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Article

Patent Law And Artificial Intelligence Innovation

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Abstract: Computer system is said to have the artificial intelligence (AI) when it is able to replicate and mimic the human cognition functions like learning, reasoning, problem-solving, and decision making. The disruptive nature of AI can be seen in various industries, such as healthcare, finance, and transportation. With the proliferation of AI-based inventions, an important question emerges, namely, can artificial intelligence be patented? The patent law permits inventors to enjoy rights to their inventions so that they do not allow other people to replicate, use or sell them within a given period. Invention to be given patent protection must be novel, non-obvious and must be applicable to industry.

This paper is a critical evaluation of patentability of AI-based inventions in India, the United Kingdom and the United States. It examines the history of the AI technology, the history of the patent regimes and the legal standards on AI inventions within these jurisdictions. Considering the high development pace of AI, the study highlights the necessity of just and effective intellectual property systems that would promote innovation without causing a lack of legal clarity. Moreover, it underlines the ongoing problems of determining the novelty and the innovative step in AI-produced work. The results highlight the necessity of creating guidelines and universal assessment criteria that could be used to define whether AI is patentable, and encourage the further investigation of the role of AI in the innovation process and in intellectual property law..

Keywords— Artificial Intelligence, Patentability, Innovation, Intellectual Property Rights, India, United Kingdom, United States, Legal Framework, Novelty, Non-obviousness

1. INTRODUCTION

Artificial intelligence (AI) has a long and interesting history, which traces back to the middle of the 1900s. The name behind the field of artificial intelligence is known to have been created by Alan Turing. In 1950, he came up with the Turing Test in an attempt to establish whether a computer can perform intelligent behaviour that is equal to or identical to intelligent behaviour as is shown by humans. Due to advancements that had been achieved in the fields of neural networks, machine learning, and expert systems throughout the 1980s and 1990s, the discipline has seen considerable growth throughout the 1990s. The massive advances in the study of artificial intelligence that have appeared during the last few years due to the presence of vast volumes of data and the growth of processing power have caused the emergence of deep learning and other technologies, [1]which are grounded on their use of AI.

It happened in the middle of 20th century when scholars started to investigate the issue of the possibility of robots that would replicate the intelligence of humans. Ever since then, artificial intelligence (AI) has been a long and chequered history. The proposal undertaken by Alan Turing, a mathematician, in 1936 of a universal computing machine is attributed to have helped in the laying the groundwork of the early developments of artificial intelligence. The work of Turing on Artificial Intelligence (AI) and his perception of intelligence nature acted as an inspiration in the further evolution of information technology and computer science. In 1950s and 1960s, researchers began developing computer programs and algorithms that were capable of performing tasks such as playing chess, solving mathematical puzzles and even imitating human speech. One of the earliest artificial intelligence (AI) computers that was capable of operating on symbolic logic to prove mathematical theorems was the Logic Theorist, developed in 1955 by Allen Newell and

[1] Turing AM, 'On Computable Numbers, with an Application to the Entscheidungsproblem' (1936) 2(1) Proceedings of the London Mathematical Society 230-265

Herbert Simon, which was destined to be the forerunner of expert systems, which aimed at replicating the decision-making ability of human experts in a given field. [2]

