ARTIFICIAL INTELLIGENCE AS AN INVENTOR: RETHINKING PATENT LAW AND PATENT ELIGIBILITY

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ABSTRACT

The era of Industry 4.0 has significantly changed the manufacturing sector by the integration of AI technologies in its domain. This has led to the development of a new Intellectual Property domain that can use AI technology to contribute to economic growth through national development. This research work examines the current patent system and the hypothetical scenario of AI being granted the inventorship of AI-generated inventions. After evaluating the existing conditions this study finds out the different AI technologies that include Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and Fuzzy logic technology that can be implemented in the patent field for generating AI inventions. This research reveals the existing legal issues concerning the identification of inventors in AI-generated inventions in the U.S. and India and the court's traditional view on shifting recognition of AI as the inventor of a patent. A model concerning the assignability of patents has been created that shows the categories of persons to whom the patent office may assign such invention. Based on the analysis the next framework has been suggested.

Keywords: Artificial Intelligence, Artificial Neural Networks, AI-Generated Invention, Inventorship, Patent

Introduction

To begin with, AI-assisted invention is mostly regarded as the next wave of innovation and technological progress, while the SDGs aim at saving resources and the environment for both the present and the future, thus, depicting the equal sharing of resources and intra-generational equity. Moreover, as patent systems become more globalized due to cross-border relations, the IP sector has been a driver of sustainable industrialization and innovation aligned with SDG 9.[1] Besides, AI, as a breakthrough technology in sectors like banking, transportation, and healthcare, is a new way of data handling and processing by machines, which are capable of giving human-like responses in trained situations.

The patent system is all about prioritizing innovation and technological progress, hence, it is mainly in favor of employing AI for driving technological invention, thereby, leading to the paradigm question of AI-generated inventions as well as the possibility of AI being legally recognized as an inventor. Traditionally, based on U.S. courts' interpretations, AI is not allowed to be an inventor and only a human or natural person can qualify.[2] However, this article disagrees with that standpoint by advocating for AI's exclusive patent ownership in cases where there is no human external influence[3], as it acknowledges that AI can function without human intervention and manufacture that can result in national technological development without direct human guidance.

OBJECTIVES

- Identify AI technologies that can be used in the patent lifecycle to create AI-powered inventions.
- Compare the concept of inventorship in the U.S. and India for AI-generated inventions.
- Suggest a patent assignability scheme specifying the recipient types that can receive an assignment from the office.

[1] United Nations General Assembly, 'Transforming our world: the 2030 Agenda for Sustainable Development' UNGA Res 70/1 (25 September 2015) https://sdgs.un.org/2030agenda
[2] Thaler v Vidal (Fed Cir, 2022) 43 F 4th 1207 https://cafc.uscourts.gov/opinions-orders/21-2347.OPINION.7-29-2022_1956718.pdf
[3] Stephen Thaler v Comptroller-General of Patents, Designs and Trade Marks [2021] EWCA Civ 1374 https://www.bailii.org/ew/cases/EWCA/Civ/2021/1374.html

- Suggest next-generation recommendations based on the analysis.

RESEARCH METHODOLOGY

The study method is doctrinal and has an analytical research plan that employs qualitative methods to lay down a framework for assessing the interaction between artificial intelligence and patent law: a study of patentability of ai-generated works.

Technological Drivers of Change within the Patent Regime

Artificial Intelligence (AI) is a broad term that encompasses any technology that imitates human cognitive functions. It comprises such technologies as machine learning, deep learning, data mining, and fuzzy logic. In such a system, machines are trained to learn, adapt and operate based on their experiences.[4]

These machines work on the principle that they are loaded with a huge amount of data and are instructed to operate through the given data. AI systems refer to an intelligence demonstrated by a machine, in contrast to the natural intelligence displayed by humans and other animals. The most common AI technologies involve machine learning that can be divided further into Artificial Neural Networks (ANN) and Convolutional Neural Networks (CNN).[5] These neural networks are designed to simulate the functions of a human brain and to learn through experiences. The networks have the ability to connect with a huge amount of data and carry out complex tasks and generate productive results. On top of that, these neural networks can also be embedded in the patent system to automatically generate novel and industrially applicable inventions.[6]

