

**Tambourine Innovation Ventures' comments
on the**

**WIPO DRAFT ISSUES PAPER ON INTELLECTUAL PROPERTY POLICY AND
ARTIFICIAL INTELLIGENCE**

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Our comments are highlighted in yellow.

PATENTS

Issue 1: Inventorship and Ownership

1. In most cases, AI is a tool that assists inventors in the invention process or constitutes a feature of an invention. In these respects, AI does not differ radically from other computer-assisted inventions. However, it would now seem clear that inventions can be autonomously generated by AI, and there are several reported cases of applications for patent protection in which the applicant has named an AI application as the inventor.

2. In the case of inventions autonomously generated by AI:

(i) Should the law permit or require that the AI application be named as the inventor or should it be required that a human being be named as the inventor? In the event that a human inventor is required to be named, should the law give indications of the way in which the human inventor should be determined, or should this decision be left to private arrangements, such as corporate policy, with the possibility of judicial review by appeal in accordance with existing laws concerning disputes over inventorship? **The law should require that a human being be named as the inventor. The law should not give indications of the way in which the human inventor should be determined – this should be left to private arrangements, with a possibility of judicial review.**

(ii) The inventorship issue also raises the question of who should be recorded as the owner of a patent involving an AI application. Do specific legal provisions need to be introduced to govern the ownership of autonomously generated AI inventions, or should ownership follow from inventorship and any relevant private arrangements, such as corporate policy, concerning attribution of inventorship and ownership? **Ownership should follow from inventorship and any relevant private arrangements.**

(iii) Should the law exclude from the availability of patent protection any invention that has been generated autonomously by an AI application? See also Issue 2, below. **See our detailed comments below**

TIV comments

Patenting of AI Inventions

Patents are exclusive rights granted to new inventions. They can help attract investment and licensing. In exchange for granting an inventor exclusive rights, patent offices publish successful patent applications, revealing the technical details of each new technology.

AI patents fall into two general categories. Those that use AI for a specific application such as autonomous driving cars, image recognition, and data analysis to name a few, and those that recite novel AI algorithms, such as supervised learning techniques in neural networks. Both types of AI patents face unique challenges under the current landscape of software patents. It remains to be seen how enforceable these patents will be 10 years from now.

AI as an Inventor

Under U.S. law, inventorship is the first point of analysis for determining patent ownership. Identifying what contributed to the development of an AI-related patent for the purposes of determining whether someone was an “inventor” will probably happen more frequently. Although drawing the inventorship line may be complicated, the legal analysis substantially follows the legal touchpoints currently applied to other complex technologies.

US patent law (35 U.S. Code Article 101) explains who may obtain a patent and what constitutes a patentable invention: “Whoever invents or discovers any new and useful process, machine, manufacture or composition of matters, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.”

Section 100(f) of the Patent Act, 35 U.S.C.A. § 100(f) defines “inventor”. US patent laws take only human inventors into account, defining an “inventor” as “the individual or, if a joint invention, the individuals collectively who invented the subject matter of the invention”. According to the U.S. Supreme Court, Congress intended statutory subject matter to “include anything under the sun that is made by man”.

As AI develops, however, the patent bar may be confronted with another type of inventorship analysis that may be outside of the scope of current U.S. law: Is AI a “subject”? What if an AI-enabled machine invents something? What if an AI algorithm—without any human intervention—develops a new drug, a method of recognizing diseases in medical images, or a new blade shape for a turbine?

The current law is unable to answer hypothetical situation when for instance AI program is developed by Company A that then sells it to Company B, which operates the AI program on cloud computing servers owned by Company C. Company B also obtains data used to train the AI system from Company D. After training, an invention is produced by the AI system. The main issue that cannot be answered with great clarity by current legal system is who will be considered the inventor in this case. In order to qualify as a joint inventor, one must contribute to the conception of the claimed invention in a way that is not insignificant in quality, when the contribution is measured against the dimension of the full invention. It could be argued that Company B, that owns the AI program, and Company D, that provided the training data, contributed significantly to the development of the invention. Unless there are contractual considerations, Companies A and C might also claim to be inventors because they produced or operated the AI that created the invention. However, their contributions might be dismissed as being merely that of the toolmaker and the technician as opposed to that of the inventor that selected the AI tool and directed the technician’s application of ordinary skill. Another issue that

needs to be taken into consideration is the impact if the training data is taken from the Internet or social media. If the AI scrapes a personal website and that data leads to the invention, the owner or provider of the site content might also claim inventorship.

Recently, both Google and Facebook have seen AI develop its own language to perform assigned tasks, eschewing known languages in favor of a more efficient means of communication. Thus, it is more and more likely that AI will be the entity taking the inventive step, drawing new conclusions between the observed and the unknown. Current AI systems develop their own code as a result of the system's training. If that is the case, the patent offices and the courts around the globe will have to decide on the list of possible human inventors. This might include the AI software and hardware developers, the experts who provided the data set with known values or otherwise provided input into the development of the AI, and/or those who reviewed the AI results and recognized that an invention had been made.