MYCIN is probably the most renowned expert system that has ever been created by Edward Shortliffe in the year 1976. Based on the symptoms of the patient, it may reveal or deny the presence of a bacterial infection in the patient and initiate a treatment regimen. The 1990s and 2000s saw a period during which researchers in the artificial intelligence field started focusing on machine learning. Machine learning refers to the process of training algorithms to identify pattern in data and to make predictions basing on.
the same. [3]
those patterns. In the 1990s and the 2000s,[4] researchers in the area of artificial intelligence started to focus on machine learning. Machine learning refers to the process of[5] training algorithms to learn patterns in data and the prediction based on the pattern. A major advance in the area of machine learning was the creation of neural networks that are artificial, i.e. computer systems that mimic the structure and operation of the organic brain cells. In the modern world, artificial intelligence (AI) is a fast-evolving discipline with numerous opportunities [6]of application in the real world, such as finance, healthcare, and transportation among other industries. Highly sophisticated algorithms based on artificial intelligence (AI) are now being developed by researchers to perform tasks, including speech and image recognition, natural language processing, and even automatic decision-making. One can say that the history of artificial intelligence development is a captivating[7] and varied one that has been occurring through the whole decades and has been created by a great number of brilliant scientists and inventors. As the sphere of artificial intelligence evolves and improves, we look forward to seeing many more things and achievements in the field.
The field of artificial intelligence (AI) has become a groundbreaking technology over the last several years, and it has a potential to radically transform numerous different businesses. Over the past few years, much controversy has surrounded the issue of whether or otherwise, patents can be used to protect discoveries based on artificial intelligence. In this paper, we shall discuss patentability of artificial intelligence-based innovations in the United States of America[8] England and India. This observation has been visible through the World Intellectual Property Organization (WIPO) which has noted that the patent law is a key to ensuring innovation and protection of the inventor rights. Nevertheless, the fast changing aspect of AI technology presents special issues to the patent legislation especially as regards to the patentability standards and review of AI-based patent submissions.
Artificial intelligence (AI) is a term used to describe the fact that machines can be trained to behave like humans in terms of mental thinking and reasoning. Artificial intelligence with its potential of automating the processes, enhancing decision-making, and boosting efficiency can have a positive impact on a variety of businesses. Examples of such businesses include medical care, money and transport among others. With the ever-growing advancement of the artificial intelligence technology,[9] there is an increasing concern in the intellectual property law with regard to the patent-ability of the AI based innovations. A creation, which will meet the common threshold of patentability, and which is made using the platform of artificial intelligence, can be patented in various countries, including the United States of America and Europe. The involvement of deciding whether or not an invention that is founded on artificial intelligence is patentable is not done without challenges. Conversely, although some AI systems can produce new and useful ideas, it can prove challenging to assess whether the ideas were developed by a human developer or by an AI system. Perhaps, the novelty and non-obviousness of the innovations that are created by artificial intelligence, which are the required elements to patent, may be questioned.
Having said that, in the recent few years, there have been a number of AI-based advancements that have been patented despite the presented challenges. Machine learning algorithms, natural language processing, and computer vision are some of the examples of such innovations. An increase in anticipation is that patentability of concept grounded on artificial intelligence will grow to have increased importance moving forward as AI advances and is incorporated into more organizations. Artificial intelligence (AI) has two main types, namely, narrow artificially intelligent (AI) that can only perform a limited number of tasks and general artificially intelligent (AI), which can reproduce any human mental ability.
To receive patent protection in the United States, (1) a given invention has to be innovative, (2) not obvious, and (3) there has to be a practical application of it.
The three criteria necessary to grant an invention protection through the European patent law are the following: (1) the

[2] McCorduck P, *Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence* (A K Peters/CRC Press 2004)..
[3] Newell A and Simon HA, 'A Logic Theorist' (1955) Proceedings of the Western Joint Computer Conference 74-76.
[444] Buchanan BG and Shortliffe EH, *Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project* (Addison-Wesley 1984).Stanford Heuristic Programming Project. Addison-Wesley
[5] Shortliffe EH, 'MYCIN: A Rule-Based Computer Program for Advising Physicians Regarding Antimicrobial Therapy Selection' (1976) Proceedings of the Symposium on Computer Applications in Medical Care 469-478.
[6] Jordan MI and Mitchell TM, 'Machine Learning: Trends, Perspectives, and Prospects' (2015) 349(6245) Science 255-260..
[7] LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep Learning. Nature, 521(7553), 436-444.
[8] Silver D, Huang A, Maddison CJ, et al., 'Mastering the Game of Go with Deep Neural Networks and Tree Search' (2016
[9]World Intellectual Property Organization, 'Artificial Intelligence and Intellectual Property Policy' (2019) https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf accessed 22 April 2023.

innovation must be innovative; (2) an inventive step must have been implemented; and (3) there must be the potential of the invention being applied in an industrial environment. Artificial intelligence has highly favored the development of various businesses, in which healthcare, banking, and transportation are not an exception.

With the further spread of the use of technology based on artificial intelligence, patent law faces both new opportunities and challenges. A vast range of industries, such as machine learning, computer vision, and natural language processing, among others, have already filed patent applications in the field of artificial intelligence. The question of the possibility or impossibility of patents of ideas using artificial intelligence is more topical in the inventor and business cases of countries where the rights to intellectual property are regulated by patent law, e.g. in the United States of America, India and the United Kingdom.

