AIPLA

American Intellectual Property Law Association

November 8, 2019

Hon. Andrei Iancu
Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office
United States Patent and Trademark Office
600 Dulany Street
Alexandria, Virginia 22314

Via email: AIPartnership@uspto.gov

> **Re: AIPLA Comments to Request for Comments on Patenting Artificial
> Intelligence Inventions, 84 Fed. Reg. 44889 (August 27, 2019) [Docket No. PTO–
> C–2019–0029]**

Dear Under Secretary Iancu:

The American Intellectual Property Law Association (AIPLA) respectfully submits these comments in response to the Department of Commerce's Request regarding issues related to patenting artificial intelligence inventions raised in the August 27, 2019 Federal Register Notice (84 Fed. Reg. 44889).

AIPLA is a national bar association of approximately 12,000 members engaged in private or corporate practice, in government service, and in the academic community. AIPLA members represent a wide and diverse spectrum of individuals, companies, and institutions involved directly or indirectly in the practice of patent, trademark, copyright, trade secret, and unfair competition law, as well as other fields of law affecting intellectual property. Our members represent both owners and users of intellectual property. Our mission includes helping establish and maintain fair and effective laws and policies that stimulate and reward invention while balancing the public's interest in healthy competition, reasonable costs, and basic fairness.

I.   Inventions that utilize AI, as well as inventions that are developed by AI, have commonly been referred to as ''AI inventions.'' What are elements of an AI invention?

Although the term "AI inventions" is often used to generally refer to all innovations involving the use of AI, the different policy issues associated with inventions produced by AI and innovations that utilize AI necessitate a set of distinctive terms. This response proposes adopting the distinguishing terms "inventive AI" and "AI inventions." The term "inventive AI" refers to inventions that are derived, discovered, or otherwise arrived at primarily by or in conjunction with the efforts of AI. That is, inventive AI should be the term used when AI makes what would constitute an inventive contribution to an invention, if the contribution were made. Conversely, the term "AI inventions" means those innovations that incorporate AI-related technologies. The use of these terms facilitate a discussion of the distinctions between patent

issues arising from innovations made by AI and patent issues arising from attempts to procure rights for innovations that implement AI.

An AI invention broadly covers the software and/or the hardware on which it runs. Generally, the elements of AI inventions could relate to the algorithm, the training data, the infrastructure supporting the training database, the hardware running the algorithm, the hardware that supports the algorithm accessing the training data, the input hardware (e.g., sensors) that collect new data for the training dataset, and the output results of implementing the algorithm.

Examples of AI inventions can include for example:

1. Architecture of an AI engine – here, inventions are often directed at novel structural components with novel functionality (e.g., WaveNet), novel arrangement of the structural components (e.g., Inception), and novel combination of different engines and their interplay (e.g., generative adversarial networks).

2. Model training algorithms – this covers techniques for efficiently converging engine implementing an AI model to perform one or more tasks accurately. Here, inventions are often directed at reducing training time (e.g., batch normalization), reducing required compute (e.g., distributed training), and enhancing quality of the learned weights (e.g., multi-objective learning).

3. Acquisition of training data – this covers acquisition and/or use of information that is fed as input to the engine. Here, inventions are often directed at sensor-based data acquisition and preprocessing, harvesting large-scale training sets (e.g., synthetic data generation), preprocessing the input (e.g., transpose convolution), and automatic ground truth labeling (e.g., DeepBbox).

4. Inference – this covers information that is produced as output by the trained AI engine. Here, inventions are often directed at reducing memory consumption and latency (e.g., quantization), optimizations for particular hardware (e.g., MobileNet) and/or processes, and integration with larger systems (e.g., Vision AI).

5. Practical application – this covers using the trained AI engine to solve a technical problem. Here, inventions are often directed at computer vision (e.g., image classification), natural language processing (e.g., machine translation), and genomics (e.g., variant identification).