Similarly, the question of ownership for inventions generated by the AI itself gets complicated. Patent ownership often turns on the question of inventorship (followed by assignment), and thus will be equally complicated when AI develops its own code and conceives its own inventions. Given that AI continues to advance after its initial programming, the question of inventorship and ownership may have to be answered years after the initial system programming. Development, assignment, and employment contracts will have to account for this possibility of continued and ongoing AI invention.

A more fundamental problem is that the state of the art is nowhere near general artificial intelligence, so AI cannot be considered truly the inventor in most of the cases. It's far more common for businesses to talk about "computer-assisted innovation." Under the current circumstances, AI cannot be considered a legal person and be granted a status of subject that can acquire inventorship. Being an inventor comes with certain responsibilities. If AI gains legal personhood, it should be also able to enter into contracts, authorize licenses and file lawsuits. They can do none of those things. A few years ago, policymakers in the European Union discussed creating a category of "electronic personality," but that initiative was not successful in part because of these practical considerations.

However, if humans cannot be listed as inventors because they have not made substantial contribution to the invention, and the AI cannot be listed as an inventor either, then the invention may not be patentable at all. This could disincentivize and prevent companies from investing money in AI technologies and prevent breakthroughs in important areas like drug discovery.

For the time being, AI is likely to be considered a tool rather than an inventor for the foreseeable future. In the future, it is possible that the law will evolve to create a new patent-like right that takes into account AI contribution, so that innovation and R&D do not get stifled.

Issue 2: Patentable Subject Matter and Patentability Guidelines

3. Computer-assisted inventions and their treatment under patent laws have been the subject of lengthy discussions in many countries around the world. In the case of AI-generated or -assisted inventions:

- (i) Should the law exclude from patent eligibility inventions that are autonomously generated by an AI application? See also Issue 1(iii), above. The state of the art is nowhere near general artificial intelligence, so AI cannot be considered truly the inventor in most of

the cases. In order not to stifle AI innovation, the law should not exclude from patent eligibility inventions that are “computer-assisted”.

(ii) Should specific provisions be introduced for inventions assisted by AI or should such inventions be treated in the same way as other computer-assisted inventions? They should be treated the same way as other computer-assisted inventions.

(iii) Do amendments need to be introduced in patent examination guidelines for AI-assisted inventions? If so, please identify which parts or provisions of patent examination guidelines need to be reviewed. The current examination guidelines regarding AI-assisted inventions, as explained below, do not need to be changed. The patent prosecution practice will need to evolve and adjust to fulfill the requirements for patent-eligibility of AI-assisted inventions, and devise adequate patent prosecution strategies..

Patent-Eligible Subject Matter in AI inventions

For companies developing and seeking to protect their investments in AI innovation through IP, the current status of the law presents several hurdles. One of the fundamental challenges with respect to protecting AI technology with patents involves claiming subject matter that is patent eligible.

Under Section 101 of the Patent Act, 35 U.S.C.A. § 101, the subject matter of a patent claim must be directed to a “process, machine, manufacture or composition of matter.” However, the U.S. Supreme Court held in *Diamond v. Diehr*, 450 U.S. 175 (1981), that claims directed to nothing more than an abstract idea, such as a mathematical algorithm, or to natural phenomena or a law of nature are not eligible for patent protection. The technology underlying AI is generally based on computer programming or hardware implementing mathematical models, deep learning algorithms or a neural network. An improperly drafted patent application directed to AI may fall within this judicially recognized exception to patent-eligible subject matter.

Abstract ideas, laws of nature, and natural phenomena are considered basic tools of scientific and technological work and thus are patent ineligible. If these tools were monopolised by granting patent rights, this might impede innovation rather than promote it. In light of this, the US Supreme Court has established a two-prong test for identifying patentable inventions in the landmark *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* case.¹ According to this test, courts must first determine whether the claim at issue is directed at a ‘patent-ineligible concept’ (an abstract idea, a law of nature or a natural phenomenon).² If the claim is directed at a ‘patent-ineligible concept,’ the court must then examine the elements of the claim to determine whether the claim contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a ‘patent-eligible application.’³ The second prong of the test will be satisfied if a claim includes ‘additional features’ to ensure ‘that the claim is more than a drafting effort designed to monopolize the abstract idea.’⁴

In *Alice Corp. v. CLS Bank International*, 134 S. Ct. 2347 (2014), the Supreme Court provided the framework for determining “whether the claims at issue are directed to a patent-ineligible concept.” If the claims are, then the elements of all claims must be examined “to determine whether [they contain] an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea

¹ *Mayo Collaborative Services v. Prometheus Laboratories, Inc.* (2012), 566 U.S. 66, available at: <https://supreme.justia.com/cases/federal/us/566/66/>.