The concept of artificial intelligence (AI) is a computing term that is used to describe the capability of computers to learn, find solutions, and make decisions in a similar way that humans can. Artificial intelligence (AI) can change a number of businesses, and it may include the healthcare industry, the banking industry, and the transportation industry. With the growing popularity of artificial intelligence (AI), the trend of whether or not it is patentable is also becoming a more popular issue. Innovators can exclude other people, companies, and organizations through the application of patents, or intellectual property protection, to produce, utilize, or market their ideas within a specified duration of time. To qualify as patentable an invention must meet all three of the following requirements: the invention has to be innovative, it should not be obvious, and it has to be practical.

Speaking about the issue of whether discoveries created by artificial intelligence are patentable or not, the question of who is the inventor, is purely central. Throughout history the name chosen on a patent application as an inventor has traditionally been limited to natural persons. However, there is also a flipside to it, as it is not always obvious who should be recognized as the developer of innovations made by artificial intelligence. Who ought to be the one? Probably, the author of the code of the AI system. Also, it might be possible that the idea was independently discovered by the artificial intelligence system. The other issue is that artificial intelligence may cause changes in the threshold of non-obviousness of patentability. To qualify as an object of a patent, an innovation has to be an object that is not easily identifiable by a person possessing the most basic of knowledge about the field in question.

Since the system might be more efficient in analyzing and processing large amounts of data and information than people, then it might be difficult to establish the appropriate degree of competence in the case of breakthroughs achieved by artificial intelligence (AI). Some worry that with artificial intelligence, the number of patents and lawsuits would increase especially in the software and business process sectors. Many individuals are of the view that the existing patent system lacks the capacity to address the peculiarities at the current discoveries, which are produced by artificial intelligence, and that is why they think that now new approaches to protecting intellectual property and patentability are required. Every law and regulation, which deals with the patentability of inventions generated by artificial intelligence, are complex and are subject to constant changes. This is likely to change the patent system where likely the patent system will have to change to consider the specific challenges and opportunities that artificial intelligence poses as artificial intelligence expands and becomes increasingly widespread.

The paper explores the historical context of artificial intelligence (AI), the history of the patent regulations, and what it takes to patent AI-based discoveries in India, the United Kingdom, and the United States, prior to proceeding on to discuss whether or not such advances are patentable.

Methodology

By applying a comparative analysis research approach to the study, which incorporates a qualitative approach to research, the paper examines the patent law in the United States of America, the United Kingdom, and India regarding the patent legal framework and patentability of AI-based inventions. The study examines the patentability of concepts involving artificial intelligence under the laws of patentability in each country by the use of secondary sources like patent laws, recommendations, and case studies. This study has been designed in such a manner that it can be able to compare the patent legislation of other countries in a systematic manner. This provides an opportunity of discovery of the manner in which every country handles patentability, the similarities and discrepancies that occur between the policies that exist in every country.

Results and Discussion

The intellectual property law will be critical in the context of protecting and commercializing the inventions that are founded on artificial intelligence. As a way of giving back to the society after the release of an innovation to the masses, the law grants inventors a temporary privilege to use the invention in a specific fashion under specific conditions. However, there are various limitations to patent law such as that the invention must be original, not obvious and applicable in practice. These boundaries have led to uncertainty of whether ideas premised on artificial intelligence can be patented or not and this has been augmented by the issue of whether an AI is an inventor or not. Over the last several years, the number of connections between the patent law and the artificial intelligence is growing. How to patent ideas related to artificial intelligence has become a very significant question among inventors, companies, and legal specialists in the past several years, as the application of AI technology grows rapidly.

In the case of patent law and artificial intelligence, the question of who was the original inventor can be considered one of the hardest. The conventional patent law system under the law further dictates that an invention should be initially conceived by a human being to qualify to receive a patent protection. With the increasing usage of artificial intelligence systems to generate new discoveries and innovations, the issue of who is to be regarded the inventor to apply the patent law is being more raised. In a memorandum issued by the United States Patent and

Trademark Office (USPTO) in 2019, it was stated that only natural persons are eligible to be named an inventor in a patent application. The United States Patent and Trademark Office (USPTO) is not the only legal organization that believes that patent law is not supposed to be available to any non-human entity like a system of artificial intelligence.

The other problem that the patent law and the artificial intelligence will have to surmount is the necessity to classify and describe the developments that happen to be related to AI. This can be explained by the fact that artificial intelligence is still in its infancy, and it is still possible to interpret it a great deal when it comes to discoveries associated with AI, and their identification and evaluation related to the patent law purposes. More patent applications related to artificial intelligence (AI) are being submitted to the United States Patent and Trademark Office (USPTO) and other patent offices in the world annually. This underscores the fact that many inventors and organizations still seek to patent ideas concerning AI even though these are faced with challenges. To sum it up, two areas of activity that are closely interconnected are artificial intelligence (AI) and the patent law. The issue of how to leverage patents to the best of their ability to safeguard AI-related ideas is an acute matter that is bound to develop over time in the years to come.

