



INVENTIONS ON AUTOPILOT: ‘ROADMAP FOR CALIBRATING INTELLECTUAL PROPERTY LAWS FOR THE FUTURE’

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Abstract

“The real question is, when will we draft an artificial intelligence bill of rights? What will that consist of? And who will get to decide that?”

Grey Scott

Futurist, Techno-Philosopher

On 23rd April, 2018, United States Court of Appeals, California (Ninth Circuit) issued a ruling that animals have no legal authority to hold copyright claims in the case of ***Naruto v. David John Slater***. The observation made by the Circuit Court may have pitched a vital question as to whether a similar fate would be suffered by **Artificial Intelligence (AI)** in relation to claiming protection under the umbrella of intellectual property regime and the answer is definitely in a negative. Naruto’s inadvertency in taking photographs might have lacked the requisite of human ingenuity for seeking protection let alone his locus standi before the Court. AI being **impeccable** and **profound** does not seem to meet with the aforesaid misfortune. Although AI is at a rudimentary stage which is naive at autonomous works and invention. However, AI inventing **‘in the wild’** without any human intervention could be on the horizon from the advent of breakthroughs in algorithm designs. With the exponential growth in computing power, AI has become a major driver of innovation in fields like electronics, nanotechnology, health & pharmaceuticals.

Current forms of AI such as **IProva**, **Genetic programming**, **Artificial Neural Networks** and **Robot Eve** still requires some level of human intervention. With development of **‘Synths’**, which are ultra-human like robots indistinguishable from us physically, cognitively & emotionally, by **Sanctuary AI** and an amalgamation of such **‘Synths’** with the existing **AI&3-D printing** technologies will create a **‘paradigm shift’** in interpreting the present intellectual property laws for granting protection and reward. The first and foremost issue that will need to be addressed by the drafters would be the scope of inventors & ownership itself as traditionally patentable inventions have always been considered to be the result of human mind and skills. Apart from this, AI coupled with 3-D printing technologies will led to **convergence** of the realm of copyright and patent laws urging for a hybrid legislation enabling simultaneous protection under both.

One may ask as to why undertake such significant challenge to adjust the IP policy to accommodate the rights of AI for their inventions instead of secluding them from protection altogether as they lack the elementary cognizance as to what a **proprietor/authorship** would mean in a strict legal sense at least for now. Consequently, denying IP rights to inventions generated by AI would lead to such works forming part of the **prior-art** thereby precluding subsequent human inventions from getting protection.

With Saudi Arabia granting citizenship to a humanoid robot named **‘Sophia’**, it is inevitable that AI is here to stay. Thus, this paper seeks to address the prerequisite of calibrating existing IP laws to deal with the sphere of the **‘4th Industrial Revolution’**.

1. Introduction: Fourth Industrial Revolution – AI Meets IP

The First Industrial Revolution used water and steam power to mechanize production. The Second used electric power to create mass production. The Third used electronics and information technology to automate production. Now, a Fourth Industrial Revolution is building on the Third, the digital revolution that has been occurring since the middle of the last century. It is characterized by a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres. Artificial Intelligence by no doubt is a rising star in this revolution and has thus generated curiosity in the digital world. Artificial Intelligence has created new type of technologies, which have an artificial element in them, such as 3-D printing, virtual reality, robotics, autonomous vehicles, block chain etc. In fact, Dubai seems to target 25 % of all journeys to be self-driving by 2030 for which they have already unveiled autonomous taxi equipped with artificial intelligence automated Chat Bot system that responds to customer inquiries using smart communication. A step further, Saudi Arabia is the first nation to welcome Artificial Intelligence with an open mind and granted citizenship to a humanoid robot named 'Sophia'. However, this booming industry of artificial intelligence has not been regulated at all especially when it comes to legislations and treaties relating to Intellectual Property. The IP laws so far have been neglecting grant of any protection to invention created by AI let alone conferring any kind of ownership/inventor-ship to the same. It is necessary to integrate artificial intelligence into the legislation and to regulate it for the betterment of a digitised society. The main purpose of granting IP protection is to encourage further innovation so that the society can prosper, therefore at this rudimentary stage of 4th Industrial Revolution it is necessary to examine as to what are the legally accepted concepts when an IPR such as patent or copyright consists of an AI behind it. With that being said, this research proposal aims to provide a roadmap for calibrating IP laws in order to accommodate the rights of an Artificial Intelligence as an entity by examining the following guiding research problems;-