² Laws of nature are not patent eligible, nor are processes that recite a law of nature, ‘unless that process has additional features that provide practical assurance that the process is more than [an attempt] to monopolize the law of nature itself.’ *Ibid.*, at 8-9.

³ *Ibid.*, at 3 and 9.

⁴ *Ibid.*, at 8-9.

into a patent-eligible application.” Based on the Mayo two-step test for determining patent eligibility, the Alice decision has reiterated the requirement that, in order to be patent-eligible, the software-related claims must contain an element that amounts to ‘significantly more’ than the abstract computer program. Generic computer implementation of an otherwise abstract process does not qualify as ‘significantly more’, as defined by the Mayo two-step test. Under the second step, when scrutinizing the patent eligibility of computer programs, the court has to inquire whether the patent claim includes any element, or a combination of elements, that are sufficient to ensure that the claim amounts to significantly more than an abstract computer program. However, the Supreme Court did not define what an abstract idea is. Thus, the subsequent jurisprudence had to struggle with defining the concept of an ‘abstract idea’ under the two-step test devised by the Supreme Court in Mayo and Alice.

Following *Mayo* and *Alice*, the USPTO has directed examiners to apply a two-part test to determine whether a patent claim contains an abstract idea, a law of nature or a natural phenomenon, and if it does, whether any element, or a combination of elements, in the claim is sufficient to ensure that the claim amounts to significantly more than an abstract idea. Thus, examiners would need to look into whether there were other limitations in the claims that showed a patent-eligible application of the abstract idea. In other words, examiners are required to analyse if the claims are more than a mere instruction to apply the abstract idea.⁵ Patent examiners have rejected claims directed to AI algorithms under Section 101 on the basis that the concept claimed is a certain method of human activity and is similar to claims that courts have deemed an abstract idea. Because the goal of AI is often to replicate human activity, the challenge practitioners face is rooted in how to claim AI to make it patent eligible.

The decisions of the US Court of Appeals for the Federal Circuit that ensued after *Alice*, have additionally clarified the requirements related to patent eligibility of computer-implemented inventions. For example, in *Enfish, LLC v Microsoft Corp*, the Federal Circuit held that the claims in question were not an abstract idea ‘because the claims were directed at a particular improvement in the computer’s functionality.’⁶ In a similar fashion, the Federal Circuit’s decision in *Amdocs (Israel) Ltd v Openet Telecom, Inc*⁷ clarified that patent eligibility may be found from generic computer components working together in an unconventional manner to solve a technological problem. In both cases, the Federal Circuit held that claims directed at causing a specific improvement to the way computers operate, or causing computers to operate in unconventional ways to achieve an improvement in functionality, could be considered as elements amounting to ‘significantly more’ than an abstract idea.

Patent eligibility rules: the European Patent Office perspective

The main principle that governs patentable subject matter of computer-implemented inventions and business methods at the EPO and under the European Patent Convention (the ‘EPC’)⁸ was established by the EPO Board of Appeal in its landmark decision *T0641/00 (COMVIK)*,⁹ where the EPO Board held:

‘An invention consisting of a mixture of technical and non-technical features and having technical character as a whole is to be assessed with respect to the requirement of

⁵ Morse, Barnes-Brown & Pendleton, *supra* note 18.

⁶ *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir.) (2016), available at: <http://www.cafc.uscourts.gov/sites/default/files/opinions-orders/15-1244.Opinion.5-10-2016.1.PDF>.

⁷ *Amdocs (Israel) Ltd v Openet Telecom, Inc*, *supra* note 20.

⁸ The European Patent Convention, available at: <https://www.epo.org/law-practice/legal-texts/epc.html>.

⁹ EPO Boards of Appeal, *T 0641/00 (Two identities/COMVIK)* (2002), available at: <https://www.epo.org/law-practice/case-law/appeals/pdf/t000641ep1.pdf>.

inventive step by taking account of all those features which contribute to said technical character whereas features making no such contribution cannot support the presence of inventive step.¹⁰

Article 52(1) of the EPC stipulates that patents will be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application. An invention is held to involve an inventive step if it is ‘not obvious to the skilled person in the light of the state of the art.’¹¹ The inventive step requirement is intended to prevent exclusive rights, such as patent rights, acting as barriers to normal and routine research and development.¹² In evaluating the inventive step, the EPO uses the ‘problem-solution’ approach, i.e., whether the solution presented to the problem in the patent application is obvious or not to the person skilled in the art. Depending on the specifics of the case, different factors are taken into account, such as the unexpected technical effect of a new combination of known elements, the choice of specific process parameters within a known range, the difficulty the skilled person has in combining known documents, fact that the invention solves a long-standing technical problem which there have been many attempts to solve, or the overcoming of a technical prejudice.¹³