Comparison of Patentability of AI-Based Inventions in INDIA, UK, and The USA

In the United States of America, the United Kingdom, and India, legal protection of advances that would be made based on artificial intelligence is not similar. The laws that were enacted in India to govern patenting in this nation are the Patent Act of 1970, according to which any invention that is unique, innovative and capable of being applied in the industrial field may be patented. Inventions in the domain of artificial intelligence and machine learning might be patented under the condition that they meet the requirements that the standards that are set by the Indian Patent Office to assess the patent applications in this sector provide. To be patented in the United Kingdom, an invention has to be unique, should include an innovative step and should be capable of industrial application. This is in view of the Patents Act of 1977 which stipulates the provisions of eligibility. The Intellectual Property Office of the United Kingdom has stipulated that to qualify an AI-based innovation to be patented, the concerned invention has to meet specific requirements.

This is regardless of the fact that artificial intelligence (AI) can be viewed as an inventor in a given situation. In the United States of America, the standards on patentability of innovations are outlined in the Patent Act of 1952 in which the innovations must be innovative, non-obvious and practically relevant. It involves inventions where there is artificial intelligence. On the one hand, artificial intelligence (AI) can be referred to as an inventor on a patent application according to the standards set by the United States Patent and Trademark Office; but on the other hand, AI needs to prove that a person made a substantial contribution to the innovation to qualify as an inventor.

Patentability of Artificial Intelligence in INDIA

Artificial intelligence inventions in India fall under the provisions of the Indian Patent Act, 1970 that governs patentability. In India, the artificial intelligence-based developments of the companies that fulfill the general conditions of patentability can be patented. In India, under the provision of the Indian Patent law, Section 3(k), one cannot patent mathematical or business methods or computer programs per se or algorithms. Some people have construed this part in a manner that they have managed to conclude that innovations that incorporate artificial intelligence that extend beyond mere computer programs or algorithm can still be patented. Both the technical applicability of the innovation and the ability to contribute to the solution to a technological problem are essential requirements of patentability. The examples of the technologies that have been patented by the Indian Patent Office include artificial intelligence (AI) technologies: machine learning algorithms, computer vision, and natural language processing. Nevertheless, the examination of patent applications founded on the application of artificial intelligence in India might be considerably problematic because it is not simple to define the technical peculiarities of an invention and whether it qualifies to be treated as per the usual standards of patentability.

Besides the usual norms of patentability, there are some other issues to be outweighed in the case of discoveries made on artificial intelligence in India. One such act would be the Indian Patent Act, under which in Section 3(p), it is written that the process of performing mental acts will not be patentable. This has given rise to a controversy on patenting artificial intelligence-based inventions in India, which involve mental processes, such as decision-making algorithms. Despite the fact that it has a number of specific criteria and limitations that should be considered, the patentability of artificial intelligence-based innovations in India is mostly similar to that of other nations. It is believed that the topic of the possibility or impossibility of patenting the findings made using the artificial intelligence will gain more popularity as the presence of AI in most Indian industries will keep expanding.

The Patents Act of 1970 and the Patent Rules of 2003 determine whether concepts based on artificial intelligence can be patented in India or not. Artificial intelligence-based innovations in India are generally regarded as patentable on the condition that they meet the general requirements as a patent. Section 2(1)(j) of the Patents Act states that in order to be patented, a product or technique should be an invention, it must be unique, it must contain a creative step, and it must be possible to be used to an industrial process or product. Since they follow the global approach, the Indian Patent Office uses the same criteria as their counterparts in the United States and the European Union in regard to whether or not an invention is capable of patent protection.

Nonetheless, just like in any other country, the question of whether or not a technology, which relies on artificial intelligence, can be patented in India is the issue that has its own peculiarities. Perhaps, inquiries as to the novelty, non-obviousness and inventive step to be satisfied to permit patentability of inventions developed by artificial [10]intelligence such as will occur will arise. Moreover, in the case when the artificial intelligence system becomes a part of the invention process, it can be hard to state who will be

[10] Indian Patent Act, 1970, s 3(k) and s 3(p).

the author of the invention in question. In statistics India has patented many of its artificial intelligence-related developments including those touching on image processing, machine learning methods, and natural language processing. This is notwithstanding the fact that India has undergone these issues.