Fuzzy logic technology is known as the advanced version of either traditional or classical logical systems. It builds a model that is expected to bring reason-based or rational results, which is regarded as a natural operation of the human mind. It implements a decision-making algorithm and does not simply produce binary results (true or false). The fuzzy system also allows itself to be adjusted in a particular given situation so as not to interfere with the process

[4] Organisation for Economic Co-operation and Development, 'Recommendation of the Council on Artificial Intelligence' (OECD, 22 May 2019) https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449
[5] Ian Goodfellow, Yoshua Bengio and Aaron Courville, *Deep Learning* (MIT Press 2016) https://www.deeplearningbook.org
[6] World Intellectual Property Organization, 'WIPO Technology Trends 2019: Artificial Intelligence' (WIPO 2019) https://www.wipo.int/tech_trends/en/artificial_intelligence

even if there are no rules or directions from the expert. This model is capable of dealing with complicated problems to come up with a logical solution. The patent system is in favor of technological progress that benefits society and this condition can be fulfilled by applying fuzzy logic technology in the patent system to create such inventions that would be revolutionary for the society.[7]

Inventorship and Its Legal Significance in the Patent Ecosystem

A patent is one aspect of intellectual property, which limits the rights of others and gives the sole right over the invention to the holder.[8] The conditions for granting a patent are specified in the law and they comprise:

- **Patentable subject matter**- The first condition serves the function of distinguishing and classification of categories of works based on whether or not they can be considered as an invention. In their decisions, the courts state that the laws of nature, the results of nature, and concepts are not patentable. The U.S. Supreme Court noted that "Congress had the intention to cover anything under the sun that is made by man."[9]

- **Utility**- The next step is to figure out whether the invention has a beneficial purpose and the invention must be capable of a practical use.

- **Novelty**- The newness of the invention is a criterion according to which the invention cannot be ones known or used by others and it has to be a product or a process.

- **Non-obviousness-** The content of the patent application for which a patent is requested should not be an evident idea to a person skilled in the particular field.

Regulatory Position in the India Context

A patent application is a formal request made by the inventor to secure a patent for the invention; hence it is a matter of primary importance to settle the question of the inventorship. In most cases, an inventor is considered a person who shares the most significant part of the

[7] Lotfi A Zadeh, 'Fuzzy Sets' (1965) 8(3) *Information and Control* 338 https://doi.org/10.1016/S0019-9958(65)90241-X
[8] World Intellectual Property Organization, 'What is a Patent?' (WIPO) https://www.wipo.int/patents/en/
[9] *Diamond v Chakrabarty* 447 US 303 (1980) https://supreme.justia.com/cases/federal/us/447/303/

contribution for the invention.

Firstly, the term "conception" means the creation of the idea, the invention approach, and the feature of the practical use.

There are a number of criteria by which a person could be determined not to be an inventor, for instance:

1. One that has contributed to the invention solely by making suggestions;
2. A person, who has always followed the instructions of the inventor;
3. A person whose contribution is limited to consulting experiments;

In India, Section 6 of the Indian Patents Act outlines the conditions under which individuals can apply for patents. The applicant of a patent should be the "true and first inventor" of the invention. Section 2 (1) (y)[10] defines "true and first inventor" as "a person that does not account for either the first importer of an invention into India or a person to whom the invention is first communicated from outside India." Nevertheless, the Act clearly refrains from providing a definition for the term "inventor" or "inventorship" and leaves room for subjective interpretations.

Figuring out who the inventors are is a must when figuring out who created the invention in those cases with multiple co-inventors and in cases of employer-employee relationships. The court in *V.B. Mohammed Ibrahim v. Alfred Schafrnek*[11], held that "the plaintiff has not brought any part of his ingeniousness, skill or technical knowledge into the invention, and he has only done the act of providing the financial contribution for the experiments, the plaintiff cannot be considered as the inventor." Besides that, the court also noted that "a company or a money partner cannot be the sole inventor and only a natural person who contributes his/her skill and knowledge to the innovation is entitled to make the legal claim of inventorship".

