Study Guidelines

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2020 – Study Question

Inventorship of inventions made using Artificial Intelligence

Introduction

1)   This Study Question examines the question of inventorship of inventions made using Artificial Intelligence ("AI"). In particular, this Study Question considers the various roles humans play in the creation, training and use of AI systems and examines how the standards of inventorship should apply when considering an invention made using such a system. This Study Question also addresses the issue of whether an AI system ultimately could itself – as an "artificial person" -- be considered an inventor or co-inventor.

2)   In most jurisdictions, an "inventor" is defined as an individual, a human or a natural person. As of today, in a typical AI application, humans may be involved at various stages including creation of an AI algorithm, designing an AI system to suit a particular purpose, curating data and training the system with that data, and applying the trained system to a particular task. Already, given the ability of AI systems to "learn", traditional notions of inventorship may be challenged. In the future, human involvement may be minimized or disappear altogether. Whether the current law of inventorship is adequate to address these scenarios, or whether something new or different is needed, is the focus of this Study.

Why AIPPI considers this an important area of study

3)   AI is a rapidly evolving technology that finds new applications on virtually a daily basis. It has profoundly changed how problems are approached and solved in a wide variety of fields.

4)   While most experts agree that, as of today, AI cannot independently create or invent, the use of AI in connection with inventive activities already challenges traditional concepts of inventorship. Future applications of AI in increasingly diverse fields are likely to further push the boundaries of inventorship. Thus, it is timely for AIPPI to consider this issue.

5) With AI enlarging its role within the inventive process it is important to scrutinize the current regulations and case law and develop models to account for its growing importance in the future.

Definitions

6) *Definition of Artificial Intelligence.* Recognizing that there is no universally applicable definition of AI, and understanding that other definitions also exist, for the purposes of this Study Question and in order to have a concrete frame of reference for the analysis of inventorship issues, we adopt the following definition:

> Artificial intelligence is an entity (or collective set of cooperative entities), able to receive inputs, interpret and learn from such inputs, and exhibit related and flexible behaviours and actions that help the entity achieve a particular goal or objective over a period of time.

> *See Daniel Faggella, Emerj, https://emerj.com/ai-glossary-terms/what-is-artificial-intelligence-an-informed-definition/*

7) *AI Contribution.* As used herein, "AI Contribution" means the contribution to an invention made by an AI entity, as opposed to by a natural person.

Relevant treaty provisions

8) There are currently no treaty provisions addressing inventorship of inventions made using AI. However, there are various provisions regarding inventorship in general. Art. 4ter of the Paris Convention grants the inventor the right to be mentioned as such in the patent. Art. 1.3 TRIPs refers to a natural or legal person as an inventor stating that "*In respect of the relevant intellectual property right, the nationals of other Members shall be understood as those natural or legal persons that would meet the criteria for eligibility for protection provided for in the Paris Convention (1967), the Berne Convention (1971), the Rome Convention and the Treaty on Intellectual Property in Respect of Integrated Circuits, were all Members of the WTO members of those conventions.*" Art. 4.1(v) PCT requires naming of the inventor when this is required by the national law of at least one of the designated states. The language of Art. 60 EPC seems to presuppose the inventor is a natural person, providing, "The right to a European patent shall belong to the inventor or his successor in title. If the inventor is an employee, the right to a European patent shall be determined in accordance with the law of the State in which the employee is mainly employed."

9) Whether or not AI is considered an inventor currently has to be developed by case law. Especially notable is a modification the UKIPO recently made to its Formalities Manual. On 28th of October 2019 UKIPO updated its Formalities Manual, adding under Section 3.05 a provision stating that "*An 'AI Inventor' is not acceptable as this does not identify 'a person' which is required by law. The consequence for failing to supply this information is that the application is taken to be withdrawn under s. 13(2).*" Although a domestic amendment addressing formalities, it reflects the intention of the UKIPO and the way that it perceives AI at this point of time as well as it might have an impact to patent applications submitted in the UKIPO, USPTO and EPO.

10) Most recently, the EPO stated in a brief press release in December 2019 that the EPO has refused two European patent applications in which a machine was designated as inventor. Both patent applications indicate "DABUS" as inventor, which is described as "a type of connectionist artificial intelligence". The applicant stated that they acquired the right to the European patent from the inventor by being its successor in title. After hearing the arguments of the applicant in non-public oral proceedings on 25 November 2019 the EPO refused EP 18275163 and EP 18275174 on the grounds that they do not meet the requirement of the EPC that an inventor designated in the application has to be a human being, not a machine. A reasoned decision may be expected in January 2020.

