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Request for Comments on Patenting Artificial Intelligence Inventions

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General Comment

1. Intuitively, I would consider algorithms and architectures for creating/training AI technologies to be suitable for patenting on their own (assuming they are sufficiently novel.) Inventions created using one or more AI tools are also, intuitively, suitable for patent, assuming sufficient novelty. But while the final parameters of trained AI systems such as deep neural networks MAY be suitable for patent, there is risk there. It is very easy to run existing algorithms on existing data and claim to have produced something novel; indeed, it is something seen frequently enough in the wild. However, in this case the so-called inventor has contributed nothing but computation time to create the final product. If inventors will be permitted to patent trained systems, careful standards will need to be established to prevent large numbers of spurious, low-value patents.

3. I do not believe that the rules on authorship needs to be revised at this time. It is possible that they may someday change, but for the foreseeable future, it is sufficient to treat AI systems as tools used by an author, just like any other tool. More generally, I am of the view that there is no value to attributing AI the legal aspects of personhood, such as authorship, ownership, liability, etc., unless it is expected that the legal and social incentive structures created by these concepts will influence the AI system's behavior. For the foreseeable future, they do not.

6. Replicability--or proving that an inventor had possession of an algorithm--is a challenge that academia is currently facing with regard to AI systems. Based on current experiences there, it is my opinion that in general, algorithms, the implementations of those algorithms, AND the trained weights are all required to properly document an AI invention and what it is capable of, whether that invention is the training algorithm or a fully trained system. In other words, a complete AI system must be provided to document an AI invention properly. Due to the randomness present in AI training, and the dependence on specific, large corpuses of data, anything short of this runs a risk of causing replicability issues. I understand that this approach could result in storage issues for the US Patent Office, and that will need to be considered. But storing trained weights is certainly preferable to storing the datasets used to create an AI system, which would surely be prohibitively costly.

7. See my comments on #6--I believe that algorithms, trained weights, and ideally code will be needed to enable replication of AI systems.

8. How AI impacts ordinary skill in the art will evolve as time goes on. Already, AI systems are capable of devising ideas not obvious to humans. See the success of AlphaGo. It is reasonable to consider some of these inventions. But for now, as per my comments on #3, I think it is reasonable to simply assume that a person of ordinary skill in the art is enabled by whatever AI tools are currently in widespread use in the field.

11. I wish to make one additional comment on the patenting of AI algorithms. While patents, and intellectual property protection generally, are important for encouraging innovation, two things appear clear to me. First, both public and private sectors are already investing staggering sums of money into the research and development of AI technology. Second, the vast majority of this research is very quickly disseminated and built upon, accelerating the further development of AI, and this process is enabled by the fact that the vast majority of AI discoveries today are published and detailed publicly for use by anyone. To give only two examples that came immediately to mind, Batch Normalization, a specific technique in deep learning architectures, and Microsoft's ResNet, a specific network architecture, were published in 2015 and 2016 respectively, and are already foundational to hundreds if not thousands of other algorithms and other inventions. In fact, the later invention, ResNet, makes extensive use of Batch Normalization. If either of these inventions had been patented, the field of AI in 2019 might have been significantly retarded. This open ecosystem of research appears to be key to US economic and scientific leadership in this field, and is a major asset. Due to this, and because further incentives for research in this field may be unnecessary at this time, the US Patent Office should consider the economic and scientific risks of granting patents to AI algorithm inventions and basic research that may have the potential to become foundational. This is not an easy consideration since the boundaries between fundamental and applied research are extremely fuzzy in this field.