- i. Can Artificial Intelligence be categorized into some entity or individual upon which ownership can be granted of an IPR or can an AI be the inventor of its own invention produced autonomously without any human intervention?
- ii. Whether it is necessary to undertake such significant challenge to adjust the IP policy to accommodate the rights of AI for their inventions as they lack the elementary cognizance as to what a proprietor/authorship would mean in a strict legal sense at least for now?

2. Review of Literature

Fraser, E. 2016. "Computers as Inventors. *Legal and Policy Implications of Artificial Intelligence on Patent Law*, Vol. 13, no 3.

This article deals with the effects of changing technologies over the intellectual property regime, especially the current patent system. The main focus is on the computer generated claims and patent text which forms the part of the public domain i.e. prior art. While shedding light upon the aforesaid problem of prior art it suggests upon calibrating the legislation to come up with a hybrid solution.

Ronnerhed, J. 2018. *Artificial Intelligence outsmarting the human perception of what is patentable? – An EU examination of the patentability of Artificial Intelligence*. JAEMO3 Master Thesis, European Business Law, Faculty of Law, Lund University.

This article talks about the European perspective on giving Artificial Intelligence a kind of non-economic protection in the form of inventorship or co-inventorship. Furthermore, it examines various treaties such as Vienna Convention on Law of Treaties, Trade Related Aspects of Intellectual Property Rights and WIPO regulations to interpret whether Artificial Intelligence entity can be given a status of a legal person.

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This World Intellectual Property Organization handbook consists of the fundamentals of Intellectual Property rights such as the concept of invention, inventor-ship, ownership, authorship, novelty, inventive step, industrial applicability and the like which was very useful in completion of this research paper.

3. Methodology

The research problem raised in this paper will be answered by using doctrinal method. A doctrinal method uses accepted legal sources and tries to find an answer by looking at the law, legislation, case law, various literature such as news reports, articles, journals and paper.

3.1 Deciphering Artificial Intelligence: “The Ownership – Inventorship dichotomy”

Artificial Intelligence at its core boils down to two fundamental things i.e. algorithms and software. An algorithm is ‘a process or set of rules to be followed in calculation or other problem solving operations, especially by a computer’. On the other hand, software is a programme where several algorithms give instructions to perform a certain task. Apart from the aforesaid fundamental constituents, artificial intelligence can be explained as ‘the simulation of human intelligence processes by machines, especially by computer systems’. It is pertinent to mention here that software per se is not patentable and comes under the realm of copyright in most of the territories. However, Artificial Intelligence embedded in computer programmes have diminished this criterion of non-patentability as it entails a technical aspect, solves a technical problem and even make a computer work outside its given function. The legal issue herein is that Artificial Intelligence was not taken into consideration when drafting the patent law or when reflecting upon the meaning of inventor or owner. Thus, unforeseen technologies like this require a wider scope of application under the existing law. With that being said, it is necessary to integrate Artificial Intelligence technologies into the IP legislation so as to provide incentive to those behind it to innovate further in this field.

3.2 AI as an Inventor of its Own Invention Created By its Own Intelligence

As mentioned earlier in the abstract proposal, the 9th Circuit Court of United States Court of Appeals in the case of *Naruto v. David John Slater* ruled that the photographer was entitled to get copyright on the ground that he made some changes to the setting of the camera to get a sharper image when the monkey would take the picture. This contribution of the human photographer in order to entitle him copyright protection can be viewed in the light of artificial intelligence and patents as well. If humans can change the algorithms to work differently than what they were designed to, same goes with artificial intelligence since it can develop on its own which is popularly known as ‘machine learning’. However, in the aforesaid ruling the monkey lacked locus standi for claiming IP protection and same goes with artificial intelligence entity, as an inventor is still considered to be a person by patent regulations, cases and various guidelines by IP organization.