6. Self-executing AI – this covers automatically performing the one or more elements listed above with minimal human intervention. Here, inventions are often directed at meta-learning the engine's architecture (e.g., coevolution), meta-learning the training algorithms (e.g., model-agnostic meta-learning), and meta-learning effective learning environments and training data (e.g., quality diverse algorithms). Note that in some instances, self-executing AI may also be properly considered to be Inventive AI with potentially patentable resulting practical applications.

7. AI accelerators and chips – this covers specialized hardware designed for AI applications. Here, inventions are often directed at efficiently compiling the engine (e.g., Spatial), systolic array processors and AI chips that run the engine (e.g., TPUs), and system-on-chip design libraries for designing the AI chips (e.g., DesignWare).

These seven AI elements are high-level examples of elements that are commonly used, combined, and improved, along with many other elements now known or later invented. As with inventions in any other technical area or combination of technical areas, inventors may contribute to an invention by improving any of these elements, combining the elements in new ways, or coming up with new elements.

While a few test cases such as the DABUS patent applications[1] exist now, there is not yet enough information available to know whether the claimed subject-matter is truly "inventive AI." As such, no real-world examples of inventive AI are provided in this discussion.

II.   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?

There are different ways in which a natural person may contribute to the conception of an AI invention.[2] For example, a programmer may be considered an inventor of a new AI technique or a system that improves upon an existing technique. Contributing acts by other individuals may include developing techniques for obtaining and formatting the training data, selecting the type of AI system, obtaining inputs, and utilizing the output of the AI engine.

Each of these contributions, however, should be evaluated on a case-by-case basis. The act of designing an algorithm may be inventive in some circumstances, but not all. If a natural person applies new training data obtained in an inventive manner to an AI engine, they may be considered to have contributed to the conception of that invention. However, if a person simply runs an AI algorithm on data and obtains the anticipated results (where the algorithm and data are given), that person may be said to have acted as a technician and therefore made no contribution to the invention.

III.   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?

Under current U.S. law, the inventor must be a natural person; that law should not be changed at this time. Although there are currently a few test cases such as the DABUS patent

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[1] *See, e.g.,* Tina G. Yin Sowatzke, *Meet DABUS: An Artificial Intelligence Machine Hoping to Maintain Two Patent Applications in its own Name*, (Aug. 22, 2019) (https://www.filewrapper.com/filewrapper/meet-dabus-an-artificial-intelligence-machine-hoping-to-maintain-two-patent-applications-in-its-own-?filewrapper=true).

[2] Inventorship of AI inventions is a current AIPPI study question (to be presented in Hangzhou next October) and, as such, there will be significantly more information and research available on this topic next year.

applications[3], as noted above, there is not yet enough information available to know whether this is truly "inventive AI." Moreover, if inventive AI does exist in the future, it will be necessary to consider what types of activities by AI entities would be considered as inventive contributions to the claimed invention. For example, it may be that "accidental" invention of something new by an AI entity trained to do something else (where the invention is an unintended byproduct of the intended function) should be treated differently than a product that an AI entity is trained to invent. Thus, until there are more examples of and more understanding around "inventive AI," it is premature to consider a change to the existing law.

IV.   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?

Ownership of patent rights should remain reserved for only natural or juridical persons at this time. Changing the ownership regime to allow an AI entity to own a patent would raise broad fundamental issues relating to incentives for inventing and "AI personhood," which go far beyond the scope of this discussion.

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

At present, there does not appear to be eligibility considerations that are unique to AI inventions. Like other fields of technology, there exists a need for certainty and predictability to ensure that our patent system is adequately incentivizing and protecting AI inventions. There is currently a lack of certainty in many technology areas as a result of the Supreme Court jurisprudence on Section 101.