The question of first inventors is always confusing when multiple contributors are involved. The *National Institute of Virology v. Mrs. Vandana S. Bhide*[12], the Patent Controller pointed his

[10] The Patents Act 1970 (India) ss 2(1)(y), 6 https://legislative.gov.in/sites/default/files/A1970-39_0.pdf
[11] *V.B. Mohammed Ibrahim v Alfred Schafrnek* AIR 1960 All 601 https://indiankanoon.org/doc/1211364/
[12] https://ipindia.gov.in/writereaddata/Portal/ev/sections/patentcontrollerorders/NI_v_Bhide.pdf

finger at one particular inventor facing the problem of the contradictory statement. While determining the inventorship, a court may have to consider certain factors among which are:

- One's contribution has to be on the level of the most important idea that led to the final invention.

- A person who is not involved in the creation of an invention is not entitled to get the credit for inventing it.

- Suppose an experiment helper or apparatus builder is a non-intellectual contributor, then the one who is assisting the inventor is not the inventor.

The court also went on to draw a line between inventors and hired labourers. It was held by the Court that the writing authorship of a paper may be tantamount to the contribution of the paper, but is not direct evidence of the invention for the patent application. So, certain factors need to be considered for inventorship, which includes:

- If a person's idea leads to the development of an invention, then the person shall be considered the inventor.

- Where a person provides mere non-novel technical contribution, that person cannot be granted the status of an inventor, on the ground that the technical suggestion could be a routine lab work and a skilled person might already be familiar with the technical concept.

- On the other hand, if the technical contribution is found to be novel, the person may be considered an inventor as the technical contribution has transitioned the idea from theory into actual practice and has resulted in a tangible invention.

The bill made by the legislature to award the patent to the "inventor" was recorded in the Ayyangar Committee Report of 1959[13]. According to the report, a person who does not have full legal ownership of the invention can still be considered the 'inventor' if he/she has the moral rights. The concept is to give the inventor the monetary benefits legally due to him/her, even

[13] Rajagopala Ayyangar, 'Report on the Revision of the Patents Law' (Government of India, 1959) https://ipindia.gov.in/writereaddata/Portal/ev/sections/ayyangarcommittee1959-report.pdf

though the agreements limit the exclusive rights. Now, AI is not capable of having either moral or legal rights.

The U.S. Patent Law Approach

The America Invents Act defines the subject matter of a patent as any new or useful process, a machine, a manufacture, a composition of matter, or any new and useful improvement of the above, may be granted a patent, subject to the conditions and requirements of this title.[14] U.S. patent law does not specifically define the term 'inventor'. The USTO's Manual of Patent Examining Procedure states that, "the primary issue in determining inventorship is who conceived the invention, and if a person does not contribute to the conception of the invention, he is not an inventor."[15] Patent law specifically mentions that those individuals who are inventors should be recognized as such. This means that entities such as corporations cannot be considered as inventors. An individual who invents an idea is an inventor and usually this is a natural person. The courts have helped clarify the meaning of the term "conception".

The court in *Townsend v. Smith*[16], defined "conception" as the "complete mental performance of the inventive act and the formation in the mind of the invention of a definite and permanent idea of the complete and operative invention as it is thereafter to be applied in practice."

The Court in *Hybritech Inc. v. Monoclonal Antibodies Inc*.[17], explained that conception is "the formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice."

In *Hiatt v. Ziegler*[18], the court stated that "conception is when the invention is made sufficiently clear to give the skilled in the art the ability to put the invention into practice without the need for further considerable trial or the use of inventive skill."