3.3 Legal Perspective on Inventor & Owner: Analyzing WIPO Regulations & VCLT:

Inventorship refers to the creative mind behind the invention and ownership is the recognition of the right to a proprietary right. However, this does not necessarily mean that every time owner will match the inventor. According to World Intellectual Property Organization, Intellectual Property refers to creation of mind: inventions; literary and artistic works etc. However, the aforesaid definition does not clarify if it *de facto* is a human mind. WIPO’s definition can be interpreted in such a way that inventions susceptible to intellectual property protection is a combination of existing things and the mind creating these needs to be aware of existing inventions in public domain. Thus, it is not necessary to limit the concept of patentable invention to a human mind.

3.4 Artificial Neural Networks

At this juncture, it is apt to introduce the concept of Artificial Neural Networks (ANNs) which forms an intrinsic part of today's artificial intelligence. An ANN is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. To explain it in a simple way, it has to be understood in juxtaposition with conventional computer systems. Neural networks take a different approach to problem solving than that of conventional computers. Conventional computers use an algorithmic approach i.e. the computer follows a set of instructions in order to solve a problem. Unless the specific steps that the computer needs to follow are known the computer cannot solve the problem. That restricts the problem solving capability of conventional computers to problems that humans already understand and know how to solve. But ANN could do things that we don't exactly know how to do and process information in a similar way the human brain does. With that being said WIPO's definition of inventions and the existence of ANN leaves a room for interpretation as to bring AI under the realm of inventor of its own invention.

3.5 Lacuna in the Patent Law (European Patent Convention)

It is highly likely that under the current legislation, the only possible way of categorizing AI as an entity is to refer it synonymously with computer or a machine, reason being that computers are perceivable by us as tangible unlike AI which works inside a computer. However, this categorization won't suffice to give any kind of IP rights to AI as such, but due to the lack of any concrete definition of invention susceptible to IP protection there is a weak spot in the patent law. For instance Article 52(1) of European Patent Convention provides that '*any invention, in all fields of technology, provided that they are new, involves an inventive step and is susceptible of industrial application*' should be patentable. As a result, a '*computer-implemented-method*' is a subject of patent and so as the AI which implements the method to create an invention which forms a part of a computer programme. This situation of an AI implementing its own creative method to generate Intellectual Property material without any human intervention can be explained with a following example:-

3.6 NASA's Use of Genetic Programming in Space Exploration

NASA used Genetic Programming in designing the antenna for its miniature satellite which was used in its Space Technology 5 mission. Genetic Programming or GP is a form of AI modelled after the process of biological evolution that systematically solves high-level problems by improving upon a set of candidate solutions of known performance. By using GP algorithm, NASA was able to build a set of novel antennas, which met mission's predefined requirements, from a set of existing antennas and the program's execution was usually without any human intervention. This exemplifies that using AI to explore a wide range of possibilities without the limitations of human preconception can produce results with previously unachievable levels of performance.

With the above example, it is quite clear that AI is profound and possesses considerable skills and cannot be considered simply a pair of hands in a patented invention. Some degree of protection to the AI can be provided with under the IP legislation, for the time being, in the form of Inventorship or co-inventorship to the AI and ownership to the holder of the AI technology. For example in the aforesaid NASA's project, the machine equipped with the GP algorithm may be assigned non-economic protection in the form of inventor/co-inventor in the patent application for space antenna and the overall ownership shall vest in NASA as a proprietor of that AI. To emphasize upon this inventor/ownership dichotomy, it is apt to rely upon *Apotex Inc. v/s Wellcome Foundation Ltd.*, wherein the Supreme Court of Canada shed some light upon the concept of inventor & co-inventorship and stated as follows:-

