to AI-generated inventions may be to list an AI as an inventor and to have the AI's owner own any patents on its inventive output. The AI should be listed as the inventor for several reasons. First, it would inform the public of how an invention was generated. Second, it will facilitate appropriate attribution of ownership and chain of title. Third, and perhaps most importantly, it will protect the rights of human inventors because it will prevent people from receiving undeserved acknowledgement. Taking credit for an AI's work would not be unfair to a machine, but it would be unfair to other people who have traditionally invented because it would equate human ingenuity with someone asking a machine to solve a task in an inventive

[1] See, e.g., *Thaler v The Comptroller-General of Patents, Designs And Trade Marks* [2020] EWHC 2412 (Pat). Other examples of AI-generated works are described in the above referenced texts.

fashion. Finally, acknowledging AI as inventors would acknowledge AI developers, and it would reduce gamesmanship with the UKIPO.

AI inventorship should also apply to instances of joint invention with a natural person. There is no reason an AI's contribution should be ignored simply because a person is involved. Leaving out the AI would prevent that AI's owner from receiving the benefit of his or her property and it may reduce the value of inventive AI—thus ultimately harming investments in inventive AI. Such an approach could also discourage owners of inventive AI to from sharing or licensing their AI.

Alternately, UKIPO could elect to allow for patents on AI-generated inventions but adopt an alternate approach to inventorship such as deemed or imputed inventorship to a natural person, for instance allowing an AI's owner, user, or programmer to qualify as an inventor even when they do not traditionally meet inventorship criteria.

An AI cannot legally assign an invention but having patent ownership vest directly in an AI's owner as opposed to an inventor is consistent with general principles of property ownership under common law doctrines such as accession and first possession.

Question 4: If AI cannot be credited as inventor, will this discourage future inventions being protected by patents? Would this impact on innovation developed using AI? Would there be an impact if inventions were kept confidential rather than made public through the patent system?

Listing an AI as an inventor is not a matter of crediting an AI but rather of informing the public of how an invention was generated and preventing a person from taking undeserved credit. Failing to list an AI as an inventor would not necessarily discourage future inventions being protected by patents, but it may be desirable for the above reasons. Failing to provide patent protection for an AI-generated invention may negatively impact AI development, by discouraging developers, users, and owners of AI from making and using inventive AI. If patent protection cannot be obtained for AI-generated inventions, then AI owners may seek to rely on trade secret protection which should have a negative impact on public disclosure and commercialization of inventions.

Question 5: Is there a moral case for recognising AI as an inventor in a patent?

The moral case for recognizing AI as an inventor is not as a matter of AI rights, but a matter of informing the public how an invention was made and preventing a person from taking underserved credit.

Question 6: If AI was named as sole or joint inventor of a patented invention, who or what should be entitled to own the patent?

See above. An AI's owner, user, or developer are obvious possibilities for entitlement to an AI-generated invention. However, an AI's owner owning any patents on AI-generated works may be most consistent with general principles of property ownership and may best incentivize development of inventive AI.

Question 7: Does current law or practice cause problems for the grant of patents for AI inventions in the UK?

Currently, UK law fails to provide protection for AI-generated works or it requires applicants to inaccurately list a person as an inventor. This may discourage the use of AI in the R&D process in situations where it can generate inventive output without a traditional human inventor.

Question 8: Could there be patentability issues in the future as AI technology develops?

N/A

Question 9: How difficult do the list of excluded categories in UK law make it to secure patent protection for AI inventions? Where should be the line be drawn here to best stimulate innovation?

N/A

Question 10: Do restrictions on the availability of patent rights cause problems for ethical oversight of AI inventions?

N/A

Question 11: Does the requirement for a patent to provide sufficient detail to allow a skilled person to perform an invention pose problems for AI inventions?

N/A

Question 12: In the future could there be reasons for the law to provide sufficient detail of an AI invention for societal reasons that go beyond the current purposes of patent law?

N/A

Question 13: Does or will AI challenge the level of inventive step required to obtain a patent? If yes, can this challenge be accommodated by current patent law?

The skilled person essentially represents the average worker in the field of an invention, and so the standard should evolve as the characteristics of average workers change over time. As AI comes to commonly augment the average researcher, the skilled person should be conceptualized as a skilled person using AI. AI can make a person more knowledgeable and sophisticated, so this should raise the level of inventive step. With respect to augmenting the sophistication of average researchers, certain activities that once required inventive skill may become routine with the use of AI, such as modeling protein folding.