Most AI inventions to date are directed to software. There is limited guidance in the U.S. distinguishing the patent eligibility analysis for AI inventions from software inventions more generally.[4] If patents on AI inventions are treated the same as software patents for purposes of eligibility, then similar hurdles will likely exist. For example, AI inventions that simulate, supplement, or replace human thought may be subject to heightened scrutiny, even though AI inventions are not a naturally occurring phenomenon.[5],[6] However, in some cases where claims are focused on a specific means or method that improves the relevant computer

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[3] *See, e.g., Tina G. Yin Sowatzke, Meet DABUS: An Artificial Intelligence Machine Hoping to Maintain Two Patent Applications in its own Name*, (Aug. 22, 2019) (https://www.filewrapper.com/filewrapper/meet-dabus-an-artificial-intelligence-machine-hoping-to-maintain-two-patent-applications-in-its-own-?filewrapper=true).

[4] *See, e.g.*, Ben Hattenbach & Gavin Snyder, *Rethinking the Mental Steps Doctrine and Other Barriers to Patentability of Artificial Intelligence*, 19 Colum. Sci. & Tech. L. Rev. 313, 320 (2018) ("The scope has also aligned because no judicially-recognized distinctions between software in general, and artificial intelligence software in particular, have yet arisen.").

[5] *See, e.g.*, Elizabeth Rocha, *Sophia: Exploring the Ways AI May Change Intellectual Property Protections*, 28 DePaul J. Art Tech. & Intell. Prop. L. 126, 138 (2018) (discussing that humanoid robot Sophia granted citizenship by Saudi Arabia "may act and function as a natural person, but she is a creation of a lab technician" and is therefore not "naturally occurring").

[6] *See, e.g.*, *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1371 (Fed. Cir. 2011). Likewise, certain computer-implemented inventions for performing diagnosis of medical conditions and disorders have also been held patent-ineligible. *See Mayo Collaborative Servs. v. Prometheus Labs, Inc.*, 556 U.S. 66 (2012); *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371 (Fed. Cir. 2015).

technology[7], courts have held that "[p]rocesses that automate tasks that humans are capable of performing are patent-eligible."[8] Recently, the USPTO released guidance further suggesting that claims directed to a "practical application" of otherwise patent-ineligible subject matter may be eligible for patent protection.[9]

VI. **Are there any disclosure-related considerations unique to AI inventions? For example, under current practice, written description support for computer-implemented inventions generally require sufficient disclosure of an algorithm to perform a claimed function, such that a person of ordinary skill in the art can reasonably conclude that the inventor had possession of the claimed invention. 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?**

Section 112(a) of Title 35 of the U.S.C.[10] requires that the specification provide a written description of: (1) the invention; (2) the manner and process of making and using the invention; and (3) the best mode for carrying out the invention.[11] The Federal Circuit has held that "a separate requirement to describe one's invention is basic to patent law. Every patent must describe an invention…."[12] These requirements are reiterated in the recently released guidance from the United States Patent and Trademark Office, which maintains the need for specification

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[7] *See, e.g.*, *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016) ("we find it relevant to ask whether the claims are directed to an improvement to computer functionality versus being directed to an abstract idea, even at the first step of the *Alice* analysis") (citing *Alice Corp. Pty Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 296 (2014)).

[8] *See, e.g.*, *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1307 (Fed. Cir. 2016) (upholding as patent-eligible claims directed to a method for "automatically … producing accurate and realistic lip synchronization and facial expressions in animated characters" previously performed by humans).

[9]*See* 2019 Revised Patent Subject Matter Eligibility Guidance, *supra* note **Error! Bookmark not defined.**, 84 Fed. Reg. at 50 ("A claim is not 'directed to' a judicial exception, and thus is patent eligible, if the claim as a whole integrates the recited judicial exception into a practical application of that exception."). The guidance further synthesizes key concepts identified by the courts as abstract ideas to explain that the abstract idea exception includes "[m]athematical concepts[,] . . . certain methods of organizing human activity, [] and mental processes [] performed in the human mind." *Id*. at 52.

[10] "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention." 35 U.S.C. § 112(a); *see also* M.P.E.P. § 2161.

[11] *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1344 (Fed. Cir. 2010).