Scope of this Study Question

11) This Study Question is limited to considerations of inventorship of inventions made using AI. Thus, inventorship of AI inventions themselves, *i.e.*, AI algorithms, software to implement AI, and specific AI applications, are outside the scope of this Study Question.

12) The scope of this Study Question may touch upon fundamental legal aspects, such as constitutional law aspects as well as on public policy. However, the focus of the work shall lie on the practical issues relating to inventorship of inventions made using AI.

Previous work of AIPPI

13) The issue of inventorship of inventions made using AI has not been the subject of any dedicated AIPPI Study Question. However, the previous work of AIPPI has indirectly touched upon this topic multiple times.

14) Concerning multinational inventions, in Resolution Q244 – "Inventorship of Multinational Inventions" (Rio de Janeiro, 2015), AIPPI noted that "*A person should be considered a (co-)inventor if they have made an intellectual contribution to the inventive concept. The inventive concept shall be determined on the basis of the entire content of a patent application or patent, including the description, claims and drawings.*" In addition, "*The rule to determine intellectual contribution of an inventor should be consistent regardless of the residency or location of the inventor, their citizenship, the governing law of the employment, or the country in which the intellectual contribution was made.*"

15) At the Sydney Congress in 2017, AIPPI held a panel session titled "The business of IP – Big Data, big issues" partially addressing the topic of inventorship of inventions made using AI. Although the panel session focused on the general challenges and meaning of AI for the global society, issues concerning intellectual property rights that might arise by the use of AI were also considered. Regarding patent law many issues were discussed including whether or not an invention made by AI is patentable; who would own the patent; whether if AI can be an inventor it can also be an infringer; and the related issues of remedies.

16) During the Cancun Congress in 2018, AIPPI held a double-length panel session dedicated to "Artificial Intelligence – the real IP issues" focusing on a general description of the IP issues related to AI.

17) Further, at the London Congress (2019), in connection with the Study Question on "Copyright in artificially generated works", AIPPI resolved that "*AI generated works should only be eligible for protection by Copyright if there is human intervention in the creation of the work and provided that the other conditions for protection are met. AI generated works should not be protected by Copyright without human intervention.*" Furthermore, "*Originality (as interpreted by national laws) of the generated work resulting from the human intervention should be a condition for the protection by Copyright*". Still,

"*AI generated works may be eligible for protection other than Copyright protection (as set forth in the Revised Berne Convention), even without human intervention.*"

18) To assist in gathering information about the impact of AI technologies on intellectual property law and policy, in August 2019, the USPTO published questions related to the impact of artificial intelligence inventions on patent law and policy and asked the public for written comments. Those questions covered a variety of topics, including whether revisions to intellectual property protection are needed. In order to accelerate the ongoing discussion, AIPPI's Standing Committee on IT and Internet contributed responses opinion to the questions asked by the USPTO. The Questionnaire is available here: https://www.federalregister.gov/documents/2019/10/30/2019-23638/request-for-comments-on-intellectual-property-protection-for-artificial-intelligence-innovation. AIPPI's responses are available here: https://aippi.org/wp-content/uploads/2019/11/USPTO_AI_Submission.pdf.

Discussion

19) As a starting point of the discussion, it might be helpful to look into the parallel discussion in copyright law, assessing whether there is any general concept of intellectual property law that can be used as guidance for the inventorship issue.

20) Many jurisdictions, including most continental European countries, are based on the so-called personalistic copyright law approach. Under the personalistic approach, copyright protection inter alia aims to protect the expression of the personality of the author of a work, as reflected by the originality of a work. This doctrine – if taken alone – seems to generally exclude copyright protection for AI-made works, as such works likely lack any expression of personality of a human being.

21) However, based on the Group Reports submitted in the AIPPI Study Question "*Copyright in artificially generated works*" (London, 2019), copyright protection to works created with the assistance of AI is generally available even in those jurisdictions influenced by a personalistic copyright law approach.

