A Critical Analysis on the Denial of Inventorship Rights to AI and Creative Computers

Sergios Papastergiou
LegalTech LLM
Swansea University
Wales
serg.papastergiou@gmail.com

ABSTRACT

As the title suggests, in this paper the author examines, through the analysis of the DABUS applications, the possibility, legality and usefulness of identifying creative computers as inventors for patentable innovations imagined and developed by these systems with insignificant or no human intervention. The author stands by the view that identifying humans as inventors in cases where they had little or no contribution, distorts the current patent system by rating protection to non-inventors. On the other hand, grating inventorship to non-human actors serves no visible purpose. Maybe, the current patent system is in need of reshaping, as to make room and regulations to protect such inventions, which, day by day, are becoming more and more popular.

CCS CONCEPTS

• Applied computing

~Law, social and behavioral sciences

~Law

KEYWORDS

AI, Patent, Inventorship, creative computers, DABUS

1. Introduction

Artificial Intelligence is making an increasing appearance in businesses and industries and it is becoming a powerful tool of innovation[1]. Inventing computers are nowadays being used regularly to create new technologies in various fields[2], ranging from writing articles[3] and producing food recipes[4] to composing music and inventing new jet engines with enhanced performance[5]. The last few years academics and experts have started talking about the possibility of a designation of an innovative computer as an inventor in patent applications. The World Intellectual Property Organization (WIPO) has called out to the word for comments[6] on the situation and the challenges that arise. On the other hand, the European Patent Office (EPO) has recently issued a decision upon the DABUS application (2018)[7], in which Stephen Thaler, the applicant, was the first one to ever appoint a computer, DABUS, as the inventor of the patentable material.

In light of these developments, this paper will discuss the subject of AI generated innovations and the assignment of inventors in such cases. In the first section the paper will address the meaning of AI and their inventive qualities. Following that, in the next section, the current patent legislation will be discussed and will be applied in the situation in hand. To better comprehend the patent system and successfully tackle the issue of computer innovations, the third section will explore the philosophical justifications for patent law. After gathering all this information, we are ready to apply our conclusions to the issue before us. The last two sections of the paper provide the writer's point of view over the patentability of computer inventions and the possibility of naming AI as inventors as well as the allocation of ownership rights in the case of an affirmative answer to the challenge of inventorship.

2. The creativity of Artificial Intelligence

There have been many attempts to define Artificial Intelligence as well as many types of AI systems with various functionalities and capabilities[8]. In the most widely accepted definition, AI can be understood as the technology that performs such a task, which if done by a human, would require intelligence[9]. However, not all Artificial Intelligence systems are the same. A core distinction in Artificial Intelligence systems is that of weak and strong AI. The former one is designed to perform a specific, narrow ask and cannot deviate from that goal to be used in a wider field[10]. An example of weak AI is IBM's Deep Blue that won versus Gary Kasparov in a game of chess in 1997[11]. The latter one, on the other hand, is designed to achieve a result much closer to a human brain by developing more generalized "mental" capabilities, such as problem solving and reasoning[12]. An example of this kind of AI would be, from IBM again, Watson[13], a reasoning machine with access to vast amounts of data, which is able to outperform humans in a wide variety of fields, from winning in the game "Jeopardy!" against former winners[14] to practically becoming a chef[15], generating new recipes, some of which could potentially be patentable, if they were made by humans.

Artificial Intelligence is rapidly evolving and increasingly more strong AI systems are developed by big private sector firms such as Google, Amazon, and IBM, which invest huge amounts of

WAIEL2020, September 3, 2020, Athens, Greece

money in the creation of AI systems, able to perform independently with innovative and unpredictable outcomes. Certain academics recognize in these systems characteristics like creativity, autonomy, "free choice" (although goal oriented) as well as others, which prove that the AI is indeed intelligent[16].These machines are not programmed to follow specific, rigid rules, but rather operate in the more loose rule of goal-achievement. Some of them use neural networks, a technique that mimics the function of the human brain to create synapses between various neurons when learning new information. The harder you train, the stronger and more accurate your synapses will be. Much like that, the computer is trained with large amounts of data, ever optimizing its "understanding" of the data[17]. Another very popular technology is that of genetic programming. Genetic algorithms mimic natural selection by breeding a certain "population" of random value chromosomes and the ones that perform closer to the initially defined goal get to reproduce. Moreover, a function is embedded in the process that randomly produces new untested chromosomes to secure the largest amount of variety possible in the research. In the end, the population that is better suited to fulfill the initial requirements becomes dominant and is the only one to reproduce.[18]

These machines are already producing patentable inventions for decades now, but the AI's participation in the inventive process is not being disclosed in the U.S. Patent Office due to law uncertainties concerning AI inventions. Examples of such inventions are the 1994 "Creativity Machine", developed by Stephen Thaler, which was using a neural network to generate novel ideas[19]. After being exposed to some music, the program was able to produce more than 11.000 new pieces in one weekend[20]. Dr Thaler succeeded in getting a patent for the "Creativity Machine", but not only that, he got yet another patent on December 22[21], “Neural Network Based Prototyping System and Method", which was quote "...invented by Patent Number One"[22].

