CHALLENGES POSED BY ARTIFICIAL INTELLIGENCE BASED TECHNOLOGIES TO PATENT AND COPYRIGHT SYSTEM

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INTRODUCTION

Artificial Intelligence (AI) is a branch of computer science used for making intelligent computer systems which are capable of self-learning from experience and adjust to new inputs, thereby mimicking human like actions. The application of AI may include self-driving car, recommendation engines, predictive analytics, auto pilot functionality of flights, healthcare, robotics and so on. Machine learning (ML), a subset of AI, helps the computer systems to achieve the aim of AI by leveraging the information present in data and learning the same by itself. In conventional programming technology, the computer system receives input and applies the rules to provide a certain output from the user. However, in ML, computer system receives training data and once the training is completed, it receives input and instruction of expected output. However, the rule or model that computer system should follow to generate the output is generated by the computer system itself using ML and not by the user.

The training to the computer system can be supervised, unsupervised or it may be reinforcement training[i]. In supervised learning, we label the training data. In unsupervised learning, the training data is not labelled, but computer finds a pattern in the training data by itself. Further, no training data is used in reinforcement learning. In this technique machine learns from its past experiences and rewards. Computer system uses neural networks to learn the information from training data. From this training data computer system generates a model to solve similar problems in future. However, we do not fully understand why the algorithms behind the AI do what they do or how they work thus making the system opaque[ii]. Hence, it is often termed as a black box[iii]. In the next stage, the computer system receives test data to verify if the generated model is working fine. If the generated model provides wrong output, the computer system readjusts the model by itself and again validates it against the test data.

The world has witnessed gradual increase in AI related technologies and as a result of it patent filings also increased for protecting the inventions related to some form of AI. However, the opaqueness of the computer system driven by AI poses some challenges from Patent and Copyright Law perspective. It is high time to consider the challenges with respect to Patent and Copyright Law and to come up with the solutions at the earliest. This paper will discuss those patent and copyright related challenges which AI inventions are facing or could face in near future.

ARTIFICIAL INTELLIGENCE AND LEGAL THEORIES

Majority of issues surrounding AI deals with the question of what rights AI should have and who will be liable for the outcomes. This section will analyze the existing Legal theories and will try to find out if AI can be understood in context of any of the Legal Theories.

Many stakeholders of AI have suggested to consider AI either as a Legal/Artificial Person or as an Agent. Let's first understand if we can consider AI as a legal person under existing legal framework. "Personality" is defined by Gray as "an entity to which rights and duties may be attributed". As per Salmond "a person is any being to whom the law regards as capable of rights and duties. Legal personality is created by a legal fiction which provides a mask of personhood to any non-living entity. Hence, Legal Person is an imaginary or artificial person to whom Law confers the 'personality" tag. The examples of Legal Person include Corporation, Company, University etc.[iv]

On the other hand, Agency is a legal relationship between two people where one acts on behalf of other[v]. The person who acts on behalf of other called an "Agent" and the person for whom the Agent works is called "Principal". The Law confers certain rights and duties to the Agent. The duties of Agent include following instruction of Principal, exhibiting reasonable care and skill while conducting his duty, avoid conflict of interest and so on. Similarly, examples of some rights that an Agent has may include a) right to get remuneration, b) right to retain money or goods of Principal until he gets the due payment, c) right to get indemnity for the expenses he incurred for conducting his duty, and d) right to be compensated for any injury he suffered.

It is clear by now that the Legal Person and an Agent must be qualified to possess some rights. Let's take a look of the jurisprudence of legal "Rights". One of the important theories of Legal

rights is "Interest Theory" developed by Rudolf Von Jhering[vi]. The objective of this theory is to protect an entity's interest and reduce the individual conflicts in society. As per Salmond "Legal right is an interest which is protected and recognized by the rule of Law". Similarly, as per Gray "right is not the interest itself, it is the means to enjoy the interest secured".

Hence, if we want to consider AI as a Legal Person or an Agent, we first need to demonstrate the interest that AI has in the outcome of it. At present, since the outcome of AI is owned by some individual or an Organization, it is difficult to prove the interest of AI as such. Hence, the interest on its outcome will vest to the developer of the AI or its owner. Further, AI is different from existing Legal Person concept in two main aspects: a) AI can have its own thought and choice, and b) AI may perform some of its functions without the help of any Natural Person.

Hence, at present, there is no legal theory or framework which recognizes the rights of AI. If we want to recognize AI as an Artificial Person, then law has to explicitly mention the same and also needs to address the issues, such as who will carry out the duties of AI in the eye of Law and who bears the liabilities that may arise from its outcome.

