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Japan Electronics and Information Technology Industries Association (JEITA)

Patent Committee

Comments on Patenting Artificial Intelligence (AI) Inventions

1. Introduction

First of all, allow us to express our gratitude for your providing us with an opportunity to submit our comments for the public consultation on "Patenting AI Inventions."

We are the Japan Electronics and Information Technology Industries Association ("JEITA"), one of Japan's largest industry organizations, primarily constituted by stakeholders including electronics and information technology (IT) businesses. Our Patent Committee has 21 member companies, of which 12 members are among the top 50 companies in terms of the number of patents granted in the U.S.

AI is a technology that could have such a great impact on many technical fields that it has come to be widely debated whether AI will coexist with humans or replace humans. A number of patent applications have already been filed across the world for AI inventions, and the number is expected to increase further in the future.

Patent issues related to AI inventions (i.e., AI-related technology categorized by us in an arbitrary manner) can be roughly divided into three. The first issue is an invention of AI algorithms that is characterized by, inter alia, AI algorithms themselves and/or learning data. The second issue is an invention of application of AI that utilizes AI as a tool, such as by applying trained models to products and services. In this case, the inventions are characterized by employing inputs and outputs of AI or usage of AI so that such inventions can satisfy the requirements of the patentability of inventions under US patent law. The third issue is an AI-created invention, which means an invention created by an AI independently, or without human intervention and based only on the idea that the AI conceived of (the AI's conception). Among these three types of AI inventions, we consider that the United States Patent and Trademark Office ("USPTO") should extend the protection based on the existing requirements under US patent law so that such inventions of AI algorithms and inventions of application of AI can be properly protected by patents. On the other hand, careful consideration is required at the present moment as to whether or not the scope of patent protection should be expanded by making a major change to the existing requirements and treating AI-created inventions (i.e., the third type of AI invention) as patent-eligible subject matters.

As an aside, the majority opinion among the companies joining JEITA with respect to AI-created inventions is against the idea of giving protection under the current patent system to such

AI-created inventions that are created based only on an AI's conception. On the other hand, some people argue that it is too early to have such discussion, whereas others argue that since AI-created inventions are a major technological trend, an effort should be made to protect these inventions while considering a separate protection framework, rather than putting the brakes on such advancement of technology.

From this standpoint, we would like to make a submission of our comments below, requesting that careful and adequate discussion by the USPTO be held as to how this new technology that has come under the spotlight should be protected and utilized and that the USPTO will develop an appropriate policy and practice for patenting AI inventions.

2. Comments
Regarding Q1

We consider that all the examples of the AI inventions provided by the USPTO can be elements of an AI invention if we leave the question of whether or not an AI invention is a patent-eligible subject matter out of consideration.

AI technology exists in multiple phases including the following.

Data collection

Conversion of the collected data into training data

Training of an AI algorithm

Utilization of the trained AI algorithm

Acquisition of the results obtained by running the AI algorithm

Maintenance (e.g., verification of validity and correction of the trained AI algorithm)

In this regard, we should say that in addition to those cited as examples by the USPTO, other technologies can be elements of an AI invention, such as data augmentation (technology to create a new learning dataset based on one existing learning dataset and thus increasing the volume of learning data), technology to convert raw data into data suitable for learning, and technology to perform maintenance of the trained AI algorithm. However, we consider that it is unclear whether the list of examples given by the USPTO covers these other technologies as elements of an AI invention. Those technologies should be included in the elements of the AI inventions.

As we explained above, we consider that an AI invention covers such wide variations of elements and therefore, it is likely that elements that have not been included in the USPTO's list of examples will possibly come up as a potential AI invention. We consider that study into possible elements of AI inventions should be continued, along with the progress in AI technology.

It is our understanding that the "results of the AI invention through an automated process" cited by the USPTO as one example can be an element of "inventions that are developed by AI," and that "inventions that are developed by AI" include inventions created based only on the AI's

conception. As we will mention in detail with regard to Q3, we consider that the AI's conception can be an element of an AI-created invention, although there is controversy among the companies in JEITA as to whether products created by an AI alone are eligible for patent protection.

Regarding Q2

We consider that all the examples of acts provided by the USPTO can be a contribution to the conception of an AI invention which qualifies a natural person to be named as an inventor. A combination of these examples of acts can also be such contribution.