A second example of a unknowingly grated patent for an invention artificially created is the "Invention machine" from John Koza. The machine was able to generate new and innovative content without the need of human intervention. A patent was granted for an "Apparatus for Improved General - Purpose PID and non-PID Controllers” on January 25, 2005[23]. The significance of this case lies in the fact that John Koza did not have any expert knowledge about existing controllers or a database of such[24], proving that he could have never invented such a thing on his own. However, he was advised not to disclose the machines involvement in the patent application[25].

The common factor in both examples and the many more that we did not mention but are making their appearance in the innovative industries, is that the AI is able to function and produce innovative content without human intervention in the creative process. Indeed, programmers and developers engineer the software and trainers spend enormous amounts of time to feed the data to the AI, but that is not a part that can be considered as "conceptualization" in the sense of patent law[26]. To allow such persons to be recognized as inventors for the AI-generated inventions, will not constitute unfair treatment to the AI, since it does not have any interest in being listed as an inventor, nor it will be further incentivized to continue inventing, but rather, it will be unfair to the rest of human inventors that work really hard and devote themselves and countless hours of their lives in the attempt to discover patentable inventions[27]. In light of these, there is an ongoing discussion about the challenges that AI inventors pose to the patent regime and whether AI should or should not be considered as an inventor. Furthermore, if concluded that AI can be named inventor in a patent, who should be the owner of the invention? Currently AIs are not considered legal persons in any jurisdiction and thus, cannot hold property of any kind, nor have any rights or obligations.

3. Current Patent System

A patent is the exclusive right over a process or product that provides a new way to perform a specific action to the user, or a novel solution to a problem of technical nature, or in other words an "invention"[28]. By holding such a right, one may exclude all others from selling, making, and using the particular invention for a period of twenty years creating an absolute monopoly over the patented invention[29]. This right is primarily the belonging of the inventor himself, as well as the right to be mentioned as an inventor and many others[30]. For something to be considered a patentable invention, certain requirements have to be met, for in most jurisdictions there is no specific definition of an invention. The reason for the absence of a clear definition lies in the attempt of the regulator to encompass as wide a spectrum for patentable inventions as possible[31]. The requirements for an invention to be granted a patent are novelty, originality and industrial use[32]. An invention is novel in patent law, if it does not belong to the "State of the art"[33], meaning that it should not have been used or disclosed, or known by any other means anywhere before. Originality refers to the non-obviousness of the invention, or else "inventive step". A test has been placed in order to examine that parameter, that of the "person skilled in the art", which considers that an expert in the field (assuming that he indeed knows the entirety of the state of the art) reviews the invention and decides whether the solution provided is obvious or not. Last but not least, the quality of industrial utility refers to the potential marketability of the solution[34].

All these provisions, in addition to the normative reasoning behind the adoption of patent law that we are going to discuss later (the utilitarian theory of Intellectual property rights) showcase the orientation of patent law towards the invention and the general benefit of society, rather than the inventors themselves. There does not exist an expressed statute requirement for the inventor to be a natural person[35]. However, presently most jurisdictions only permit natural persons to be identified as inventors[36].

The U.S. constitution does not specifically defines what an "inventor" is[37]. Nevertheless, there is a requirement for the inventor to be an "individual". Thus, corporations and legal persons are excluded from being identified as such. An inventor is the individual who "invented or discovered the subject matter of the invention"[38]. Conception is the key idea in identifying the inventor. Conception can be construed as "the formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention as it is thereafter to be applied in practice."[39]. Considering these requirement and the way that they are construed, it seems very unlikely that a person providing goals and tasks that a computer then has to solve on its own and produce possibly patentable results, should qualify as an inventor. In his paper[40], Ryan Abbott, describes the following analogy to depict the actual involvement of the human "inventor" in the case of independent artificially generated inventions; "Imagine Friend A tells Friend B, who is an engineer, that A would like B to develop an iPhone battery with twice the standard battery life and A gives B some publicly available battery schematics. If B then succeeds in developing such a battery, A would not qualify as an inventor of the battery by virtue of having instructed B to create a result.".