INVENTORSHIP AND AUTHORSHIP IN AI BASED INVENTIONS

As we've noticed that along with exponential rise in the number of AI based inventions, the challenges surrounding it are also surging. One of the major issues related to AI based invention is determining inventorship[vii]. Recently European Patent Office rejected two patents (EP 18275163 and EP 18275174) on the ground that the AI was mentioned as an inventor of the inventions for the above-mentioned patent applications[viii]. The European Patent Office opined that inventor must be a natural person or human being and not a machine as per the European Patent Convention (EPC). If we carefully observe the provisions of Patent Law of different jurisdictions, we could see that no Patent Act explicitly mentions that the inventor has to be a natural person. However, from other provisions where inventorship is discussed, we may say that this is implied that the inventor needs to be a human being to enjoy certain benefits which the Law recognizes and also to perform certain acts under the Law. One of such acts is to assign their rights to any organization for which they are working (Work for Hire). If such assignee needs to file the patent application, then he needs to furnish the assignment agreement or

declaration. This requirement of Patent Law poses a challenge in case of AI driven inventions as AI cannot assign its rights.

We need to understand that AI must be having some legal rights in the first place to assign its rights to others. We've already seen in the previous discussion that AI cannot hold any Legal rights as per the present legal jurisprudence. If AI is not qualified to possess any rights, then there should not be any need to assign its rights. Hence, in cases where any claim of an invention is contributed by an AI, we should consider the immediate natural person who developed the AI or trained the machine in such a way that the machine or AI can perform the required action or provide the output as desired by the developer of the AI as an inventor.

Alternately, we can amend the existing Patent Laws which will acknowledge the AI as an inventor along with the natural person. However, since AI is not qualified to possess any legal rights, the assignment requirement of the Patent Law becomes void. The amendment can mention that in the event where AI is an inventor, the immediate natural or legal person who has the interest over the AI outcome would be considered as assignee by default. However, we need to understand that all the elements mentioned in claim of a patent application may not be contributed by AI. In reality, we may not be able to claim what is happening inside the AI black-box. We cannot claim something which we do not know. Hence, how an AI is providing the output may not be claimed in specific words, since we would not know the process or algorithm the AI has developed to give the result/output. We may only be able to claim the final output provided by AI based on the given set of input. Some novel steps which are required to get the final output could be contributed by a natural person. In that case, we can name that natural person, as an inventor, who contributes at least one claim element of the AI mediated invention. For example, if a method for providing an alert for fraudulent transactions includes below steps:

a) obtaining past fraud related transaction history;
b) determining attributes corresponding to a fraudulent transaction from the transaction history (done by AI);
c) generating a predictive model based on determined attributes to identify future fraudulent transactions (done by AI);
d) receiving current transaction data; and
e) sending alert to customer upon identifying the current transaction being a fraudulent based on the predictive model.

In the above mentioned steps, apart from step (b) and (c), all other steps are conceived by a natural person. In this case, we may need to mention the name of the natural person who contributed to these ideas/features as an inventor.

Hence, as long as there is a natural or legal personality (recognized by present Law) present to own the invention or in other words, if there is a definitive assignee mentioned for a patent application, the inventorship issue should not be a barrier to get a patent.

Similar approach can be taken to determine authorship in copyrighted work[ix]. As of today, the US Copyright Office registers an original work of authorship, provided that the work was created by a human being[x]. This practice needs to be changed, since a machine does not have any financial motivation to create an original work, hence there is no need to incentivize the machine by giving monopoly rights for the original work created by it[xi]. Even if any monopoly right is given to a machine, it does have any ability to enforce that right against third party. Copyright authorship can either be given to the natural person who develops that AI which creates the original work or it can be given to the AI machine itself. This aspect is covered to some extent in UK Copyright Law. As per Section 9(3) of Copyright, Design and Patents Act (CDPA), "In the case of a literary, dramatic, musical or artistic work which is computer generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken". Similar approach can be taken by other jurisdictions as well.

If the authorship is given to the AI machine, then the owner of that AI technology should automatically get the ownership of such copyrighted work as the owner spends money and effort to develop the AI technology which is capable to generating original work. The monopoly right given to the owner of AI can be considered as a reward for the financial investment made by him. The Copyright Act needs to be amended to address this issue. Presently, as per the Copyright Act of several jurisdictions, the author is considered the first owner of the copyrighted work. This needs to be changed in case we consider AI as the author.

PATENT AND COPYRIGHT INFRINGEMENT BY AI BASED SOFTWARE

Copyright infringement happens when someone copies or reproduce or distributes the copyrighted work of another person or entity without due permission. The issue may arise when an AI generated work ends up infringing some ones copyright. We need to remember that the copyright will only exist in the output given by the AI and not in the underlying algorithm. Even if the output is infringing someone else's copyright, then "independent creation" theory may be applied[xii] unless the training data itself is infringing. As per this theory, if anyone creates a work similar to any copyrighted work without knowledge of or exposure to that copyrighted work, then this will not be considered as copyright infringement[xiii]. Independent creation is a valid defense to copyright infringement. The case is not same with patent infringement as innocent copying is not allowed in patent infringement cases. Hence, patent infringement issue poses more challenges than copyright infringement. In next few paragraphs will discuss about the challenges in case of patent infringement.

