Dear Madam or Sir:

Please find a comment attached.

Sincerely,

Daniel Gervais

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Comment

Submitted to the United States Patent and Trademark Office

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I am pleased to provide this brief comment in response to *Request for Comments on Intellectual Property Protection for Artificial Intelligence Innovation* (84 FR 66176, 12/3/19; Docket No. PTO–C–2019–0038).

I am the Milton R. Underwood Chair in Law at Vanderbilt University Law School, where I teach both a number of intellectual property courses and a specialized course on Artificial Intelligence (AI), Robots & the Law. My comments below deal only with patents[2].

At the most basic level, as USPTO examiners already know well, text and data mining (TDM) tools powered by AI can greatly enhance the use of patent information, including in identifying relevant prior art.[3] TDM can help with novelty but also for non-obviousness, both of which are data-intensive inquiries.[4] In the near future, AI systems will produce reports on validity that courts are likely to rely on more and more, especially as those systems continue to improve.[5]

At this juncture, the trajectory of developments in AI allows us to see many more important changes to patent law and practice. Existing AI-based systems using Big Data (e.g. databases of published patents and technical literature) already allow patent applicants to maximize the scope of their exclusive rights. AI systems can identify material analogous

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[1] Daniel.gervais@vanderbilt.edu. This comment presents the personal views of its author and is not meant to reflect the views of Vanderbilt University or any other person or institution.

[2] For my views on the copyright side of this issue, *see* Daniel Gervais, *The Machine As Author,* (*forthcoming*, IOWA LAW REVIEW 2020), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3359524.

[3] *See* Dario Mastrelia, *Patent Information And Technology Transfer In The Information Society Era: From The Current Scenario To New Business Ideas*, 40:7 EUR. INT. PROP. REV. 460 (2018).

[4] For non-obviousness in particular, looking at the entire relevant prior art can be an arduous task. For a human. Not as much for an AI machine.

[5] *See* Ben Dugan, *Mechanizing Alice: Automating the Subject Matter Eligibility Test of Alice v. CLS Bank*, [2018] U ILLINOIS J L TECH & POLICY 33. A similar phenomenon can be observed in criminal justice as bail and sentencing decisions rely increasingly often on recidivism risk analyses performed by AI-based algorithms.

to the human inventor's invention that can then be added to the claims, thus potentially broadening its scope *beyond what the applicant actually invented*.[6]

Because the future is notoriously hard to predict, it is possible that this claim-broadening capability will be used in reverse, namely to pre-emptively *disclose* (but *without* claiming patent rights) incremental variations on claims of existing patents, thus potentially preventing patenting of improvements and even derivative and incremental inventions.[7] The reality is that both phenomena may co-exist for many years.

We can again take the discussion of the role of Big Data-based AI systems in innovation up a notch. As Yanisky Ravid and Liu note:

> AI systems create a wide range of innovative, new, and non-obvious products and services, such as medical devices, drug synthesizers, weapons, kitchen appliances, and machines, and will soon produce many others that, had they been generated by humans, might be patentable inventions under current patent law.[8]

In other words, beyond their incremental claim-broadening and disclosure potential, there is little doubt that some Big Data-based AI systems can "innovate," that is, that they can produce what one might at least "look like" new inventions.[9] In fact, AI systems could churn out small innovations at a pace that could eclipse any previous period in human history, causing an exponential increase over the (already very fast) pace of current technological change. One company active in the field markets itself as creating "commercially relevant inventions at high speed and with great diversity" and notes that "[h]undreds of patents based on *our inventions* have been filed by some of the best-known technology companies worldwide."[10] If this type of technology continues to grow, as it

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[6] *See* Ben Hattenbach, Joshua Glucoft, *Patents in an Era of Infinite Monkeys and Artificial Intelligence*, 19 STAN. TECH. L REV 32, 35 (2015), describing a company called CLOEM using "brute-force computing to mechanically compose text for thousands of patent claims covering potentially novel inventions and also to generate defensive publications to prevent others from obtaining patent protection in the same field".

[7] *See* Ryan Abbott, *'I Think, Therefore I Invent': Creative Computers and the Future of Patent Law*, 57 BOS. COLL. L REV. 1079 (2016), describing "projects such as "All Prior Art" and "All the Claims" which attempt to use machines to create and publish vast amounts of information to prevent other parties from obtaining patents".

[8] Shlomit Yanisky Ravid & Xiaoqiong (Jackie) Liu, *When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3a Era,* 39 CARDOZO L. REV. 2215, 2219-2220 (2018).

[9] Mike James, *Google's DeepMind Files AI Patents*, I-PROGRAMMEr (11 June 2018) <https://bit.ly/2ATh5or>.

[10] <http://www.iprova.com/about-us/> (accessed 7 January 2020).

surely will, we could reach what I might call a *singularity of innovation*: Much more would be patented than could ever be exploited. [11]

Such an innovation singularity would compel a fundamental rethink of the innovation incentive system. To maintain incentives in the face of massive disclosures by entities *not* claiming patent rights, patent offices and courts would be asked to limit the patent-defeating power of such disclosures, for example by finding that AI disclosures do not sufficiently enable or describe the invention. Would such AI-generated disclosures (especially of variations on existing inventions or other incremental innovations) provide enough information for a person skilled in the art to make or practice the invention?[12] Whether (potentially massive) AI disclosures of potential innovations would defeat later applications in the same area is, I submit, a question that the USPTO and courts should answer convincingly and in very short order.