Given continued advancements in AI it is likely that, at some point in the medium to long term future, AI will transition from augmenting human researchers to automating R&D—at least in some fields. This may happen, initially, in areas where AI has a comparative advantage such as discovering new uses of existing drugs from pattern recognition in large data sets. If the PHOSITA standard fails to reflect the capability possessed by AI, then once the average worker routinely uses inventive AI, or inventive AI replaces the average worker, then inventive activity will be normal

instead of exceptional. This will result in too lenient a standard for patentability. Allowing the average worker to routinely patent their outputs would cause social harm. As the U.S. Supreme Court has articulated, "[g]ranting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may . . . deprive prior inventions of their value or utility." KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 402 (2007).

Once inventive AI becomes the standard means of research in a field, considering the skilled person as a skilled person using AI would also encompass the routine use of inventive AI by average workers. Taken a step further, once inventive AI becomes the standard means of research in a field, the skilled person should be an inventive AI. Specifically, the skilled person should be an inventive AI when the standard approach to research in a field or with respect to a particular problem is to use an inventive AI (the "Inventive Machine Standard"). Conceptualizing the skilled person as using a skilled person using AI might be administratively simpler but replacing the skilled person with the inventive AI would be preferable because it emphasizes that the AI is engaging in inventive activity, rather than the human worker.

To obtain the necessary information to implement this test, the UKIPO should establish a new requirement for applicants to disclose when an AI contributes to an invention in a manner that would qualify a person to be an inventor. Applicants are already required to disclose all human inventors. Similarly, applicants should need to disclose whether an AI has done the work of a human inventor. This information could be aggregated to determine whether most invention in a field is performed by people or AI. This information would also be useful for determining appropriate inventorship, and more broadly for formulating innovation policies.

Yet simply substituting an inventive AI for a skilled person might exacerbate existing problems with the inventive step inquiry. With the current skilled person standard, decisionmakers, in hindsight, need to reason about what another person would have found obvious. This results in inconsistent and unpredictable nonobviousness determinations. In practice, the skilled person standard bears unfortunate similarities to the "Elephant Test"—I know it when I see it. This may be even more problematic in the case of inventive AI, as it is likely to be difficult for human decisionmakers to theoretically reason about what an AI would find obvious.

An existing vein of critical scholarship has already advocated for nonobviousness inquiries to focus more on economic factors or objective "secondary" criteria, such as long-felt but unsolved needs, the failure of others, and real-world evidence of how an invention was received in the marketplace. Inventive AI may provide the impetus for such a shift. Nonobvious inquiries utilizing the Inventive AI Standard might also focus on reproducibility, specifically whether standard AI could reproduce the subject matter of a patent application with sufficient ease. This could be a more objective and determinate test that would allow the UKIPO to apply a single standard consistently, and it would result in fewer judicially invalidated patents. A nonobviousness inquiry focused on either secondary factors or reproducibility may avoid some of the difficulties inherent in applying a "cognitive" Inventive Machine Standard.

However the test is applied, an Inventive Machine Standard will dynamically raise the current benchmark for patentability. Inventive AI will be significantly more intelligent than skilled persons and also capable of considering more prior art. An Inventive Machine Standard would not prohibit patents, but it would make obtaining them more difficult: A person or AI might need to have an unusual insight that other inventive AI could not easily recreate, developers might need to create increasingly intelligent AI that could outperform standard AI, or, most likely, invention will be dependent on specialized, non-public sources of data. The nonobviousness bar will continue to rise as AI inevitably become increasingly sophisticated.

Taken to its logical extreme, and given there may be no limit to how intelligent AI will become, it may be that every invention will one day be obvious to commonly used AI. That would mean no more patents should be issued without some radical change to current patentability criteria.

Please refer to Abbott 2019a which is directed at these questions in greater detail.

Question 14: Should we extend the concept of "the person skilled in the art" to "the machine trained in the art"?

See above.

Question 15: Who is liable when AI infringes a patent, particularly when this action could not have been predicted by a human?

N/A

Question 16: Could there be problems proving patent infringement by AI? If yes, can you estimate the size and the impacts of the problem?

N/A

Thank you for the opportunity to provide these comments. I support the UKIPO's efforts to improve the patent system, welcome the opportunity to answer any questions these comments may raise, and look forward to a continuing dialogue on this very important subject.

Respectfully Submitted,

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