According to Article 52(2) of the EPC, the following are not considered inventions and are excluded from patentability: (a) discoveries, scientific theories and mathematical methods; (b) aesthetic creations; (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programmes for computers; and (d) presentations of information.¹⁴

As an illustrative example, an element would be considered non-technical, and thus unpatentable, if it were related exclusively to a mathematical method. For instance, it can be assumed that any AI application that enables a FinTech solution is based on a mathematical model. Following this line of reasoning, any FinTech invention whose main enabler is an AI application might be excluded from patentability, based on the assertion that the AI application is directed at a mathematical model *per se*. In order to clarify matters and avoid a situation where all FinTech inventions that rely on AI applications are deemed patent-ineligible, the new EPO Guidelines for Examination provide further guidance regarding patentability of AI inventions.¹⁵ Under the EPO Guidelines, computer programmes, if claimed as such, are excluded from patentability under EPC Article 52(2)(c) and (3). However, this exclusion does not apply to computer programmes having a technical character. In order to have a technical character and be patent eligible, a computer programme must produce a ‘further technical effect’ when run on a computer, i.e., a technical effect going beyond the ‘normal’ physical interactions between the programme (software) and the computer (hardware) on which it is run. The normal physical effects of the execution of a programme (for example, the circulation of electrical currents in the computer), are not *per se* sufficient to confer technical character to a computer programme.¹⁶

¹⁰ *Ibid.*, at 1.

¹¹ The European Patent Convention, Article 56.

¹² EPO: *Guide for applicants: How to get a European patent*, available at: https://www.epo.org/applying/european/Guide-for-applicants/html/e/ga_b_iii.html

¹³ *Ibid.*

¹⁴ The European Patent Convention, *supra* note 24, Article 52.

¹⁵ EPO: *Guidelines for Examination* (November 2018), available at: https://www.epo.org/law-practice/legal-texts/html/guidelines2018/e/g_ii_3_3.htm.

¹⁶ EPO Boards of Appeal, *T 1173/97* (Computer program product) of (1 July 1998), available at: <https://www.epo.org/law-practice/case-law-appeals/recent/t971173ep1.html#g>; see also EPO Boards of Appeal, *G 0003/08* (Programs for computers) (12 May 2010), available at: <https://www.epo.org/law-practice/case-law-appeals/recent/g080003ex1.html>.

The EPO has devised a ‘two-step’ approach for analysing patent eligibility of computer-implemented inventions. The first step has a rather low threshold, and requires the proposed invention to be of a technical character, i.e., it must show a technically skilled person how to solve a technical problem using technical solutions. The problem solved by the invention must be technical, and not of a purely financial, commercial or mathematical nature. The requirements of this step can be fulfilled by amending the patent claim from a method that is based on the performance of a machine learning algorithm to a computer-implemented method.

This reasoning is based on the decision in *T1227/05 (INFINEON)*, in which a mathematical method for generating random numbers according to a specific distribution was found to be technical. Specifically, the Board of Appeal was persuaded that ‘simulation of a circuit subject to 1/f noise constituted an adequately defined technical purpose for a computer-implemented method, provided that the method is functionally limited to that technical purpose.’¹⁷ The technical purpose of the method is determined by the direct technical relevance of the results of the mathematical method, and not by the nature of the data input into the method.¹⁸ Patent claims might also include a mix of technical and non-technical features, and all features contributing to the technical character should be taken into account.

If the invention has not satisfied the requirements of the first step, the second step (i.e., inventive step) must be satisfied. The presence of an inventive step may only be supported by those features of the claimed invention that contribute to its technical character, i.e., those features that provide a technical solution to a technical problem. There must be a non-obvious technical contribution over the prior art.¹⁹ Thus, the threshold for the second step is higher than for the first step, as it requires a technical contribution to the inventive step. For instance, a mathematical method may contribute to the inventive step if it is applied to a specific technical problem, such as image processing. Another example of satisfying the second step would be claiming a specific technical implementation of a mathematical method that has been adapted to run on a particular hardware configuration.²⁰

Issue 3: Inventive Step or Non-Obviousness

4. A condition of patentability is that the invention involves an inventive step or be non-obvious. The standard applied for assessing non-obviousness is whether the invention would be obvious to a person skilled in the relevant art to which the invention belongs.

(i) In the context of AI inventions, what art does the standard refer to? Should the art be the field of technology of the product or service that emerges as the invention from the AI application?

(ii) Should the standard of a person skilled in the art be maintained where the invention is autonomously generated by an AI application or should consideration be given to replacing the person by an algorithm trained with data from a designated field of art?

¹⁷ EPO Boards of Appeal, *T 1227/05 (Circuit simulation I/Infineon Technologies)* (2006), available at: <https://www.epo.org/law-practice/case-law-appeals/recent/t051227ep1.html>, ¶3.1.