The U.S Code on Patents is very clear about the concept of joint inventorship. It also specifies that "an invention may have joint inventors, each of whom may have independently contributed to the conception of at least one component, feature, or limitation of the invention."[19] These

[14] 35 United States Code §101 https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title35-section101
[15] United States Patent and Trademark Office, *Manual of Patent Examining Procedure* (MPEP §2137)
[16] *Townsend v Smith* 36 F 2d 292 (CCPA 1929)
[17] *Hybritech Inc v Monoclonal Antibodies Inc* 802 F 2d 1367 (Fed Cir 1986)
[18] *Hiatt v Ziegler* 179 F 2d 135 (CCPA 1950)
[19] https://uscode.house.gov/view.xhtml?req=(title:35%20section:116)&f=treesort&num=0&edition=prelim

explanations show that an inventive act needs an inventive mind thus such a person has to be a natural one. Therefore, an inventor cannot be a company or a business that is registered as a corporation or an organisation.

In *Beech Aircraft Corp. v. EDO Corp*.[20], the Federal Circuit decided that "only natural persons may be inventors." A person who merely helps and follows the direction of another in making a prototype is not an inventor. In 1952, Congress declared that the subject matter of the patent was "anything under the sun that is made by man." This declaration reflects the lawmakers' point of view in terms of the extent of the Patents Act and only human beings as the creators of the work.

Ownership of the invention originates from inventorship. Included under ownership is the right to claim patent protection, and the inventor is the one who submits the patent application. The owner has the right of assignability over the rights. Thus, in the case of joint inventors being employees of the same company, they assign their rights via an agreement and the firm is considered as the owner of the invention. When two companies decide to work together in a patent, they are co-owners of the invention. Each company holds an undivided interest in the patent and has the liberty to utilize its rights without the other company's consent.

In *HIP Inc. v. Hormel Foods Corp*.[21], the District Court was of the opinion that one could be granted joint inventorship based on one's contribution to the invention.

AI as an Inventor: Patent Law Implications

The current patent regime system provides that the invention must be novel, it must have industrial application, and it must be a patentable subject matter. These are the conditions which are required for the registration of a patent. The traditional approach concerning the issue of the ownership of a patent or the inventorship has always been in favor of the ‘person who is the inventor.’ The term 'person' includes a natural, juristic, and legal entity that is capable of being sued or has the capacity to sue.

The question is whether AI comes under the definition of a person as no legal rights of machines have been recognized. Different statutes say that a human being or a natural person is the one

[20] Beech Aircraft Corp. v. EDO Corp., 990 F .2d 1237 (Fed. Cir. 1993)
[21] HIP, Inc. v. Hormel Foods Corp., 94 F.4th 1309 (Fed. Cir. 2024)

who can be granted a patent in case the invention is created with the use of AI. Even now, there are no case laws or statutes that consider a 'computer program' or AI as the inventor of the invention.

In the case of *Thaler v. Vidal*[22], the court held that only a natural person could be an inventor of the invention and that such inventorship cannot be granted to AI in cases where the invention is made with the assistance of AI. The argument that AI can also be granted a patent can be supported if we take into account the point made by the US Supreme Court in the case of *Goldstein v. California*[23], where the court stated that terms like "authors and inventors" should not be looked at in a narrow literal sense, but in a broad one to be in line with constitutional principles. This point made by the court has led to a number of different possibilities where the AI can also be granted inventorship if such an invention is made solely by the AI without any human intervention.

Although it is a generally accepted view that humans enable data into the AI system, this action does not give the human sole authority to be considered as the inventor of the patent invention. The main condition for the principle of inventorship is the making of a significant contribution to the invention. AI patents tend to encourage innovation and the creation of inventive machines and are beneficial for technological advancement. It is thought that there must be a permanent idea of the invention, which is enough for the skilled person to perform or carry out the invention without experimentation.

The matter arises regarding which entity will profit from the innovation, where the patent is granted to AI. It is thought that when an AI is given patent ownership, a dispute over the ownership of the patent will arise. The best possible way is where the Patent Office, through a license or an assignment, gives the patent that is AI-generated to AI users, who are the persons using AI to create new inventions. This guarantees that the innovation stays open in the public domain and that the natural person who has been assigned or licensed gets the economic benefit through the AI-generated invention. This mechanism makes the concept of AI being granted the inventorship a possible event.