On the other hand, if AI systems "invent" and their inventions are patented on a massive scale, the opposite problem (of a possibly insurmountable patent thicket) might emerge. If owners of patent rights in inventions they cannot exploit actually license them to companies that can exploit them, then private ordering might solve the otherwise massive blocking effect. It is unclear whether this private ordering would happen, however, and indeed whether it would increase general welfare in any way. There might instead be a massive increase in litigation by non-practising entities--who could have a huge incentive to build and own such "AI inventor systems."

Here, the solution to avoid the problem is to focus on inventorship.

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[11] The notion of "singularity" is described in RAY KURZWEIL, THE SINGULARITY IS NEAR (Viking, 2006). *See also* Abbott, note 7, at 1079–80 ("A creative singularity in which computers overtake human inventors as the primary source of new discoveries is foreseeable".) The singularity, according to Kurzweil, will be a reality when computers become more "intelligent" than humans.

[12] *See* Jennifer L. Kisko and Mark Bosse, *Enablement and Anticipation*, 89 *J Pat. & Trad. Off. Soc'y* 144, 151 (2007). This is not obvious (pun intended) because AI machines have not been very good at explaining how they got from point A (in this case a big corpus of data) to point B (in this case something that looks like an invention). *See* Will Knight, *The Dark Secret at the Heart of AI*, MIT TECH. REV., Apr 11, 2017, available at https://bit.ly/2N6XS9a.

Clearly, it would be an error to conclude that, because something has value, a patent should issue to protect it.[13] Hence, the argument that some AI system produce something of value that, *therefore*, must be patentable, must be rejected. Conversely, although Big Data-based AI systems are more likely to generate incremental innovations than pioneer inventions, that in itself does not justify their exclusion from patentability of course.

As with copyright authorship, one should ask instead whether there must be *human* inventorship for a patent to be granted.[14] Must there be a *causal link* between one or more identifiable human inventors and the invention? Of course, this presupposes that someone actually *knows* whether a human or a machine is the "inventor." If the patent applicant does not need to provide proof of human invention to the PTO, perhaps courts will require it later on in infringement proceedings and invalidate patents for lack of (human) inventorship.

I respectfully submit that the USPTO consider that in *Sony*, the Supreme Court explained that the benefits of patents and copyright are "intended to motivate the creative activity of authors and inventors by the provision of a special reward, and allow the public access to the products of their *genius*."[15] Is this the case when a machine is simply running its code and producing "inventions" that are (too far) removed from the programmer (especially because machines can increasingly program and reprogram themselves) to have anything to do with human "genius"?

A study and survey of European Union (EU) member states conducted for the European Patent Office (EPO) early in 2019 is interesting in that regard. The study, prepared by Noam Shemtov (Queen Mary University, London), suggested that claiming an AI machine as inventor might fail under Article 81 and Rule 19 EPC.[16] This was the reasoning followed in a recent first instance (Receiving Section) ruling by the EPO, essentially finding that an AI system was not an "employee" and that, therefore, the owner was not the inventor/employer.[17] A similar situation will occur in several fields of law when

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[13] Science has value, but patents apply to what can be broadly captured using the term "technology." As a rule of thumb that encapsulates at least part of that distinction, one does not ask of a technology whether it is "true." *See* Daniel Gervais, *The Patent Target*, 23 FED CIR. BAR J. 305 (2013).

[14] *See supra* note 1.

[15] Sony Corp. of Am. v. Universal City Studios, Inc. 464 U.S. 417, 429 (2014). Emphasis added.

[16] European Patent Convention. *See Artificial Intelligence* https://www.epo.org/news-issues/issues/ict/artificial-intelligence.html (accessed 5 January 2020)

[17] The decision is likely to be appealed. *See* IPKat, *EPO Refuses "AI Inventor" Applications In Short Order - AI Inventor Team Intend To Appeal,* https://ipkitten.blogspot.com/2019/12/epo-refuses-ai-

AI machines cross what I have called an autonomy (or agency) threshold and take decisions that cannot be attributed to the programmer, owner or user of the machine.[18]

In the above-mentioned study, some EU member states suggested that because a legal person can be an inventor, a machine could also be an inventor. This argument is specious. Everyone understands that there is a *causal link* between actual humans and the 'decisions' made by a corporation or other legal person. An invention 'made' by a legal person has what Dr. Shemtov refers to as a "chain of creation" to which individuals make identifiable contributions. Not so with many AI machines.

Finally, I suggest that it is unlikely that rules concerning the AI/patent interface developed in one jurisdiction (e.g., the United States) can be imposed (assuming this is considered desirable) on other nations under existing trade rules. Binding international patentability criteria are for the most part contained in article 27 of the TRIPS Agreement. This provision leaves World Trade Organization (WTO) members a fair degree of flexibility in determining what constitutes an "invention," and then whether such invention is new, involves an inventive step (or is non-obvious) and is industrially applicable (or useful). Setting useful and well-reasoned examples in US law and practice that others might want to follow would likely work far better to avoid trade-impeding divergences among major jurisdictions.

Nashville January 9, 2020

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inventor-applications-in.html (accessed Jan. 8, 2020) ("[M]achines do not have legal personality and cannot own property...a machine cannot own rights to an invention and cannot transfer them within a employment relationship.")

[18] *See* note 2 above.