However, whether each act in the list of examples can actually be evaluated as the contribution due to which the person who performs that act is qualified as an inventor should be determined by fully considering the concept of the invention.

Here is our view of the contribution. For example, in the case of an invention of an AI algorithm, the designer of the algorithm should be named as an inventor of the invention. On the other hand, in the case of an invention of application of AI, if the invention relates to the application of AI to a specific problem and a versatile algorithm (an algorithm that is already known at the time of conception of the invention) is used in the invention, it may not be appropriate to name the designer of the versatile algorithm as an inventor of the invention.

In addition, if the "outcome of the results obtained by running AI" is in itself an invention, a natural person can contribute to the invention by defining the conditions for obtaining the results, designing the AI algorithm, and verifying the results. In this respect, however, the extent of contribution that a natural person is required to make in order to be qualified as an inventor should be carefully verified. Inventions in these categories are created with human intervention or involvement of a natural person, and therefore they are different from AI-created inventions.

As well, in the case of an AI-created invention, we believe that no natural person can be named as an inventor at the present moment because it is created by an AI alone, or without human intervention in the conception of the invention.

Regarding Q3

We express our opinion below based on the recognition that an "entity or entities other than a natural person" is a concept that includes AI.

There may be three ways in which AI contributes to the conception of an invention: (1) a natural person uses AI as a tool when conceiving of the invention (an invention of an AI algorithm or invention of application of AI); (2) both a natural person and AI jointly conceive of the invention; and (3) an AI conceives of the invention independently (an AI-created invention). Of these, we believe that the first and second cases do not require any revision to current patent laws and regulations because a natural person who has contributed to the conception of the invention

can be named as an inventor.

On the other hand, in the third case concerning an AI-created invention, if the AI would be allowed to be named as an inventor and the product created by the AI would be recognized as an invention that is eligible for patent protection, we would express concern over too many patents being granted which could generate patent thickets and cause confusion in industrial activities. For this reason, the majority opinion is against the idea of giving patent protection to products created by an AI alone.

Looking at the definition of the term "inventor" provided in Section 100, an AI cannot be an inventor under the current patent law because it is not an "individual." Therefore, we consider that the definition of the term "inventor" under the current patent law need not be revised.

Meanwhile, an AI-created invention is assumed as an invention created without human intervention, and the "outcome of the results obtained by running an AI" would no longer be an AI-created invention if there is any human intervention. Accordingly, there is a view among the companies in JEITA that the "outcome of the results obtained by running an AI" should be protected by recognizing the natural person who has intervened in the creation of the invention as an inventor.

With regard to the issue of the degree of human intervention required as an inventor's contribution, we consider that, not only inventors of patent inventions, but also the creators of designs created by running an AI and the authors of works created by running an AI should be considered in the same manner.

There is also a view among the companies in JEITA that this issue should be discussed with regard to protection of AI-created inventions created without human intervention, as long as it would not cause any confusion to industrial activities.

Regarding Q4

We consider that it is not good idea to allow a person who trains an AI to be an owner of an invention created by the AI. For example, it may be possible that a company trains an AI model and sells the trained model to other companies. In such a case, it is fair to say that, if the purchaser company creates a new invention by using the trained model, the seller company would be an owner of the new invention. This could interfere with smooth conduct of business operations and therefore it should be avoided.

In reality, a "company" does not by itself train an AI. However, if an employee of a company trains an AI and makes sufficient contribution to the conception of an invention, the employee can be named as an inventor by reason of such human intervention. In this case, the company can be an owner of the "outcome of the results obtained by running an AI" according to, for example, an agreement between the company and the employee.

Regarding Q5

We consider that basically, the patent eligibility of AI inventions is not different from that of software-related inventions, so there are no patent eligibility considerations unique to AI inventions. Accordingly, AI inventions should be treated in the same manner as software-related inventions in general when determining patent eligibility.

Regarding Q6 and 7

The applicability of the disclosure rules (Q6 and 7) to AI inventions can be determined in a similar manner to software-related inventions.

If an AI invention is characteristic for the use and execution of an AI algorithm rather than the algorithm itself, the criterion for applying the written description requirement would be a point of consideration. If the written description requirement is deemed to be satisfied by a specification which does not provide a sufficient explanation of an AI algorithm, this could lead to patenting an invention which merely expresses a desire or an invention whose feasibility is uncertain. It may be desirable that a patent specification should describe the process of machine learning as well as teaching data and inputs/outputs specifically so that a person of ordinary skill in the art can carry out the invention, if the person is unable to understand the algorithm.