An AI-generated work cannot be awarded inventorship since AI systems are not natural persons. The boundaries of patentability exclude the patenting of laws of nature, natural

[22] Thaler v. Vidal, 43 F.4th 1207 (Fed. Cir. 2022)
[23] Goldstein v. California, 412 U.S. 546 (1973)

phenomena, and abstract ideas. Hence, the court has placed the burden of proof on inventors to demonstrate the presence of the "inventive concept." The patent in the case of *Dr. Koza*[24] was granted even though he admitted that the whole invention, "invention the machine," was made by the computer or artificial intelligence. This implies that the USPTO only grants patents to natural persons, no matter what method is used to develop the idea.

The main reason for the idea of giving the invention to AI is that AI, by its very nature, is capable of thinking and reacting in a way similar to a human brain and also has a superior capacity for handling data. The opponents of the concept of granting patent ownership rights to the AI argue that the AI machine does not operate without the support of the external world, as a human has to introduce data into the machine or allow the machine to function.

This evidence can be rejected by the fact that with the advancement of technology and the emerging technology, like self-learning which evolves and operates based on its "experience" without being "fed" with additional data, thus, a situation may result where the need for external human intervention in the operation of machines is no longer a necessary condition for the operation of AI machines and AI can operate independently.

The technology of Artificial Neural Networks (ANN)[25] imitates a human brain and is able to generate new inventions, which can thus lead to technological progress in society.

If the inventorship is assigned to AI, the question about the use of inventions created by AI for the future arises. To the greatest extent of technology utilization and to get the economic benefits out of the invention, it is necessary for the invention to be made available in the public domain so that the invention can be leveraged for technological progress. This study offers a model for making the decision as to whom the invention should be transferred from the assignor, i.e., the AI. There are certain groups of people who can be granted a patent and those who cannot.

The transfer of property rights can only be done for persons who are interested in maximizing the economic benefits related to the innovations.

Two types persons exist: (i) Active parties and (ii) Disruptive/ Silent parties.

[24] Koza's U.S. Patent No. 6,847,851
[25] Yann LeCun, Yoshua Bengio and Geoffrey Hinton, 'Deep Learning' (2015) 521 *Nature* 436

The disruptive or silent parties are the ones who are not interested in the monetization of the invention and they attempt not to reveal it to the public domain. They are persons who block the patents and thus lower the worth of the patent. Since a patent is a bundle of rights that are valuable in terms of economic benefits for further use of the invention. It is also revealed that non-active market participants who have no intention to patriciate in the future, do not raise capital in the field of the invention and the invention becomes valueless.

The suggestion is that the patent should not be assigned to software firms as it is believed that software firms might internalize the AI invention and become the AI user of such inventions and thereby have the power to be the potential patentee for any further inventions. The active parties are those, who are involved in gaining benefits either by way of licensing or assignability. They bring their invention to the open domain so that it can be used by the working sector for the next progression.

AI users are considered as the most suitable category for the patent assignment. The AI users are the people who use AI to make software, so they are the most appropriate as assignees. It is claimed that if the inventorship is with the AI, then the invention may not be made available to the public and that it can impede the use of the invention for the benefit of the public. In this regard, a model suggests assignability. This framework offers a mechanism for transferring AI-generated innovations. The very first moment when a machine comes up with a new idea, and the Patent Office learns about it, the registrar should take note that the AI has invented the new thing. Registration involving a patent includes the stages of provisional/complete specification filing, specification publication, registrar examination, Specification-related objections and, at last, the patent grant.

The next step is when the AI is awarded the patent, the registrar shall inform a natural person about the patent transfer so that the invention can be further utilized by the public in various fields. The proposed framework lays out people qualified for receiving a patent as either active or silent parties. Ultimately, the assignment by the Patent Office occurs under the terms and conditions which may involve the flow of cash between the AI and the human on the subject of the patented invention assignment as shown in Fig. 1. This plan enhanced openness in the handover of the patented innovation.