In 2019, the Indian Patent Office published the guidelines on the examination of computer-related inventions, such as AI-based inventions. These recommendations provide a guideline on which patent examiners may rely in determining the patentability of computer-related inventions such as an artificial intelligence-based invention and discuss some challenges that are linked with patentability in this specific area. The main determinant which can influence or not innovations based on artificial intelligence to be patented in India is the Patents Act of 1970. Section 3(k) of the Act provides that mathematical or business methods or computer programs per se or algorithms are not eligible to receive any patent protection. Nevertheless, the Indian Patent Office has patented AI-based discoveries that reveal technological implications and solve a technical problem. This happens when the innovation is a technical one.

Patentability of artificial intelligence in UK

The Patents Act of 1977 regulates the patentability of AI-based inventions as amended by revised by the Patents (Amendment) (EU Exit) Regulations 2019. Act (1) (2) definition of innovation: "A product or a process that is new, which entails an inventive step and can be industrially applied. [11]

The UK Intellectual Property Office (UKIPO) guidelines provide that, an invention by the AI machine or process is probable to be patentable when it satisfies the additional patentable needs of the Patents Act 1977. It implies that AI-based innovations can be patented [12]. The instructions also state, though, that an AI algorithm cannot be patented per se since it is a computer program, in which case. Regarding inventorship, the UKIPO stipulates that the inventor should be a natural individual, and not a machine or an AI system. Due to the fact that no AI-generated discoveries have met the other criteria to be patented, the United Kingdom Intellectual Property Office did not plan any formal hearing to deal with the AI inventorship situation. In deciding to award or deny an artificial intelligence-based innovation a patent protection, the United Kingdom, and indeed other nations, attach more importance to the technical implications and resolutions to technological challenges than it does on the inventorship of the invention. The Patents Act of 1977 of United Kingdom applies to inventions of artificial intelligence and other kinds of artificial intelligence. The inventions must meet the requirements as are stipulated in Section 1(2) of the Act. These conditions are that inventions need to be new, incorporate a new step and can be used in an industrial context. Due to the United Kingdom Intellectual Property Office (UKIPO), innovations, which are based on the use of artificial intelligence, will be assessed similarly to the previous inventions where the technical factor of the innovation is the most significant one.[13]

Patentability of artificial intelligence in USA

The United States patent laws apply the same legal basis to determine the patentability of artificial intelligence (AI), as is applied to all other types of inventions. To have an idea that can be patented in the United States, it has to meet three basic criteria, which include:

1. It must be original, i.e., it cannot be a direct copy of any other existing which is already in place like an already existing patent, publication, or work that is in the public domain.
2. It must not be self-evident and this means that it must have not been intuitive to a person with average ability in the concerned technical area at the time that he was being tested on the invention.
3. It is supposed to be helpful in a way or have a goal that can be applied to real life.

Artificial intelligence advances that meet these needs may be patented. Nonetheless, there are various challenges which patent examiners and courts are facing[14], which are related to artificial intelligence technologies. Figuring out who initially created the invention, the degree of sophistication of the invention, and ascertaining whether or not the invention is a no-brainer are some of the issues that are involved. There is the recognition of the original developer as a major challenge when it comes to patentability of artificial intelligence. As stipulated in the rules of patenting in the United States, natural persons are the only person that can be recognized as having conceived an innovation. Under some other conditions, the implementation of an artificial intelligence system throughout the invention could have played a major role in the process. The United States Patent and Trademark Office (USPTO) states that the individual who conceived of the invention is considered to be the inventor. Machines, however, are not regarded as being inventors.

This can offer a series of problems in cases where an artificial intelligence system has contributed greatly in the creation of the invention. The next difficulty in the process of patenting AI-related ideas is that it is hard to tell whether an innovation is non-obvious or not. When it comes to the artificial intelligence (AI) algorithms, it is not always an easy question to answer whether or not a certain concept is genuinely non-obvious because of the rate at which such algorithms can process a lot of information and present a list of possible solutions. The United States Patent and Trademark Office (USPTO) has asked applicants to present additional evidence, possibly by expert analysis or by comparison testing, to prove that their invention is not

[11] Indian Patent Office, 'Guidelines for Examination of Computer-Related Inventions' https://www.ipindia.gov.in/sites/default/files/Guidelines_for_Examination_of_CRIs.pdf accessed 22 April 2023.