In more detail, a patent applicant may be more likely to be motivated to minimize (put into a "black box") the content of an explanation of an AI algorithm which is not a characteristic element of an AI invention, for fear that it would be more difficult to prove infringement or it would be easier to design around the patent depending on how the algorithm is explained (that is, for fear that protection for the invention would be diminished due to the description of an element that is not a characteristic of the invention). However, if such "black box" practice is adopted without control, an invention which merely expresses a desire or an invention whose feasibility is uncertain would be patented, making it difficult to properly secure patent clearance for third parties.

On the other hand, requiring too detailed explanation on an AI algorithm could result in an unreasonable consequence in that an AI invention, which is characteristic for the inputs of data to the algorithm and the use of outputs obtained thereby, would not be patented due to the explanation of an element that is not a characteristic of the invention.

The extent of an explanation of an AI algorithm that is required to be provided in a patent specification in order to satisfy the written requirement description may be a point of consideration unique to an invention characterized by the use of an AI algorithm.

In this respect, we consider that it may not be always necessary to go into detail and explain the internal structure of an AI algorithm or the algorithm of machine learning. However,

inventions that merely express desires should not be patented. Therefore, it may be desirable that in a case where a person of ordinary skill in the art is unable to understand an AI algorithm, the patent specification should describe the process of machine learning as well as teaching data and inputs/outputs specifically by providing an embodiment such as "learning model consisting of pairs of inputs and outputs is produced using multiple teaching datasets," so as to help the person understand the algorithm. For example, given that performing a task based on a feedback signal is a means that is commonly employed in the field of control engineering, if an AI invention that inputs a signal of a control device processes signals using an AI algorithm, but both a person of ordinary skill in the art of AI and a person of ordinary skill in the art of control engineering are unable to understand the algorithm, it may be impossible for them to see whether the invention is feasible unless at least the correlation between inputs and outputs and the effect of the invention are described in a patent specification.

In any case, whether or not it is appropriate to revise the written description requirement especially for AI inventions should be determined flexibly in light of the characteristics of AI inventions, while going back to the principle as to whether or not the description of an AI invention is clear and sufficient to the extent that it enables a person of ordinary skill in the art to carry out the invention.

In the case of an invention developed by an AI, there would be a higher risk of poor explanation of the effect or basis of the invention because an AI, not a human, is involved in the conception of the invention. Therefore, we consider that in the examination of an invention developed by an AI, more careful consideration should be given to whether the explanation of the effect or basis of the invention is sufficiently disclosed.

Regarding Q8

We consider that AI could impact the level of a person of ordinary skill in the art because the use of AI can improve the person's capability to develop and search remarkably. In the future, the state of the art of AI should be taken into consideration while assessing the level of a person of ordinary skill in the art.

Regarding Q9

In principle, we consider it appropriate to determine prior art for AI inventions according to the same criteria as the current criteria applied to software-related inventions. However, we find practical problems regarding the criteria for prior art to be applied in the examination of AI inventions.

For example, we request that the USPTO avoid simply determining obviousness of an invention created by applying AI to a technology in a given field on the grounds that AI can be

applied in various fields.

At the same time, we also request that the USPTO avoid easily finding an invention created by applying AI to a technology in the field of agriculture to be non-obvious just because AI is applied, although such invention may appear to be novel or non-obvious in light of only the state of the art in this field where knowledge of AI is scarce.

Therefore, in the examination of AI inventions, due consideration should be given to the nature and characteristics of inventions created by applying AI.

Recently, AI that can produce prior art references has been developed, but some of those references produced by AI may be nothing more than random combinations of existing technologies. Whether such references can be treated as prior art references should be carefully considered.

Regarding Q10

At present, we do not have any specific proposal of new forms of intellectual property protection. However, it may be advisable to make better use of the current forms of intellectual property protection, such as protecting AI inventions as copyrighted works or trade secrets depending on the content of AI technologies involved. We propose to consider this issue by collecting opinions and proposals from experts and other related persons dealing with different types of intellectual property.

Regarding Q11

How to examine novelty (Section 102) and non-obviousness (Section 103) of AI inventions may be another issue that needs to be considered in relation to patenting AI inventions.