22) Moreover, in the Resolution adopted by AIPPI on "*Copyright in artificially generated works*" (London, 2019), AIPPI takes the position that "*AI generated works should only be eligible for protection by Copyright if there is human intervention in the creation of the work and provided that the other conditions for protection are met. AI generated works should not be protected by Copyright without human intervention.*" However, AIPPI also resolved that "*In case of Copyright protection for the work generated by AI, because the requirements set out in 2) (human intervention) and 3) (originality) above have been met, the protection regime should be identical to other works protected by Copyright. This is in particular true for: Economic Rights; Moral Rights (as interpreted by national laws); Term of protection; Exceptions and limitations; Initial ownership.*"

23) Further, the following practical case might be helpful to understand the limitations of the personalistic copyright law approach, as applied in practice. Assume one takes a picture with a camera which has an as yet undiscovered technical defect, so that the final picture looks distorted but yet artistically appealing. In this case, one would attribute authorship (and copyright protection) to the photographer even if the distorted picture does not reflect the photographer's expression at all, but rather the technical properties of the camera.

24) The above shows that the personalistic copyright law approach– as an intellectual property law doctrine – is not per se preventing copyright protection of AI-made (or generally: "machine made") works.

25) Taking the above copyright-based approach as to AI-made works as a preliminary benchmark, an interesting question is whether patent law shows less or more "personalistic aspects" than copyright law. The aim of patent law is to promote investment into and disclosure of technical innovation. Against this background, the question is whether the law assumes that a patentable invention reflects at all the personality of the inventor. One might initially think that the inventive step requirement reflects the personal challenge of the inventor. However, it is generally accepted that the inventive step requirement is purely objective and does not reflect how the invention was effectively made by the inventor. Indeed, it is not even of relevance whether a specific technical teaching was actually invented (based on R&D) or "just" discovered. This rule can be demonstrated e.g. by referring to the "invention" of polytetrafluorethylene (PTFE; commonly known as "*Teflon*"): The "inventor", Mr. *Roy Plunkett* was experimenting with tetrafluoroethylene (TFE) as refrigerants for refrigerators. He forgot to store one of the gas bottles he was experimenting with in the refrigerator and let it stand in the laboratory uncooled. After a couple of days Plunkett took notice of the uncooled gas bottle and noticed that no gas was escaping the gas bottle when opened. He opened the gas bottle by sawing it apart and found the colorless crumbs: Tetrafluoroethylene was polymerized to polytetrafluoroethylene. On 4th of February 1941, Roy Plunkett received the US patent applied for on 1st of July 1939 with the publication number US2230654 A on PTFE.

26) Consequently, one might reach the conclusion that an AI-made invention could be generally patentable like any human-made invention. On the other hand, one might argue that the public policy justifications for the patent system, which include fostering innovation, are not served by granting patents to inventions made in whole or in part by an AI entity.

In view of the above, this Study Question is structured as follows:

I.   Current law and practice (Questions 1 to 7)

II.   Policy considerations and proposals for improvements of your Group's current law (Questions 8 to 11)

III.   Proposals for harmonization (Questions 12 to 19)

You are invited to submit a Report addressing the questions below. Please refer to the 'Protocol for the preparation of Reports'.

Questions

I.   Current law and practice

1)   What are the requirements to be considered an inventor of a patented invention in your jurisdiction? When this Study Question is referring to *"your law"* or *"your jurisdiction"*, please note this is intended to be inclusive of both statutory law and case law.

2)   Assuming valid inventorship, does your law include provisions concerning the *naming* of the inventor of an invention? If yes, please briefly explain.

3)   Does your law, including any regulations or official guidelines, provide any specific guidance or rules on inventorship of inventions made using AI?

4)   Under your law, is it possible for an AI entity to be considered an inventor or co-inventor in a patent application? If yes, please explain.

5) Under your law, is it possible to *name* an AI entity as an inventor or co-inventor in a patent application? If yes, please explain.