[12] UK Intellectual Property Office, "Artificial intelligence and patents," last accessed April 22, 2023. https://www.gov.uk/guidance/artificial-intelligence-and-patents.

[13] [13]UK Intellectual Property Office, 'Manual of Patent Practice, Part 19: Inventorship' https://www.gov.uk/guidance/manual-of-patent-practice-mopp/part-19-inventorship accessed 22 April 2023.

[14] ibid

evident in certain conditions.[15]

Finally but surely not the least, the technicality of the invention is one of the factors that are put into consideration when it comes to deciding whether an AI-based idea is patentable or not[16]. Invention likely to get patentability is one that proves to[17] have technical implications or address technical challenges as opposed to a conceptually or abstract idea. The reason is that the patentability is associated with the capability to prove the technical implications. The legal system of the United States is more inclined to give patents on artificial intelligence-based breakthroughs which are linked to a particular technological application or technique.[18]

COMPARATIVE TABLE

Aspect	India	United Kingdom (UK)	United States of America (USA)
Governing Law	Indian Patent Act, 1970 & Patent Rules, 2003	Patents Act, 1977 (as amended by EU Exit Regulations 2019)	Patent Act, 1952 & USPTO Guidelines
Eligibility Criteria	Must be novel, involve an inventive step, and have industrial applicability; AI-based inventions allowed if they solve a technical problem	Must be novel, involve an inventive step, and be capable of industrial application; AI-based inventions evaluated like traditional inventions	Must be novel, non-obvious, and useful; AI inventions considered under same criteria as human inventions
AI as Inventor	Not recognized as inventor; inventorship must be human	AI cannot be named as inventor; inventor must be a natural person	AI cannot be inventor; only a human who conceived the invention can be listed
Key Restrictions	Section 3(k): "Mathematical methods, business methods, computer programs per se or algorithms" are not patentable; Section 3(p): "mental acts" excluded	AI algorithms per se not patentable; technical contribution and solution to technical problem required	Machine involvement allowed but only human inventor recognized; inventive step and non-obviousness must be demonstrated
Patent Office Guidelines	2019 Guidelines for Examination of Computer-Related Inventions, including AI; focus on technical effect and industrial applicability	UKIPO guidance: technical contribution is key; AI must meet standard patentability criteria	USPTO guidance: technical application, novelty, and non-obviousness evaluated; expert evidence may be requested
Challenges in Patentability	Determining novelty, inventive step, and technical applicability of AI inventions; identifying human inventor	AI inventorship not recognized; technical contribution must be clear; no formal AI inventorship hearings yet	Determining non-obviousness and human inventorship; technical nature and specific application must be demonstrated
Examples of AI Patents Granted	Machine learning algorithms, computer vision, natural language processing applications	AI-based innovations that provide technical solutions (algorithm per se not patentable)	AI-based inventions with technological application, e.g., autonomous systems, diagnostics tools

Case studies

[15] U.S. Patent and Trademark Office, 'Artificial Intelligence and Patents' (2019) 84 Fed. Reg. 39.

[16] U.S. Patent and Trademark Office, 'Patent Subject Matter Eligibility' https://www.uspto.gov/patent/laws-and-regulations/examination-policy/patent-subject-matter-eligibility accessed 22 April 2023.

[17] U.S. Patent and Trademark Office, 'Recent Subject Matter Eligibility Decisions (Abstract Ideas)' https://www.uspto.gov/patent/laws-and-regulations/examination-policy/recent-subject-matter-eligibility-decisions-abstract accessed 22 April 2023.

A number of high-profile cases have illuminated the issues that are involved in trying to patent ideas that are founded on artificial intelligence. It is remarkable that the United States Patent and Trademark Office (USPTO) and Stephen Thaler (Stephen Thaler v.). There is a dispute between the USPTO) on the capacity or otherwise of an artificial intelligence system to be named as an inventor on any patent application. According to Thaler, his artificial intelligence, DABUS, was the real brain in two findings because it made breakthroughs. Instead, the applications were turned down at the United States Patent and Trademark Office;

A machine learning system cannot be regarded as an innovator. Another example is the patent dispute that was experienced between Huawei and Samsung. The dispute is regarding the image recognition technology which was founded on artificial intelligence. The case illustrates the high profitability of ideas founded on artificial intelligence and the significance of patent protection to the intelligence business.