Although this is not a serious issue that may arise during the examination process, we would say that novelty and non-obviousness of AI inventions can basically be determined in a similar manner to software-related inventions. For example, in the case of an AI invention which is characteristic for the use and execution of an AI algorithm rather than the algorithm itself, it may be possible to say that a person of ordinary skill in the art is able to carry out the invention even if the written description requirement is eased to some degree with regard to the part of the patent specification concerning the AI algorithm. However, considering that the AI algorithm is not more characteristic than other elements of such AI invention, consideration to the AI algorithm itself should be decreased in the process of determining novelty and non-obviousness.

We request that the USPTO develop guidelines for patent examiners and disclose them to applicants, with a focus on how AI inventions should be examined under the existing examination guidelines in order to ensure transparency and predictability of the examination results, including the issue mentioned above.

We are also concerned that it would be more difficult to identify the inventor along with the advancement of inventions created by AI. In this respect, we hope that the USPTO will carefully consider the existence and extent of contribution by a natural person to the creation of an AI invention, in addition to the possibility of misappropriated applications. We request that the USPTO fully discuss the standard extent of contribution that a natural person is required to make in order to be qualified as an inventor.

Regarding Q12

The following references may be helpful.

● JPO, *Recent Trends in AI-related Inventions – Report* (July 2019)

https://www.jpo.go.jp/system/patent/gaiyo/sesaku/ai/document/ai_shutsugan_chosa/hokoku.pdf

● JPO, *Additional Case Examples Pertinent to AI-Related Technology*, January 30, 2019

https://www.jpo.go.jp/system/laws/rule/guideline/patent/document/ai_jirei/jirei_tsuika.pdf

● JPO, *Points of Revision of the Examination Guidelines and Examination Handbook Regarding Computer Software-Related Inventions*, March 30, 2018

https://www.jpo.go.jp/system/laws/rule/guideline/patent/document/ai_jirei/h30_software_hb_ka itei_point.pdf

● JPO, *Comparative Study on Computer Implemented Inventions/Software Related Inventions* [English], 2018

https://www.jpo.go.jp/news/kokusai/epo/document/software_201903/01_en.pdf

● EPO, *Guidelines for Examination in the European Patent Office*, November 2018
Guidelines, Part G-Patentability, Chapter II-Inventions, 3. List of exclusions, 3.3
Guidelines, Part F: European Patent Application, Chapter IV: Claims (Art.84 and formal requirement), 3. Kinds of claim, 3.9 Claims directed to computer-implemented inventions, 3.9.3

https://www.epo.org/law-practice/legal-texts/guidelines.html

3. Others

3-1.

The use of AI inventions, combined with 5G wireless telecommunication technology and/or big data, is extending not only to the technical fields of information processing such as image recognition but also to many other technical fields, including the medical and agricultural fields. The patentability of AI inventions would be less predictable for potential patent applicants if patent examination guidelines would be applied from invention to invention, depending on the technical field. To avoid this, we ask for consideration so that the uniform examination guidelines will be applied to inventions even in different technical fields.

3-2.

In the United States, an invention consisting of an abstract idea and containing no inventive concept is rejected under Section 101 (the U.S. Supreme Court's decision on Alice v. CLS Bank Case). In Europe, an invention is more strictly required to be intended to solve an objective technical problem, and therefore, an element concerning convenience for users is not regarded as meeting the requirement of that jurisdiction. Thus, examination guidelines for AI inventions differ among jurisdictions, so we hope that the USPTO will encourage other jurisdictions to work on harmonization in order to promote international protection of AI inventions.

We also request that the USPTO promote international harmonization of policies as to the necessity of protection of AI-created inventions and the treatment of inventors of AI, for these issues could have an influence on not only the United States but also other jurisdictions.

3-3.

To close our comments, we would like to point out that AI can take various forms such as machine learning, neural networks, and deep learning and that the methods of examination of AI inventions may differ depending on the form. In addition, seeing that elements of an AI invention are referred to in Q1, we presume that the definition of an AI invention will be changed based on the submitted comments. Therefore, we would greatly appreciate it if the USPTO, when giving feedback on the submitted comments or revising the examination guidelines, could indicate the definition of "AI" or "AI invention" as clearly as possible, which will promote users' understanding.

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