Although the U.S. patent Act does not specifically require a natural person to be identified as the inventor, the regulations are written in such a way that implicitly presuppose that the inventor will be human. Examples can be seen in the famous quote regarding what is an invention "anything under the sun that is made by man"[41] and the phrasing of the mental requirement that requires that the idea has already been conceived "in the mind" of the inventor[42]. However, it is only natural that when these provisions where made machines that could operate autonomously and systems like neural networks and genetic algorithms where far beyond science-fiction. Hence, the phrasing of the regulations does not indicate a decision of the legislator to exclude non-humans, but rather the simple fact that only humans could then be imagined of being capable to invent and act autonomously. On the other hand, regulations and precedents, even from that time, actively make efforts to deny people that did not have a significant involvement in a solution to be named "inventors"[43]. The same goes for other jurisdictions as well, such as the UK, where under the Patent Act of 1977 an inventor is "the actual diviser of the invention"[44], presupposing a substantial contribution in the inventive concept. Moreover, in Germany, to qualify as an inventor one must both contribute substantially in the inventive process and the contribution has to originate from that person rather than a product of other people directions[45]. Last but not least, in Switzerland, the invention has to be conceived at such a level that a person skilled in the art could reduce it into practice[46].

On the other hand, as mentioned before, there is the possibility of the inventor to "discover the subject matter of the invention". This way, inventorship is also grated to a person that is the first one to acknowledge the importance of an invention that already exists. This provision allows for an invention by accident or pure luck. That is to say that if someone stumbles upon anything that could be considered an invention, they have a claim of inventorship that is weaker only to the person that actually invented the solution[47]. This provision provides the supporters of human inventorship of AI generated inventions in that they are able to overcome the issue of conception by default rather than dealing with the essence of the problem, which is the rightfulness of identifying as an inventor a person with minimal participation in the inventive process. Moreover, a solution like this will result in the inventorship being granted to the person least involved in the inventive process; the person who owns he machine and uses it as an end-product (since they will be the ones able to recognize first the patentability of the AI generated content)[48].

4. DABUS Applications

On the 17th of October 2018 two applications was filed to both the Intellectual Property Office of the United Kingdom and the European Patent Office for the grant of a patent concerning a food container[49] and "devices and methods for attracting enhanced attention"[50] without an indication of the inventor. After request, the applicant identified as the inventor an artificial intelligence machine called DABUS. The applicant explained that the machine was the one that both came up with the novel idea and identified its significance. Moreover, he stated that identifying anyone else as the inventor would be misleading and against the principle of the law. The ownership of the rights he applied for, would be conferred to the applicant himself, either as successor of the inventor in title or by the exception of employment law; an exception that allows the employer to be the default owner of the inventions created by their employees.

After considering the applications, the EPO came to the decision to reject[51] the identification of DABUS as the inventor and consequently to reject the patent as well. The decision was based on the fact that Artificial Intelligence systems do not have any sort of legal personality and the EPO provides only for persons. Since they are not persons, they cannot hold the rights provided by the EPC and thus it is not possible to be recognized as inventors. It is also mentioned in the decision that the boards have not yet answered in the question of whether entities other than natural persons can be inventors. They continue to elaborate that the employer exception cannot be applied since there is no employment relationship between a machine and a person. The same goes for the succession of title; since AIs do not hold any rights it follows that it is impossible to transfer rights. The owner of the machine is by default the owner of the content generated by the machine.

In light of these, the question of whether AI should or should not be granted inventorship is unfolding to reveal its pertinent elements. On the one hand, an AI does not have at the moment any legal personality and thus is absent of any rights and claims deriving from the law. Hence, the question of them being granted inventorship stands void. On the other hand, by abiding to the

current patent system and allowing the end user to enjoy inventorship for the works of the inventive computer, even if they had minimal or no input, we are distorting the integrity of the patent system as well as incentivizing a new "minimal effort" regime for inventions where people spending their lives in search for an invention would be equated with the people spending their money to buy inventive machines. This paper stands by the view that the current patent system will need to adjust to the new reality of things and evolve to balance once again the conflicting interests.