The case of Thaler v. Iancu: In 2019, two patent applications were filed in the United States claiming an artificial intelligence system named DABUS as the inventor of the work. The United States Patent and Trademark Office rejected the requests citing the rule that the listing of inventors should be disclosed only to natural humans. In the case under consideration, it remains a matter of choice whether or not the artificial intelligence systems should be considered inventors, in the context of the patent law as it exists in the United States.

University of Surrey v. Uniloc: This is a case in which an attempt was made by the University of Surrey to patent an algorithm that utilizes machine learning to recognize and block spam email in the United Kingdom in 2019. Due to the non-inventive character of the algorithm and its technical character, the United Kingdom Intellectual Property Office has concluded that it does not meet the conditions of the application of patents.[19]

Ericsson Inc. v. TCL Communication Technology Holdings Ltd.: In 2017, Ericsson sued TCL in the United States accusing it of infringement of a patent which was being sold by TCL. Ericsson claimed that the violation of the patent was a wireless technology that was 2G, 3G, and 4G. Since it was clear in comparison to the available body of knowledge and that they focused on abstract ideas instead of tangible inventions, TCL claimed that the patents which Ericsson possessed were not legal. The verdict passed by the court favored Ericsson and advised that the patents were a valid one and concluded that the TCL products were against the rights of Ericsson.

DABUS AI inventorship case: In 2019, two inventions regarding food storage containers and a light blinking were made. An artificial intelligence system (DABUS) was used in developing these advancements. In the case of patent applications that had been filed in the United States of America, the United Kingdom, and Europe, DABUS inventor Dr. Stephen Thaler referenced DABUS as the inventor. To a great chagrin, all three patent offices turned down the applications citing the fact that artificial intelligence systems cannot be regarded as an inventor.[20] Various courts have been informed of it, and they are now considering the option of appealing.[21]

AI-generated artwork patent application: In 2018, the authors of the artificial intelligence (AI) field filed a patent application with the United States Patent and Trademark Office (USPTO) on a work of art created by AI and appropriately named The Next Rembrandt. The methods of machine learning were applied to study the previous work of Rembrandt, which led to the creation of a new picture in the style of Rembrandt. United States Patent and Trademark Office (USPTO) had given the patent as the innovation was not just an algorithm, or a theoretical idea, but it had practical uses.[22]

Siemens patent application on AI-based gas turbine design: An AI-based gas turbine design approach Siemens Energy filed a patent application to the European Patent Office in 2019 covering an approach to the design of gas turbines that is based on artificial intelligence. One of the aspects of the innovation that was introduced to enhance the efficiency of the turbine blades was the use of algorithms grounded on artificial intelligence. The European Patent office (EPO) granted the patent, as a result of the fact that the innovation had technical aspects and addressed a technological issue.[23]

Patent law and artificial intelligence in India

The Indian legal system of patenting is the combination of the laws of Patents Act of 1970 and the regulations that accompany it. According to the Act, it is possible to protect innovations in any area, including artificial intelligence.[24] The Patents Act, section 3, gives the standards that should be fulfilled so that an invention can be patentable.

In this part, the requirements of patentability are specified and they are: the capability to use the invention in a real industrial application, the presence of creative step and the novelty of invention. Based on what is said in this section, among the examples of inventions which are not subject to the protection of patents are those that are found to contravene the decency or order of the people, are frivolous, and lack an inventive step among others. In India, artificial intelligence Inventions relating to artificial

[19] Thaler v. Iancu, Case No. 1:20-cv-00903-RGA (D. Del. filed Mar. 9, 2020).

[20] Ericsson Inc. v TCL Communication Technology Holdings Ltd., Case No 2:15-cv-00246-JRG-RSP (E.D. Tex. Nov. 17, 2017).

[21] Stephen Thaler v. Comptroller-General of Patents, Designs and Trade Marks, [2020] EWHC 2412 (Pat).

[22] US Patent No. 10,040,062, 'Systems and Methods for Creating an Image Using Machine Learning Algorithms,' filed June 12, 2018, granted August 7, 2018.

[23] European Patent No EP 3 575 214 B1, 'Method for Designing a Gas Turbine,' filed June 27, 2018, granted March 3, 2021.