¹⁸ See Marks & Clerk: *Patenting AI: the EPO's new guidelines* (2 October 2018), available at: <https://www.lexology.com/library/detail.aspx?g=4459673e-4c34-41bc-8459-6fc336ff0d53>.

¹⁹ Prior art is any evidence that your invention is already known. See EPO: *What is prior art?*, available at: <https://www.epo.org/learning-events/materials/inventors-handbook/novelty/prior-art.html>.

²⁰ See Marks & Clerk, *supra* note 35.

- (iii) What implications will having an AI replacing a person skilled in the art have on the determination of the prior art base?
- (iv) Should AI-generated content qualify as prior art?

Issue 4: Disclosure

5. A fundamental goal of the patent system is to disclose technology so that, in the course of time, the public domain may be enriched and a systematic record of humanity's technology is available and accessible. Patent laws require that the disclosure of an invention be sufficient to enable a person skilled in the relevant art to reproduce the invention.

- (i) What are the issues that AI-assisted or AI-generated inventions present for the disclosure requirement?
- (ii) In the case of machine learning, where the algorithm changes over time with access to data, is the disclosure of the initial algorithm sufficient?
- (iii) Would a system of deposit for algorithms, similar to the deposit of microorganisms, be useful?
- (iv) How should data used to train an algorithm be treated for the purposes of disclosure? Should the data used to train an algorithm be disclosed or described in the patent application?
- (v) Should the human expertise used to select data and to train the algorithm be required to be disclosed?

Issue 5: General Policy Considerations for the Patent System

6. A fundamental objective of the patent system is to encourage the investment of human and financial resources and the taking of risk in generating inventions that may contribute positively to the welfare of society. As such, the patent system is a fundamental component of innovation policy more generally. Does the advent of inventions autonomously generated by AI applications call for a re-assessment of the relevance of the patent incentive to AI-generated inventions. Specifically,

- (i) Should consideration be given to a sui generis system of IP rights for AI-generated inventions in order to adjust innovation incentives for AI?
- (ii) Is it too early to consider these questions because the impact of AI on both science and technology is still unfolding at a rapid rate and there is, at this stage, insufficient understanding of that impact or of what policy measures, if any, might be appropriate in the circumstances?

COPYRIGHT AND RELATED RIGHTS

Issue 6: Authorship and Ownership

7. AI applications are capable of producing literary and artistic works autonomously. This capacity raises major policy questions for the copyright system, which has always been intimately associated with the human creative spirit and with respect and reward for, and the encouragement of, the expression of human creativity. The policy positions adopted in relation to the attribution of copyright to AI-generated works will go to the heart of the social purpose for which the copyright system exists. If AI-generated works were excluded from eligibility for copyright protection, the copyright system would be seen as an instrument for encouraging and favoring the dignity of human creativity over machine creativity. If copyright protection were accorded to AI-generated works, the copyright system would tend to be seen as an instrument favoring the availability for the consumer of the largest number of creative works and of placing an equal value on human and machine creativity. Specifically,

- (i) Should copyright be attributed to original literary and artistic works that are autonomously generated by AI or should a human creator be required?
- (ii) In the event copyright can be attributed to AI-generated works, in whom should the copyright vest? Should consideration be given to according a legal personality to an AI application where it creates original works autonomously, so that the copyright would vest in the personality and the personality could be governed and sold in a manner similar to a corporation?
- (iii) Should a separate sui generis system of protection (for example, one offering a reduced term of protection and other limitations, or one treating AI-generated works as performances) be envisaged for original literary and artistic works autonomously generated by AI?

AI Copyright Ownership Issues

An omnipresent issue across copyright practices in the world is the possibility of a non-carbon based lifeform capable of a conscious step to create literary and artistic works to acquire the copyright of one such work. Currently, laws governing copyright recognize only natural persons as authors, thus acquiring both the economic and moral rights that come with it. An example of such a practice can be seen in the United States with the US Copyright Office's announcement that it "will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author".²¹

AI works cannot be distinguished by human creations, therefore, when judging from the features of the work there should be no difference between AI and human creations. However, when we consider that copyright protection is afforded to the author's own intellectual creation which is the result of the choice, sequence and combination realized by the author, the question of

²¹ U.S. Copyright Office, The Compendium of U.S. Copyright Office Practices § 306 (3d ed. 2014); see also U.S. Copyright Office, The Compendium of U.S. Copyright Office Practices § 202.02(b) (2d ed. 1984), available at <http://copyright.gov/history/comp/compendium-two.pdf> ("The term 'authorship' implies that, for a work to be copyrightable, it must owe its origin to a human being.") The 2014 iteration of the Human Authorship Requirement was partially the result of a prominent public discourse about non-human authorship stemming from the "Monkey Selfies." See *Naruto v. Slater*, No. 3:2015-cv-04324, 2016 WL 362231, *1 (N.D. Cal. Jan. 23, 2016). While there have not yet been cases tackling this unique issue of inventorship, scholars have begun to take notice and weigh in. See, e.g., Ben Hattenbach, Joshua Glucoft, Patents in an Era of Infinite Monkeys and Artificial Intelligence, 19 *Stan. Tech. L. Rev.* 32 (2015); Ryan Abbott, I Think, Therefore I Invent: Creative Computers and the Future of Patent Law, 57 *B.C. L. Rev.* 1079 (2016)

creation arises. Granting protection through copyright is dependent on the conscious steps taken by a person to be involved in the authorship of a work. Currently, AI lacks the conscience and will that are prerequisites for authorship. Hence, AI works cannot qualify for copyright protection under this requirement yet.