1	Refined name	Purpose	Typical output	Key document elements
Step 1	Registration	Lodge assignment for recordation with the office.	Filing acknowledgment/recordation submission.	Cover sheet with parties, conveyed interest, execution date, signatures, and identifiers.
Step 2	Notice of recordation	Issue formal notice confirming recordation details.	Notice/recordation receipt with reel/frame or reference.	Lists assignor/assignee, application or patent numbers, and correspondence address.
Step 3	Assignment grant	Update ownership records; reflect assignee as owner of record.	Ownership update in register/assignment record.	Office records amended; proof of chain of title available.

Fig. 1.

CONCLUSION

After analysing the correlation between technology impact and patent domain, one may infer that technological growth and research in the field of intellectual property market, where economically valuable inventions that contribute to technological advancement are patented. has led to a demand for changing the traditional approach in respect of the authorship of the invention, the courts have held in the case of AI-generated invention that the AI is not entitled to be the owner of the patent, a human or a natural person subsequently, who used AI as a tool should be regarded as the inventor. The article explains the shift in technology where such AI has developed a tendency to work independently without human dependence.

The approach of treating AI as an inventor should not be considered as an illusionary one in the field of Intellectual Property Law. The traditional perspective of courts to consider AI as a mere tool needs to be changed, and this may help in the evolution of the patent system. As the

US patent system has failed to foresee the possibility of granting inventorship to AI, it is the members of the international conventions like TRIPS agreement who should take the responsibility of considering AI as a legal/artificial person and accordingly recognising the rights of machines too. This idea may change the legal framework concerning the concept of rights and duties and it requires a liberal approach from the courts for the development of the Intellectual property domain.

This article further supplies a model for the determination of the assignability of patent rights and prescribes the categories of persons who should be recognised as the assignee by the Patent Office. The analysis forms the basis of the suggestions presented.

Conclusion and Strategic Recommendations

After having analysed in detail whether AI should be recognized as an inventor, the following suggestions are presented by this part of the paper:

- There is a suggestion of explicitly defining the term ‘Artificial Intelligence’ in the law of the land for an unambiguous interpretation and determination of the issues in the intellectual property field. One can rely on the definition of the EU, and it can be merged with Indian legislation. AI may be described as "An AI system is a machine-based system architecture to perform with varying degrees of autonomy and can show modification after deployment and, for explicit or implicit objectives, it deduces from the input it is given, how to produce outputs like predictions, content, recommendations, or decisions that can have an impact on physical or virtual environments."

- It is proposed that AI should be treated as a legal person in the field of intellectual property. Implying from this that AI could be granted the status and function as an inventor under the Patent law. AI might be the single or joint owner of a work or an invention. Thus, the concept of 'person' would be extended to include not only human beings but Artificial machines.

- The U.S. patent system is in need of a thorough examination of its existing laws with the aim to widen the interpretation of the term 'person' so as to encompass artificial machines as well. In addition, members of the TRIPS agreement should be aware of

AI's rapid development in the field of intellectual property rights and as a result, take steps to adopt the mechanism that acknowledges AI recognition.

- The software companies should not be the ones to whom a patent is assigned for an AI-generated innovation, as it is considered that the software companies might secretly be the ones to internalize the AI invent and even though they may be inactive parties, they can be the AI users of such inventions and have the power to become a potential patent holders of any consequent inventions by that means. Hence, the assignment ought to be granted to the people who are actively involved in reaping the benefits, be it through licensing or assignability. One of the reasons why they do this is to advance their invention in the public sphere so that it can be utilized by the industry for further development. It is also considered that AI users who are employing AI for software development are the most appropriate group to whom the patent assignment can be given. This study puts forward a transparent model for the assignment process which can be implemented.

- It is suggested that in the case of AI-generated inventions, the person is obliged to disclose it to the Registrar. If a disclosure is not made by the person, then the patent will be cancelled.