[12] "It is part of the *quid pro quo* of a patent; one describes an invention, and, if the law's other requirements are met, one obtains a patent. The specification must then, of course, describe how to make and use the invention (*i.e.,* enable it), but that is a different task. A description of the claimed invention allows the United States Patent and Trademark Office ("PTO") to examine applications effectively; courts to understand the invention, determine compliance with the statute, and to construe the claims; and the public to understand and improve upon the invention and to avoid the claimed boundaries of the patentee's exclusive rights." *Id*., at 1345.

to disclose the algorithm for performing the claimed specific computer function in computer implemented inventions such as AI inventions.[13]

Thus, the adequacy of a patent's specification in the U.S. (regardless of whether the invention is directed to AI) hinges on whether the specification provides sufficient written description to clearly allow persons of ordinary skill in the art to understand that the inventor had possession of the claimed subject matter at the time of filing.[14] As noted in the recently released guidance from the USPTO, "the specification must describe the claimed invention in sufficient detail such that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention at the time of filing. For instance, the specification must provide a sufficient description of an invention, not an indication of a result that one might achieve."[15] To evaluate the adequacy of a patent's specification for an AI-related technology therefore requires consideration of the technologies being claimed and must be adequate to enable one of ordinary skill in the art to prepare the claimed AI invention.[16]

Broadly, patents directed to AI may be categorized as inventions directed to: (1) an AI algorithm or AI program itself; and (2) an AI application to another technology. To satisfy the requirements of 35 U.S.C. § 112(a), the patent specification directed to the AI algorithm or AI program itself should provide one of ordinary skill in the art[17] the information necessary to prepare, without "undue experimentation," such an AI algorithm/program.[18] Similarly, the patent specification directed to the application of AI to another technology should provide one of ordinary skill in the art the information needed to make and use the invention.[19] Further, as AI inventions will necessarily be computer-implemented inventions, the specifications must disclose both the hardware and software to enable any computer-implemented functional claims to be achieved.[20,21]

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[13]*See* Examining Computer-Implemented Functional Claim Limitations for Compliance with 35 U.S.C. 112, United States Patent and Trademark Office, Docket No. PTO-P-2018-0059 (Jan. 7, 2019), at 10-15. "For a computer-implemented 35 U.S.C. § 112(f) claim limitation, the specification must disclose an algorithm for performing the claimed specific computer function, or else the claim is indefinite under 35 U.S.C. § 112(b)." *Id.* at 10 (citing *Net MoneyIN, Inc. v. VeriSign, Inc*., 545 F.3d 1359, 1367 (Fed. Cir. 2008).

[14] *Id.* at 1351.

[15] *See* Examining Computer-Implemented Functional Claim Limitations for Compliance with 35 U.S.C. 112, United States Patent and Trademark Office, Docket No. PTO-P-2018-0059 (Jan. 7, 2019), at 17 and 19; *see also, Vasudevan Software, Inc. v. MicroStrategy, Inc*., 782 F.3d 671, 682-683 (Fed. Cir. 2015).

[16] *See e.g., In re Naquin*, 398 F.2d 863, 866 (C.C.P.A. 1968)

[17] The state of the prior art and the relative skill of those in the art are fact-based considerations that govern the reasonableness of the disclosure and sufficiency of enablement of the claims. *See e.g., Vasudevan Software, Inc. v. MicroStrategy, Inc.*, 782 F.3d 671, 681-85.

[18] *See e.g., In re Naquin*, 398 F.2d 863, 866 (C.C.P.A. 1968)

[19] MPEP 2164.05(b) https://www.uspto.gov/web/offices/pac/mpep/s2164.html

[20] *See* Examining Computer-Implemented Functional Claim Limitations for Compliance with 35 U.S.C. 112, United States Patent and Trademark Office, Docket No. PTO-P-2018-0059 (Jan. 7, 2019), at 18.