Vesting Copyrights to AI-Generated Works

Presently, AI systems may be granted copyright protection available for original software. However, it only extends to the original expression of the computer program and not to the ideas and principles which underline it. This means that only the code of the algorithm once it is proven to be original can be protected, while the pure concept behind it cannot.

There are two possible justifications in the recognition of legal protection and the grant of exclusive rights for AI-generated works. The first being personality-related, under which it is only possible to find a human creator in the software that constitutes the initial input to the creation of an AI, but not in any of the machine-generated outputs, as they do not qualify as works under copyright laws.²² The first attempt made in this regard, can be found in the UK, where the concept of computer authorship is regulated in the following manner: “if the work is computer generated the author will be the person by whom the arrangements necessary for the creation of the work are undertaken”. This definition is sufficient when an engineer designs a simple algorithm and actively inputs a given set of data with the express purpose of eliciting creation of a new computer program. However, how do you stretch this wording for more complex scenarios that involve multi-faceted models capable of learning and expanding their input and output without human supervision? What happens when we reach a point where human “arrangement” is many steps removed, and perhaps not capable of being traced? This further impacts questions of ownership, responsibility and accountability. The second justification would be related to the economic aspect of the work. The focus in this case would gravitate around the protection of the investment and the need to avoid “market failure” in the absence of legal exclusivity.

Most jurisdictions also protect the expression of the algorithm and AI process in the form of software through copyright. However, there is more of a challenge where the AI continues to “learn” and so make changes to its own software structure. How should regulators respond in this regard: should they recognize copyright in works created by AI, and the ownership of these works?

In the case of the US, the Copyright Act (Section 101) considers AI-generated outputs as “works made for hire”. This provision creates a legal fiction that the AI system has been “employed” to complete the given task. However, both the US and UK approach are not aligned with the EU Acquis.

Sui Generis Solutions for AI

Modern copyright legislation has not been able to match the velocity with which modern computer technology has developed. Many legislative bodies insist on the protection of the fruits of intellectual labor that stem from the creative powers of the human mind. While this view may have been sufficient in the past, it does not reflect the era of new technological advances, such as

²² Gonzalez Otero, B., Quintais, P. J. (2018) Before the Singularity: Copyright and the Challenges of Artificial Intelligence, at <http://copyrightblog.kluweriplaw.com/2018/09/25/singularity-copyright-challenges-artificial-intelligence/>

computer-generated works. Hence, we need to explore other avenues of protection for AI-generated works.

If we are unable to extend the notion of creativity to encompass works created by AI, we should explore the possibility of attributing a kind of sui generis right to AI.

Issue 7: Infringement and Exceptions

8. An AI application can produce creative works by learning from data with AI techniques such as machine learning. The data used for training the AI application may represent creative works that are subject to copyright (see also Issue 10). A number of issues arise in this regard, specifically,

- (i) Should the use of the data subsisting in copyright works without authorization for machine learning constitute an infringement of copyright? If not, should an explicit exception be made under copyright law or other relevant laws for the use of such data to train AI applications?
- (ii) If the use of the data subsisting in copyright works without authorization for machine learning is considered to constitute an infringement of copyright, what would be the impact on the development of AI and on the free flow of data to improve innovation in AI?
- (iii) If the use of the data subsisting in copyright works without authorization for machine learning is considered to constitute an infringement of copyright, should an exception be made for at least certain acts for limited purposes, such as the use in non-commercial user-generated works or the use for research?
- (iv) If the use of the data subsisting of copyright works without authorization for machine learning is considered to constitute an infringement of copyright, how would existing exceptions for text and data mining interact with such infringement?
- (v) Would any policy intervention be necessary to facilitate licensing if the unauthorized use of data subsisting in copyright works for machine learning were to be considered an infringement of copyright?
- (vi) How would the unauthorized use of data subsisting in copyright works for machine learning be detected and enforced, in particular when a large number of copyright works are created by AI?

Issue 8: Deep Fakes

9. The technology for deep fakes, or the generation of simulated likenesses of persons and their attributes, such as voice and appearance, exists and is being deployed. Considerable controversy surrounds deep fakes, especially when they have been created without the authorization of a person depicted in the deep fake and when the representation creates actions or attributes views that are not authentic. Some call for the use of deep fake technology to be specifically banned or limited. Others point to the possibility of creating audiovisual works that might allow the deployment of popular or famous performers after their demise in a continuing manner; indeed, it might be possible for a person to authorize such use.