5. Philosophical Justifications for patent law

There have been many theories behind the philosophical justifications of Intellectual Property rights. In one of the most accepted ones, Moore, provides three arguments that justify the need for IP protection rights; the utilitarian justification, the Lockean and the personality theory[52].The utilitarian or otherwise known as incentives-based theory argues that in order to promote creators into producing valuable content, they have to be granted some sort of rights and ownership of their work. Otherwise, they might cease to create content and benefit society with their creations and inventions[53]. This theory explores the "socio-economic" aspect of IP rights and happens to be the most pertinent one when discussing patent law[54]. Benefiting the public domain with new technologies and designs through the disclosure of the inventions is the central goal of the patent system[55]. For this reason only it is that competition law bends to allow an absolute monopoly over the patented inventions. In the Lockean theory, individual labor is the key value that must be protected. Locke theorized that when a person labors on an object that is un-owned, then that object is infused with that labor and cannot be separated thereafter[56]. By that reasoning, after this infusion of personal labor with the object of creation/invention a right of ownership is formed connecting the laborer with the object of labor. A person has a right of a reward for his work and personal labor, and that has to be protected by Intellectual Property laws[57]. The personality theory is very close to the Lockean one, but rather than the labor being infused with the item of interest it is the personality of the subject that lies within one's creation. Their values, beliefs, way of thinking, feelings and experiences are sculpted inside each of their creations, be that tangible or intangible[58]. Excluding that last theory, which is most pertinent in copyright law, the other two theories should play an important role in the journey of deciding whether computers should be grated inventorship or not, for when faced with a unprecedented challenge in law, it is crucial that we look in the justifications of the existing provisions to identify the reason behind our next steps.

6. Computer Inventorship

The utilitarian perspective of Patent Law is really prevalent in the Mazer v. Stein[59] case, where the Supreme Court of the U.S. stated, concerning the rewards for the inventor, ".... is wholly secondary..... [t]he sole interest of the United States ... [is] the general benefits derived by the public from the labors of authors and encouragement of individual effort by personal gain is the best way to advance public welfare . . . .". Furthermore, section 103 of the USPA provides that a patent will not be denied due to the manner in which the invention was achieved. The invention could well be a product of luck or happenstance rather than of effort and research and it will still be patentable. Indeed, section 101 regards discrimination over the circumstances in which the invention in question was made. The statements showcase the ultimate reasons behind the USPA; social benefit[60]. The consideration of whether there should be computer inventors or not should be approached with these in mind. Questions such as "What would be the purpose of naming a computer as inventor?, would anything be gained?, If so, whose right will be harmed?, Should the inventions be patented at all?, are crucial to the conclusion which we will reach.

The question of inventorship can be seen as a matching problem between the "designation of inventor" and one of the four following cases: a) the inventor is a human, b) the inventor is a computer, c) both a human and a computer are inventors, d) neither a human nor a computer are inventors[61]. It has already been argued that naming a human as inventor in the case that a computer produces the invention without significant contribution from any human in the inventive process would be unfair and would transform current inventors into computer investors. Since the owner of the machine would be able to extract full value out of the machine[62] (no salary, no special provisions, no possibility of the machine working for someone else), the cost of the computer's maintenance would be far less that employing human full time inventors, and the pace of inventive discoveries would skyrocket, the innovation market will drastically transform to adapt to this new cost effective strategy for invention.

On the other hand, computers currently do not possess legal personality and cannot hold rights. Thus, at the moment is seems purposeless to designate a computer as inventor[63]. Nevertheless, even if AIs are not to be incentivized through patents to work harder and strive, the developers and software engineers, the trainers and the researchers will[64]. Morally, though, there should be no advantages to be gained from such a designation. Moreover, a 2016 paper on the motivations of software engineers[65] showcases that the majority are not motivated be reasons relating to patents and monopolies, but form other reasons such as challenges, autonomy of work, potential of recognition and others.

Of course, if neither a human nor a computer can be named inventors, it would seem irrational to support the idea of a joint inventorship between the two. Hence, the only possibility that is left open is that no patent should be granted at all[66]. However, to avoid patents would not be without consequences. If patents are

not available for AI generated inventions, then owners of the systems will try and protect their inventions as trade secrets and thus deprive the public from the disclosure of a novel technology[67]. In such a case, the ultimate goal of the patent system would completely fail. In light of these, the question, according to the writer, now becomes: Which of the two non-perfect solutions will better balance the conflicting interests and will better serve the ultimate goal of public welfare? or should there be a reshape in patent law or a sui generis system to regulate these circumstances?