[21] Adequacy of disclosure is generally considered synonymous with the requirements under 35 U.S.C. § 112(a). However, the requirements of 35 U.S.C. § 112(b) often interact with the requirements of 35 U.S.C. § 112(b) in functional claiming of computer-implemented inventions. Per USPTO guidelines, failure to disclose sufficient

Additionally, adequacy of disclosure for either an AI algorithm/program type invention or an application of AI to another technology type invention hinges on the scope of the claims under U.S. patent law. To meet the written description requirements, a patent specification must teach how to use the AI invention as broadly as it is claimed.[22] Though a fact based issue, more than one species may be required to be disclosed to adequately support claims to a genus.[23] Unless an invention is a new form of AI, the invention recited in the claims are likely to be directed to the application of AI to a problem.[24] Many types of AI technologies involve training a machine learning algorithm with a particular dataset in order to solve a particular problem.

Deep-learning systems make up a subset of machine learning capable of learning from training data that is unstructured or unlabeled.[25] Deep-learning systems may have a large number of hidden layers of artificial neurons with weights that evolve during the learning/training process without human intervention or knowledge. If it is decided that adequate disclosure for patents covering deep-learning inventions requires disclosure of those hidden layers, then patenting such inventions may be foreclosed because the behavior and specific weighting of hidden layers is not generally well understood.[26] If it is decided that adequate disclosure for patents covering deep-learning inventions merely requires disclosure of the structure of the layers of artificial neurons, then simple diagrams showing a representation of the structure may be sufficient for one of ordinary skill in the art to make and use the invention.[27]

If it is decided that the dataset used for training machine learning must be sufficiently disclosed in the application to enable others to use the same or similar datasets to practice the claims, then some issues may be foreseeable. For example, in some situations, explicit disclosure of the training dataset may not be possible, such as when the dataset is proprietary or when the dataset is barred from disclosure by statute (e.g., a health-related dataset protected HIPPA). Sufficiently disclosing a dataset that is not proprietary or otherwise protected may

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corresponding structure for a claimed function under 35 U.S.C. § 112(b) may mean a claim also lacks written description under 35 U.S.C. § 112(a). *See, e.g.,* Examining Computer-Implemented Functional Claim Limitations for Compliance with 35 U.S.C. 112, United States Patent and Trademark Office, Docket No. PTO-P-2018-0059 (Jan. 7, 2019), at 15. Thus, if AI inventions are to be claimed functionally, further consideration as to whether the specification discloses the full algorithm to perform the functions of the claim. *See id.* at 10-13.

[22] *See, e.g., In re Vaeck*, 947 F.2d 488, 496 (Fed. Cir. 1991).

[23] *See, e.g., id.*

[24] For purposes of this article, the problem may be a new problem unique to AI technology or a known problem solved in a new way using AI technology.

[25] *See, e.g., IT Update*, USPTO Patent Public Advisory Committee Quarterly Meeting (August 2, 2018), https://www.uspto.gov/sites/default/files/documents/20180802_PPAC_AI_IT_Update.pdf.

[26] *See, e.g.,* Alexander Lavin, *Interpreting AI Is More Than Black And White*, Forbes (Jun. 17, 2017), https://www.forbes.com/sites/alexanderlavin/2019/06/17/beyond-black-box-ai/#35a7537549c4, ("deep neural networks remain prohibitively complex to understand: the explanations underlying predictions (or the 'why') is unknown. Consider the remarkable sensitivity of deep neural networks to adversarial attacks, where slightly perturbed inputs (typically imperceptible to humans, such as a piece of duct tape on a stop sign) can completely throw off predictions [], raising questions around what the models are actually learning inside that black-box.").

[27] *See generally, e.g.,* Vivienne Sze, *et al., Efficient processing of deep neural networks: A tutorial and survey*, Proceedings of the IEEE (2017).

include providing the dataset itself (or reasonable sample thereof). Where explicit disclosure of the dataset is not possible, sufficient disclosure may in some cases include merely describing the contents of the dataset so that an equivalent dataset can be reproduced. Sometimes, describing only the training task may be enough to enable one of ordinary skill in the art to determine a suitable training dataset.