10. Should the copyright system take cognizance of deep fakes and, specifically,

- (i) Since deep fakes are created on the basis of data that may be the subject of copyright, to whom should the copyright in a deep fake belong? Should there be a system of equitable remuneration for persons whose likenesses and “performances” are used in a deep fake?

Issue 9: General Policy Issues

11. Comments and suggestions identifying any other issues related to the interface between copyright and AI are welcome. Specifically,

- (i) Are there seen or unforeseen consequences of copyright on bias in AI applications? Or is there a hierarchy of social policies that needs to be envisaged that would promote the preservation of the copyright system and the dignity of human creation over the encouragement of innovation in AI, or vice versa?

DATA

12. Data are produced in increasingly abundant quantities, for a vast range of purposes, and by a multiplicity of devices and activities commonly used or undertaken throughout the whole fabric of contemporary society and the economy, such as computing systems, digital communication devices, production and manufacturing plants, transportation vehicles and systems, surveillance and security systems, sales and distribution systems, research experiments and activities, and so on.

13. Data are a critical component of AI since recent AI applications rely upon machine learning techniques that use data for training and validation. Data are an essential element in the creation of value by AI and are, thus, potentially economically valuable. Comments on appropriate access to data protected by copyright used for training AI models should be included in Issue 7 above.

14. Since data are generated by such a vast and diverse range of devices and activities, it is difficult to envisage a comprehensive single policy framework for data. There are multiple frameworks that have a potential application to data, depending on the interest or value that it is sought to regulate. These include, for example, the protection of privacy, the avoidance of the publication of defamatory material, the avoidance of the abuse of market power or the regulation of competition, the preservation of the security of certain classes of sensitive data or the suppression of data that are false and misleading to consumers.

15. The present exercise is directed only at data from the perspective of the policies that underlie the existence of IP, notably, the appropriate recognition of authorship or inventorship, the promotion of innovation and creativity, and the assurance of fair market competition.

16. The classical IP system may be considered already to afford certain types of protection to data. Data that represent inventions that are new, non-obvious and useful are protected by patents. Data that represent independently created industrial designs that are new or original are likewise protected, as are data that represent original literary or artistic works. Data that are confidential, or have some business or technological value and are maintained as confidential by their possessors, are protected against certain acts by certain persons, for example, against unauthorized disclosure by an employee or research contractor or against theft through a cyber intrusion.

17. The selection or arrangement of data may also constitute intellectual creations and be subject to IP protection and some jurisdictions have a sui generis database right for the protection

of the investment made in compiling a database. On the other hand, copyright protection is not extended to the data contained in a compilation itself, even if the compilations constitute copyrightable intellectual creations.

18. The general question that arises for the purposes of the present exercise is whether IP policy should go further than the classical system and create new rights in data in response to the new significance that data have assumed as a critical component of AI. The reasons for considering such further action would include the encouragement of the development of new and beneficial classes of data; the appropriate allocation of value to the various actors in relation to data, notably, data subjects, data producers and data users; and the assurance of fair market competition against acts or behavior deemed inimical to fair competition.

Issue 10: Further Rights in Relation to Data

- (i) Should IP policy consider the creation of new rights in relation to data or are current IP rights, unfair competition laws and similar protection regimes, contractual arrangements and technological measures sufficient to protect data?

An AI IP strategy should not be considered in a vacuum. A fundamental component of implementing AI is data. As oil is to an engine, so is data the fuel of AI technologies. Like oil, data is often found in a crude and unrefined state coming from a number of sources (e.g., existing public health records, user data and environmental parameters). The input of this crude data is not sufficient, as it must be refined and curated before it can be fed into an AI system.

Why is data so fundamental in the IP conversation? Successful AI programs require an adequate data ecosystem, along with seamless data access. The top AI patent owners may have created their own data to help successfully enable their technology on the market, yet there are likely more quality data owners who hold no formal patents than those that do. This provides a unique opportunity for data creators, curators and owners to engage successfully in the AI space without initially holding or filing any patents. It provides an exciting new opportunity for government institutions – which might be the creators of such large datasets – to participate in the AI ecosystem.

Monetizing and leveraging on AI innovation assets requires a mix of patents and trade secrets, by preventing or limiting access to data. However, relying on technology protection alone is insufficient, as aspects of the data may be compromised or reverse-engineered, thus eroding its value. AI patents increasingly cover refinement and use of strategically important data in specific market applications, such as voice analysis, vision automation, and intelligent and automated information processing.

The current IP rights, unfair competition laws, contractual arrangements and technological measures are sufficient to protect data. This would enable enough incentives for the data development and data trading community, and also for the protection of the public interest and the interests of the consumers.