In order to reach to a conclusion, it is important that we first look at the challenges that arise concerning the ownership of such inventions. In the case that ownership can be fairly attributed, then the lack of moral justification for the designation of an AI as inventor, or rather the presence of the moral justification to deny people who did not have a significant contribution to the inventive process of an AI generated invention, should be enough in allowing such a deviation in the patent system. However, an issue that is significant and has to addressed, although not in this paper, is the challenges that the capability of an AI to produce massive volumes of "inventions" every day will bring forth in the patent system in terms of saturation of the patent market and magnification of the State of the Art and its effect on the non-obviousness and novelty tests. Of course, this whole discussion is only relevant in the cases that the AI would be the sole contributor in the "conception" of the novel idea. Otherwise, granting inventorship to a person that indeed invented patentable content alongside the assistance of an AI would be completely consistent with the purposes of Patent Law.

7. Allocation of ownership rights in case of patented inventions

The fact that computers do not have a legal personality and thus cannot own property is pretty straightforward. Also, computer personality is still not close enough to start regulating this way[68]. Thus, in the case that we decide to designate AI as inventors there should be implemented provisions regarding the assignment of ownership of the patented inventions. Ownership rights will create strong economic incentives for the utilization of creative computers[69]. Hence, the correct allocation of ownership rights is crucial to the shaping of the new patent landscape, or is it? According to the Coase Theorem[70], which advocates economic efficiency (meaning a situation where all parties benefit to the maximum amount of not harming other parties), the one that most values the product will take the appropriate actions to ultimately own it. An ownership right is transferable and thus can be sold and bought. It does not matter to whom it will be initially allocated, because the party that values it the most will eventually buy it[71]. Of course, there will be a bigger margin for economic benefit if the rights are allocated correctly form the start. Michael Schuster argues in his analysis of the subject that the entity that most values the patent of an AI generated machine is the AI user[72]. Ryan Abbott[73] considers also the case where ownership will lie with the owner (user) of the AI as the optimal, in terms of creating easier challenges to deal with. For example, a company designing inventive computers that still wants to hold the ownership rights of the patents produced by their AI, could simply license the AI instead of selling it[74]. This way, they are still they owner of the AI and, hence, of the patent as well. He then proposes a regime where the default rule would be to assign ownership rights to the user, but leave the final arrangement to contractual freedom, meaning that they will be able to agree differently[75]. Another view is that ownership will be assigned to the designer company, since they provided all the actual work into developing the AI, except if the user has bought the computer specifically for the purpose of inventing[76]. Without the need to conclude in a certain regime, there seems to be a number of possibilities that one can take in order to answer the question of ownership, and all lead to justified allocations.

8. Preliminary conclusions /thoughts

The normative question, in the end, boils down to whether AIs not being persons is reason enough to exclude them from patent inventorship. Ryan Abbott suggests that if that is the case, it would be better to prohibit it explicitly rather that relying on the implied intentions of the legislator to grant this privilege only to human beings[77]. The fundamental question, however, that rationally proceeds the previous one is whether AI innovations should be granted patents. This issue should be balanced between the disruption of the current patent system from the volume of the new patented inventions and the social loss generated from the nondisclosure of these new technologies. Because in the end, as EPO explained in the DABUS case[78], it is for the public or the actual inventor to challenge the designation of the inventor, which means that most of the times a person will still be able to apply for a patent and not disclose that the invention was created by an AI. The AI will never challenge the designation and the public will rarely know or act. The hypothesis is based on the fact that this already happens for decades as we already discussed[79].

9. Conclusion

Addressing the issue of inventive computers and the possibility of them being identified as inventors in patents is a challenging task with many obstacles and various sections. This paper argues that the underlying problem behind the designation is whether it would be beneficial to grant patents to AI all together. If patents are deemed to not be the ideal regime to protect the inventions of inventive computers, then other provisions should be applied; either other kinds of protection or a new sui generis system to provide for these cases specifically. On the other hand, if he legislator decides on using the patent system, this paper finds unjust and unreasonable to designate any human for the work

done by a computer autonomously (for high level autonomous AI creative computers). The two choices left, are either to identify the machine itself as an inventor or to create a genuine category of patents with no inventors. The incentives that are necessary, since the AI has no consciousness, are only the economic ones. The economic incentives of a patent only lie within ownership, whereas inventorship provides moral incentives and recognition, things unneeded for a machine. The ownership of the patents could be assigned by default to the owner of the AI with the exception of a different agreement between the parties. The versatility of such a regime will provide the market with new dynamics and incentives for a variety of workers, since the demand for these experts will rise to meet the demand of the machines.

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