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

Considerations regarding disclosure are addressed above in the response to Question VI. The assumption that AI systems are unpredictable is not necessarily valid; "unpredictability" is not an inherent feature of AI systems. Most *current* AI systems behave in a predictable manner and that predictability is often a basis for the commercial value of practical applications of these technologies. Whether there will be increased unpredictability in AI systems as they develop in the future remains to be seen.

VIII. Does AI impact the level of a person of ordinary skill in the art? If so, how? For example: Should assessment of the level of ordinary skill in the art reflect the capability possessed by AI?

Determining who is eligible as an inventor directly affects the definition of a person of ordinary skill.

If it is decided that inventive AI may be an inventor, this decision may have a profound impact on the determination of the level of ordinary skill in the art for purposes of a validity analysis. The factual analysis of determining the ordinary skill may require an additional assessment of the state of the art of AI at the time of invention. Additionally, applicants may be required to provide additional disclosure when filing an application to identify if the application is generated by inventive AI or predominantly by AI assistance, so as to distinguish over inventions that are generated solely by human inventors. For example, in some cases where both a person and an AI are integral to conception, "a person of ordinary skill in the art" may be considered to be a skilled person using a specific AI.

If it is determined that only natural persons may be inventors, the existing analysis is workable in that it can run on the assumption that those working in the art use the relevant available tools, whether these are AI or other tools.

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

If only natural persons may be considered inventors, the process and manner of identification and application of prior art to AI inventions is unchanged simply by the involvement of AI technology in the claimed subject matter. The scope of the prior art is limited to analogous art under current law. Nothing about the nature of AI necessarily invites a reconsideration of that limitation.

In the event that an AI entity is considered an inventor, the definition of "analogous" may have to be significantly expanded, depending on the capabilities of the inventive AI. That

is, for example, presumably, an inventive AI may be capable of accessing, abstracting, and evaluating a much larger universe of prior art than its human counterpart.

A more pressing question might be: what, if anything, should be done about the fact that AI might be used to generate vast and varied bodies of prior art. Publication of the results of instructing or applying an AI at a high level of abstraction to find every possible incremental solution to a certain problem that meets a specified set of patentable criteria may produce an unworkable volume of material. Consideration should be given to determining whether AI-authored works should be considered prior art or subjected to any filtering process to ascertain validity of printed findings.

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

Training is a critical feature of AI systems, and the databases on which AI is trained may have substantial impacts on the quality and results obtained. Data is critical to this process, and sui generis forms of data protection may be appropriate. In addition, copyright laws may need to be changed to cover some aspects of code or an output of an AI engine, particularly because it is generated by a machine, which is not currently permitted by the U.S. Copyright Office. Further, companies that collect large amounts of data have a competitive advantage relative to new entrants to the market. There could be a mechanism to provide access to the repositories of data collected by large technology companies such that proprietary rights to the data are protected but new market entrants and others can use such data to train and develop their AI.

XI.   Are there any other issues pertinent to patenting AI inventions that we should examine?

Yes. Extending legal protection to AI inventions may require substantial changes in traditional legal approaches and frameworks, including notions of property, ownership, and other non-IP legal principles akin to the development of corporate law as we know it today. The more advanced AI technologies become, the greater an AI's capacity for cognitive reasoning. There is a relational distance in the involvement the program (AI) designer has to the final invention. For example, if there are only a few design parameters, then the designer may be relatively close to the resulting invention. However, if the AI is analyzing and modeling millions of variables and modifying its own processes, the relationship between the program designer and an output designed by the AI becomes more tenuous.

XII.   Are there any relevant policies or practices from other major patent agencies that may help inform USPTO's policies and practices regarding patenting of AI inventions?

Yes. All agencies that regularly address ownership, property rights, commerce, competition, and invention will need to be engaged in developing a legal framework for AI.