96 "*Inventorship is not defined in the Act, and it must therefore be inferred from various sections. From the definition of 'invention' in Section 2, for example, we infer that the inventor is the person or persons who conceived of the 'new and useful' art, process, machine, manufacture or composition of matter, or any 'new and useful' improvement thereto....*"

26 “On the co-inventorship issue, *Wetston J. cited Burroughs Wellcome Co. v. Barr Laboratories Inc.*, where it was observed that Drs. Broder and Mitsuya of the NIH were not a mere “pair of hands”. They exercised “considerable skill” and were “uniquely qualified”. They were given little instruction by Glaxo/Wellcome. In fact, Glaxo/Wellcome **did not have the expertise to be able to instruct the NIH researchers** in this regard. *Wetston J. concluded that although all the five named Glaxo/Wellcome inventors were properly included, the NIH researchers were highly skilled “collaborators” and co-inventors on the utility aspect and should not have been omitted from the application: “the utility as claimed was not established without the extensive and direct involvement of the NIH. . . . In my opinion, the work of the NIH was not ancillary to the invention and this invention would not have been complete without their investigation, skill and research.....”*”

From the aforesaid precedent, it is justified that inventorship refers to the creative mind behind the invention and ownership is the recognition of the right to a proprietary right which was stated earlier. Artificial Intelligence can be understood as a legal person, similar to a juristic person/company, which is an amalgamation of algorithms and bionics. The divide between inventorship and ownership should make it possible for artificial intelligence to be named as inventor since the owner; a physical person has a locus standi. This averment is also sub served by *Article 31* read with *Article 32* of the *Vienna Convention on Law of Treaties* which states that interpretation of treaties should be made in good faith and in the context of the object and purpose. With all the Treaties and National Legislations relating to IPR discussed earlier, the object & purpose of IP is to promote innovation by providing recognition to the creator. Although the creative mind may not be a physical person to assert his claim of royalty accruing upon it from the protection, nevertheless AI can be granted a status of legal person thereby providing it with a non-economic protection, for the time being, in the form of recognition in the patent application as an inventor.

4. Artificial Intelligence: Why It Matters?

In October, 2018 a portrait of Elmond Belamy created by Generative Adversarial Network (GAN) basically an AI was sold at an auction in United Kingdom for \$432,000 dollars. In 2016, an AI authored novel named *The Novella*, whose title translates to *‘The Day a Computer Writes a Novel’* was submitted to the third-annual Hoshi Shinichi Literary Award held in Japan. The award is known for accepting writing from both humans and machines, but this was the first time it has received submissions from AI programs. Current forms of AI known as Artificial Narrow Intelligence have potential to create copyrightable works but with some level of assistance from humans in the form of selecting data sets, designing & training the network and curating the resulting outputs. Same goes with generation of patent claims by an AI. As briefly discussed in the abstract that denying IP rights to inventions generated by AI would lead to such works forming part of the prior-art thereby precluding subsequent human inventions from getting protection is justified by the mere existence of disruptive AI technology such as Cloem which can be used by rival companies or organizations to prevent others from being granted follow-on patents.

4.1 Disruptive AI Software: Cloem

The patentability of an invention (or its validity in litigation) depends both on its novelty and inventiveness as measured against the state of the art. Novelty is destroyed by the existence of a prior publication that discloses what the applicant claims to have invented in a clear and unmistakable manner such that a person skilled in the art would be able to work it. An inventive step would be lacking where the claimed invention is obvious in light of the common general knowledge. Cloem is an example of a commercial service whereby a human operator uses a computer algorithm to create variants of existing patent claims. The algorithm produces a large number of permutations of a seed claim by rearranging phrases and substituting terms with alternative definitions, synonyms or antonyms. Cloem asserts that its algorithm is not merely random; rather, it applies patent drafting best practices to produce alternative claims

that potentially enlarge the original invention's scope, or particularly in the case of substitution with antonyms, describe a distinct invention.