- (ii) If new IP rights were to be considered for data, what types of data would be the subject of protection?
- (iii) If new IP rights were to be considered for data, what would be the policy reasons for considering the creation of any such rights?

- (iv) If new IP rights were to be considered for data, what IP rights would be appropriate, exclusive rights or rights of remuneration or both?
- (v) Would any new rights be based on the inherent qualities of data (such as its commercial value) or on protection against certain forms of competition or activity in relation to certain classes of data that are deemed to be inappropriate or unfair, or on both?
- (vi) How would any such rights affect the free flow of data that may be necessary for the improvement of AI, science, technology or business applications of AI?
- (vii) How would any new IP rights affect or interact with other policy frameworks in relation to data, such as privacy or security?
- (viii) How would any new IP rights be effectively enforced?

1. No Place for Data in a Property World? This is an important issue for data transactions.

- No known “data property law” or “data ownership law” anywhere in the world
- Data is not real property
- Data is not personal property
- What about intellectual property?

2. Data as Intellectual Property?

- Trade secrets do not grant exclusive rights
- Copyright-no protection for facts; creative compilations of data may be protected, but not the data contained within the compilation or a database
- Patent-protects new, novel, non-obvious and useful inventions, but not the underlying data

3. Parties Routinely Enter into Agreements Concerning Data Ownership. Doesn't that Demonstrate Ownership of Data?

- These arrangements are similar to rights conferred under property laws
- However, these rights are limited to the contracting parties, they do not have erga omnes effect, but inter partes only

4. Do Data Privacy Laws Provide for Data Ownership and Protect Data Owners? This is an important issue for data transactions.

- No, data privacy laws grant data subjects the right to exclude others from using certain personal information about them
- These data privacy rights are similar to property rights that allow one to exclude or prevent others from using the data (for example, copyrights), but are not equivalent

- Unlike property laws (for example, copyrights), data privacy laws do not incentivize creation

DESIGNS

Issue 11: Authorship and Ownership

19. As with inventions, designs may be produced with the assistance of AI and may be autonomously generated by an AI application. In the case of the former, AI-assisted designs, computer-aided design (CAD) has long been in use and seems to pose no particular problems for design policy. AI-assisted designs might be considered a variant of computer-aided design and might be treated in the same way. In the case of AI-generated designs, questions and considerations arise that are similar to those that arise with respect to AI-generated inventions (Issue 1, above) and AI-generated creative works (Issue 6, above). Specifically,

- (i) Should the law permit or require that design protection be accorded to an original design that has been produced autonomously by an AI application? If a human designer is required, should the law give indications of the way in which the human designer should be determined, or should this decision be left to private arrangements, such as corporate policy, with the possibility of judicial review by appeal in accordance with existing laws concerning disputes over authorship?
- (ii) Do specific legal provisions need to be introduced to govern the ownership of autonomously generated AI designs, or should ownership follow from authorship and any relevant private arrangements, such as corporate policy, concerning attribution of authorship and ownership?

TECHNOLOGY GAP AND CAPACITY BUILDING

20. The number of countries with expertise and capacity in AI is limited. At the same time, the technology of AI is advancing at a rapid pace, creating the risk of the existing technology gap being exacerbated, rather than reduced, with time. In addition, while capacity is confined to a limited number of countries, the effects of the deployment of AI are not, and will not be, limited only to the countries that possess capacity in AI.

21. This evolving situation raises a considerable number of questions and challenges, but many of those questions and challenges lie well beyond IP policy, involving, for example, questions of labor policy, ethics, human rights and so forth. This present list of issues, and WIPO's mandate, concerns IP, innovation and creative expressions only. In the field of IP, are there any measures or issues that need to be considered that can contribute to reducing the adverse impact of the technology gap in AI?

Issue 12: Capacity Building

- (i) What policy measures in the field of IP policy might be envisaged that may contribute to the containment or the reduction in the technology gap in AI capacity? Are any such measures of a practical nature or a policy nature?

ACCOUNTABILITY FOR IP ADMINISTRATIVE DECISIONS

22. As indicated in paragraph 2(a), above, AI applications are being increasingly deployed in IP Administration. The present list of issues is not concerned with questions relating to the development and possible sharing of such AI applications among Member States, which are being discussed in various working meetings of the Organization and in various bilateral and other relationships between different Member States. However, the use of AI in IP Administration also raises certain policy questions, most notably the question of accountability for decisions taken in the prosecution and administration of IP applications.

Issue 13: Accountability for Decisions in IP Administration

- (i) Should any policy or practical measures be taken to ensure accountability for decisions made in the prosecution and administration of IP applications where those decisions are taken by AI applications (for example, the encouragement of transparency with respect to the use of AI and in relation to the technology used)?
- (ii) Do any legislative changes need to be envisaged to facilitate decision-making by AI applications (for example, reviewing legislative provisions on powers and discretions of certain designated officials)?

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