Patent Laws of different jurisdictions provide patentee the right to exclude others from making, using, offering for sale, selling or importing the patent invention during the term of the patent without appropriate consent from the patentee. This prevents any third party from commercially exploiting the patented invention without obtaining license from the patent owner[xiv]. Patent infringement can be direct or indirect. Direct infringement happens when Defendant makes, sells, offers for sell or imports the patented product or perform all the steps of the patented method without permission/obtaining license from the patent owner. In case of indirect infringement, the Defendant does not infringe the patented product or process by himself, but causes others to infringe the same. Indirect infringement can be of two types: a) Inducement: inducement happens when someone instructs other party to do some act which causes infringement of a patent; and b) Contributory infringement: contributory infringement happens when someone sells or offers to sell any component of the patented invention which if used by others will eventually infringe the patent[xv]. Indirect infringement can only be considered if direct infringement is established. If direct infringement cannot be established, then the indirect infringement issue becomes redundant.

Artificial intelligence poses a unique challenge to determine the direct or indirect infringement. The main bottleneck in determining infringement by AI driven methods is the fact that the

methodology/algorithm of providing the outcome is generated by machine itself. Therefore, no one can determine or knows the actual process followed by the machine to generate the outcome. To establish the infringement, as per the "all-elements" rule[xvi], we must prove that all the claim elements (or even equivalents of the claim elements) of the patent application are infringed by Defendant's product/solutions[xvii]. But in case of AI driven method, we will not be able to prove that. This can be explained with an example. If there is already a patent existing for a method of predicting fraudulent transaction and the steps of the claim elements are as below:

a) collecting past transaction history with respect to all bank cards of an end user against a plurality of merchants;
b) generating a threshold transaction value for each of the plurality of merchants;
c) receiving transaction details of the end user in real time;
d) determining if the transaction with a particular merchant is exceeding the threshold transaction value corresponding to that particular merchant; and
e) sending an alert to the end user for possible fraudulent transaction if the current transaction value exceeds the threshold transaction value for that particular merchant.

If Defendant uses AI technology to determine the same fraudulent transaction, we may not be able to know the algorithm that the AI machine uses to come up with the final solution and hence it may be difficult for the plaintiff to establish infringement. In patent law, it is the burden of the patent holder to proof that the Defendant infringes his patent[xviii]. Even if the burden of proof is reversed under Article 34 of TRIPS[xix], the defendant may take the defense that the AI came up with the algorithm to obtain the final outcome by itself and hence, they are not aware of the exact process/steps it follows to obtain the outcome. There is a need to come up with some solution to address this issue. One of the solutions that can be looked into is the training data that has been used to train the machine to perform the final outcome. For example, in the above scenario, if the Plaintiff can establish that the Defendant trained the machine in a manner so that:

a) the machine can understand transaction history of any users by itself (Defendant may use Supervised learning method for this);
b) the machine can identify the maximum value from a set of numbers by itself (Defendant may specify regression algorithm for this); and

c) the machine can differentiate between valid and fraudulent transaction (Defendant may use Supervised/Unsupervised/Reinforcement learning method for this and may specify anomaly detection algorithm for this).

In the above case, it is most likely that the machine uses the methods mentioned in the claim to generate the final outcome, *i.e.* generating an alert message for fraudulent transaction. However, it shall not be easy when Defendant also introduces other parameters at the time of providing training to the machine. For example, in the above scenario, if the Defendant also trained the machine to understand the end user's monthly planner and/or any sale or discount information of the retailers, then it may be difficult to conclude as to how the machine finally deemed the transaction as a fraudulent one. Machine may use any other algorithm as well to come up with the final outcome considering all the factors and providing different weightage for each of the factors. In that case, Defendant may not be held guilty of infringement of the patent. Hence, training data may act as a clue to determine infringement in AI driven technologies. However, it also has some inherent drawbacks which needs to be addressed.

Another pertinent issue in infringement scenario is related to the liability. The question might arise that who will take the liability for an infringement caused by AI. As discussed earlier, since AI does not have any legal rights, the owner of such AI should also take the liability of any patent damages caused by the AI.

CONCLUSION

Artificial Intelligence (AI) is a revolutionary technology in the field of computer science and is likely to dictate and guide future of mankind. However, we need to address the legal issues that can emanate from the use of AI. Today, no jurisprudence exists to address the rights and liabilities of any act performed by AI. Hence, we need to come up with some new jurisprudence explaining the rights and liabilities arising from AI led technologies. Corollary to that, the existing patent and copyright laws needs to be amended in light of the new jurisprudence. Accordingly, amendments may be required to address the inventorship or authorship with respect to patent and copyright law respectively along with the liability issues of AI led inventions. The Amendment should also address the issue of infringement analysis in the event the infringement is done by AI. We need to ensure that the primary objective of Patent and

Copyright Law should not be defeated just because of advent of new technology. The legitimate owner of any AI led invention should not be deprived of patent and copyright rights just because the invention or part of the invention is contributed by AI. Similarly, the liability arising from patent infringement related to AI needs to be accurately attributed to the infringer or else there would be no incentive for the patent assignee to file patents in this domain. We need to adopt a balanced approach to address the aforementioned issues. Otherwise, inventors or owners of any invention may lose faith in the patent system.

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