4.2 Implications of Computer Generated (AI) Patent Claims

The vast majority of claims generated by AI technologies are nonsense; however, since computer power is inexpensive and plentiful, it is possible that technologically feasible new inventions could eventually be created, akin to the infinite monkeys on infinite typewriters theorem. However, this technology is likely to become more efficient, effective and autonomous in producing useable patent texts as natural language processing improves and computing power grows even cheaper. The patent text generated by these technologies will contain obvious and easily derived ideas and publishing these texts by Cloem or any other similar AI will place the concepts into the public domain before they can be patented by competitors or patent trolls. The publication of claims so generated is aimed at serving as prior art to prevent competitors from being granted follow-on patents. Moreover, the original patentee could broaden their monopoly by filing these claims as new or divisional patent applications, particularly where the original specification would support them.

4.3 Impact on Pharmaceutical Industry

Computer-generation of texts describing new inventions would become more likely if the right software programme constraints were used, as computing power increases, or as the algorithms for generating such texts improve. Publishing computer-generated patent texts could therefore preclude the patentability of legitimate inventions. Within certain fields, patents on future inventions could be pre-empted entirely; for example, antibodies can only be sequenced in finite permutations of amino acids. With sufficient computing power, an algorithm could potentially describe every possible antibody structure, which if published, could preclude any future patents on human inventions relating to the structure of new antibodies.

In the current scenario, where AI is operable by humans, software like Cloem can be used to limit patented invention by the society and radically would stop innovation. On the other hand, if claims generated by AI is given some kind of non-economic protection such as of inventorship/co-inventorship with their human counterpart, it would cease the invention's information from entering the prior art domain. With that being said, human inventions can simultaneously get a patent without getting rejected on the novelty criterion as overlapping claims generated by AI will not form state of the art by virtue of them being protected.

5. Recommendations

The IP system must recognize the implications of and be prepared to respond to a technological reality where leaps of human ingenuity are supplanted by AI, and the ratio of human to machine contribution to the inventive step or the creative idea progressively shifts in favor of the machines. Given the great potential social benefits of accelerating the pace of innovation through AI, the legislative system must adjust to ensure that the law continues to appropriately protect intellectual investment and incentivize the development of AI generated inventing systems. From all the discussions in this paper, the answer to the two research problems and few recommendations for calibrating the IP laws is as follows;-

- An Artificial Intelligence entity can be acknowledged as an inventor; however, not as the owner since the ownership due to legal liability reasons need to either a physical or a legal person. However, this might change in the future since Sanctuary AI is already developing ultra-human like robots known as '*Synths*' that are indistinguishable from us physically, cognitively & emotionally. As European Parliament through its Resolution of 16th February 2017 has already adopted Civil Law Rules on Robotics, 2017 governing the liability of robotics, soon ownership might also shift to an AI under patent laws.

- When computer programs equipped with AI could autonomously generate a large number of inventions at a relatively low cost, the scope of patent may need to be reduced i.e. the bar of patentability could be raised to reduce the number and increase the quality of patents. This will rebalance the changing incentives on innovation and cost of invention.
- According to the current patent regime, if too strong protection is provided to the right holders of an invention created by an AI i.e. a 20 year monopoly, it may prove to be too great reward to justify for an activity that would have become too easy to invent with the use of AI. Thus, reducing the patent term may sufficiently recalibrate the labour-reward balance.

Artificial Intelligence invention technologies will radically change the inventive process, and may yield vast and unpredictable impacts on the intellectual property system. Accordingly, a continuous re-examination of whether the IP system's supporting rationale remains appropriate will be required as AI technology progresses. AI portends exciting times for technologists and patent practitioners alike. Radical though they may be, the changes that AI will bring shall, if properly managed, reinforce the social benefits that the IP system was always meant to deliver.



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