6) In connection with a hypothetical patentable invention made using AI, which of the following contributions by one or more human contributors could be considered under your law as being at least co-inventorship of an invention made using AI? In each case, please explain why or why not. Please note this question does not consider inventorship of the AI itself; only inventorship of an invention made using the AI:

   (a) Using AI to design a particular type of product or process, when the resulting patentable invention is of the type of product or process intended (*e.g.*, a car designer who wishes to design a car body might start with a general shape, and then use AI to perfect aerodynamic or other characteristics leading to a patentable invention. Here, AI is being used as a tool to help invent, but the intent for the result lies with the user);

   (b) Using AI to achieve a particular intended goal, when a resulting patentable invention made using the AI is not directly related to that intended goal (*e.g.*, an AI system is developed to go through social media data looking for one thing and then discovers a useful relationship leading to a patentable invention that was not an original objective of the system);

   (c) Designing or contributing to the design of the AI algorithm that is used in (a) or (b);

   (d) Selecting the data or the source of the data that is used to train the AI algorithm used in (a) or (b);

   (e) Generating or selecting the data or the source of the data that is input to the trained AI algorithm used in (a) or (b); and

   (f) Selecting one from a large number of outputs produced by the AI of (a) or (b) and recognizing it to be a patentable invention.

7) Assuming an invention was made using at least a minimum amount of AI contribution during the inventive process at any stage, would this be considered as a red flag under your law leading to an exclusion of the patentability of the invention as a whole? Please briefly explain.

II. Policy considerations and proposals for improvements of your Group's current law

8) According to the opinion of your Group, is your current law regarding inventorship of inventions made using AI adequate? Please briefly explain.

9) According to the opinion of your Group, would recognition of an AI entity as an inventor or co-inventor conflict with the public policy issue of fostering innovation (you may also refer to other general patent law doctrines under your law, if applicable)? Please briefly explain.

10) In your jurisdiction, what is the purpose of *naming* the inventor in the patent application? Does the naming of the inventor in the patent application, if applicable, consider aspects of personal rights under your law, *e.g.*, does it fulfill a reward function for personal effort? Please briefly explain.

11) According to the opinion of your Group, would the recognition of inventorship by an AI entity conflict with or undermine the purpose of *naming* the inventor in the patent application you identified in question 10? Please briefly explain.

III. Proposals for harmonization

Please consult with relevant in-house / industry members of your Group in responding to Part III.

12) Do you consider international harmonization regarding inventorship of inventions made using AI as desirable? Please briefly explain.

    If YES, please respond to the following questions without regard to your Group's current law or practice.

    Even if NO, please address the following questions to the extent your Group considers your Group's current law or practice could be improved.

13) What should be the requirements to be considered an inventor or co-inventor of an invention made using AI?

14) Should an AI entity, for example when considered as an "artificial person", be considered an inventor or co-inventor of an invention made at least in part by contribution from the AI entity assuming the same contribution, if made by a human inventor, would be considered inventorship under applicable patent law?

15) If AI is considered an inventor or co-inventor of an invention made using AI, should it be possible to *name* AI as an inventor or co-inventor in a patent application?

16) In connection with a hypothetical patentable invention made using AI, which of the following contributions by one or more human contributors should be considered under your law as being at least co-inventorship of the invention made using AI? In each case, please explain why or why not. Please note this question does not consider inventorship of the AI itself; only inventorship of an invention made using the AI:

    (a) Using AI to design a particular type of product or process, when the resulting patentable invention is of the type of product or process intended (e.g., a car designer who wishes to design a car body might start with a general shape, and then use AI to perfect aerodynamic or other characteristics leading to a patentable invention. Here, AI is being used as a tool to help invent, but the intent for the result lies with the user);

    (b) Using AI to achieve a particular intended goal, when a resulting patentable invention made using the AI is not directly related to that intended goal (e.g., an AI system is developed to go through social media data looking for one thing and then discovers a useful relationship leading to a patentable invention that was not an original objective of the system);

    (c) Designing or contributing to the design of the AI algorithm that is used in (a) or (b);

    (d) Selecting the data or the source of the data that is used to train the AI algorithm used in (a) or (b);

    (e) Generating or selecting the data or the source of the data that is input to the trained AI algorithm used in (a) or (b); and

(f) Selecting one from a large number of outputs produced by the AI of (a) or (b) and recognizing it to be a patentable invention.

17) If an invention was made using at least a certain level of AI contribution during the inventive process should the invention be excluded from patentability as a whole? If yes, what would be the minimum level of AI contribution to trigger this exclusion? Please briefly explain.

18) Please comment on any additional issues concerning any aspect of inventorship of inventions made using AI you consider relevant to this Study Question.

19) Please indicate which industry sector views provided by in-house counsels are included in your Group's answers to Part III.