Jurisdictions covered by the members of the IP5[28] have begun to address policy questions related to patenting AI inventions. Antitrust and commerce agencies should also be engaged in these efforts. The approaches adopted by these various jurisdictions may be instructive to the USPTO in determining how to address these issues within the United States. Specifically, guidelines on issues of inventorship and patent eligibility may be particularly instructive.

Regarding the issue of inventorship, most jurisdictions covered by the IP5 restrict inventorship rights to natural persons. China places similar restrictions on inventorship as those present in the U.S.[29] In this regard, under Rule 13 of Chinese Patent Law Implementing Regulations, an "inventor" or "designer" means "any <u>person</u> who has made <u>creative contributions</u> to the substantive features of an invention-creation."[30] Further, the Examination Guidelines[31] explain that the "inventor" shall be an individual, and an organization or company is not qualified to be an "inventor." Similarly, Japan restricts the term "inventor" to only natural persons. In Korea, the Korean Patent Act[32] addresses meaningful results or technical creations produced by Inventive AI as a process of creating something by a human being, prohibiting the Inventive AI from being an inventor.

Europe is the only jurisdiction covered by the IP5 Offices that does not mandate that inventors be natural persons. Art. 60(1) of the European Patent Convention (EPC) states that the inventor or his successor in title is entitled to the right to a European patent. The EPC does not define the term "inventor" or construe inventorship rights as being limited to only natural persons. Thus, Inventive AI may be recognized by the EPO as an inventor.

With regard to patent eligibility, most jurisdictions rely on policies addressing computer-implemented inventions or software to address AI inventions. Europe is the only jurisdiction covered by the IP5 to have specifically addressed the patentability of AI inventions,

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[28] Members of the IP5 are the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the National Intellectual Property Administration of the People's Republic of China (CNIPA), and the USPTO.

[29] *See e.g.,* Various Contributors, *The AIPLA/AIPPI/FICPI AI Colloquium Primer,* (April 29, 2019) (*available at* https://ficpi.org/_/uploads/files/AIPLA-AIPPI-FICPI_Artificial_Intelligence_Colloquium_Patent_ONLY_Primer.pdf).

[30] Chinese Patent Law Implementing Regulations, Rule 13

[31] Chinese Examination Guidelines, part I, Chapter 1, Section 4.1.2: Formality Examination of Invention Patent Application

[32] Article 2 of the Korean Patent Act defines an invention as "the highly advanced creation of a technical idea utilizing the laws of nature." Republic of Korea, Patent Act (Act No. 950 of Dec. 31, 1961, as amended up to Act No. 14112 of Marc. 29, 2016), Art. 2(1).

although China has indicated plans for doing so in the near future.[33] European guidelines[34] on the patentability of AI and machine learning technologies came into force in November 2018. Computational models and algorithms are generally considered to be of a mathematical nature. However, a mathematical method[35] may contribute to the technical character of an invention, i.e. contribute to producing a technical effect that serves a technical purpose, by (1) its application to a field of technology and/or (2) being adapted to a specific technical implementation. AI Inventions are otherwise considered to lie within the realm of software inventions and must meet similar requirements.

Issues related to the adequacy of disclosure and assessment of inventive step tend to vary across jurisdictions of the IP5 due to differing perspectives on what level of disclosure is needed in order to enable an invention and the level of skill attributable to a person of ordinary skill in the art.

We thank you for the opportunity to provide these comments. AIPLA supports the USPTO's efforts on improving the patent system, welcomes the opportunity to answer any questions these comments may raise, and looks forward to a continuing dialogue on this very important subject.

Sincerely,

Barbara A. Fiacco
President
American Intellectual Property Law Association

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[33] *See e.g.,* Various Contributors, *The AIPLA/AIPPI/FICPI AI Colloquium Primer,* (April 29, 2019) (*available at* https://ficpi.org/_/uploads/files/AIPLA-AIPPI-FICPI_Artificial_Intelligence_Colloquium_Patent_ONLY_Primer.pdf).

[34] https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3_1.htm

[35] https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3.htm