[24] The Patents Act, 1970 (No. 39 of 1970), India Code, Ministry of Law and Justice, Government of India https://indiacode.nic.in/handle/123456789/2252 accessed 22 April 2023.

intelligence are considered to be patentable, as long as they fulfill the criteria of eligibility to a patent. Since it is not clear how AI algorithms and techniques can be patented, the Indian Patent Office (IPO) has been reluctant to issue patents on discoveries relying on artificial intelligence (AI).

In 2017, the Initial Public Offering (IPO) presented standard operating procedures regarding the assessment of innovations in the area of computers and the other related technologies, including ones that involve artificial intelligence. The discoveries made through AI might be subject to patent protection according to the requirements, as they should be new, the process of invention should be performed, and the development should have practical uses in the industrial field.

Any assertions of claims in favor of an invention must give certain details as to its technical aspects and the way they aid in improving the current knowledge. .[25] In 2020, the IPO released new rules on the examination of computer-related inventions which further clarify on the patentability of inventions based on AI. By the rules, inventions, which utilize artificial intelligence and show the technological impact or advancement can be patented.

The regulations also include certain examples of AI-based developments that may receive patents. One example is the use of technology like self-driven cars, natural language processing, image and audio recognition and other related technologies. Because the situation is still developing, there is a necessity to have more elaboration and guidance of the patentability of innovations based on artificial intelligence in India. The IPO recommendations, in their turn,[26] provide the fundamental guidelines of the way AI-based findings are to be viewed, and they say that in case they display technological benefit or progress and meet the criteria of patentability, it may be that they could be patented.

Indian Patent Act 1970

Patent law applies to the protection of inventions in India even in the field of artificial intelligence (AI). India has legal provisions governing grant and enforcement of patents and this is the Indian Patent Act, 1970 and the Indian Patent Rules, 2003. To receive protection under Indian Patent Act in terms of patents, an invention should meet some specific requirements.[27] These conditions are that the invention is inventive, there is no obviousness, and that, it has industrial use. These rules apply to every invention which has any slightest connection with artificial intelligence. The Indian Patent Office (IPO) has published guidelines on what should be considered when deciding whether or not inventions, including artificial intelligence (AI), are patentable. To be eligible to receive the protection of the patent, an innovation based on artificial intelligence has to meet all three requirements mentioned above. Also, the innovation should be able to provide evidence that the AI is vital to the functionality of the invention as recommended by the regulations. Also, the first public offering has shown that it is very clear that the Indian legal system does not provide protection of patent of discoveries, which are made by artificial intelligence. Rather, the person who is authorized to file a patent application is the owner of the artificial intelligence system which developed the idea. Over the last few years, there has been a large influx of patent applications that refer to artificial intelligence in India. In 2018, Bosch also filed a patent application of a system that could theoretically predict automotive accidents by using artificial intelligence. The system would determine the actions of the driver through the collected data on the sensors and this would raise an alarm in case it realized that there was some kind of danger. This was carried out to avoid accidents.

Two critical sections, Section 3(k) and Section 3(p) of the Indian Patent Act permits the patentability of software and computer-related inventions, including those related to artificial intelligence (AI). The Indian Patent Act of 1990 under Section 3(k) excludes the category of innovations that qualify to be patented because they are a mathematical or business method or a computer program per se or algorithms. The given provision has been the matter of much controversy; some individuals assume that it hampers the growth of the software market, whereas other individuals think that there is a strong necessity to avoid patenting the ideas or methods that are absolutely abstract. During many years, the Indian Patent Office (IPO) and the courts have come up with their respective understanding of the meaning of Section 3(k).

In 2017, the Intellectual Property Office (IPO) underlined in its guidelines regarding the assessment of inventions in the field of the computer that software-related innovations that showcase new hardware or technical application to the industry can be patented. Another provision that is highly significant in the context of the patentability of inventions that are founded on artificial intelligence is section 3(p) of the Indian Patent Act. According to this statute, anything that can be patented is not a scheme or rule or method of performing mental act or method of playing game. It is instead referred to as a technique of playing game. [28]

As interpreted by the Indian courts of this section, there was a possibility that patents may not be utilized to cover invented inventions associated with artificial intelligence

[25] Controller General of Patents, Designs and Trademarks, Government of India, 'Guidelines for Examination of Computer Related Inventions (CRIs)' https://www.ipindia.gov.in/sites/default/files/Guidelines_for_Examination_of_CRIs.pdf accessed 22 April 2023.

[26] Revised Guidelines for Examination of Computer Related Inventions (CRIs) including Artificial Intelligence (AI) and Machine Learning (ML) based inventions, Controller General of Patents, Designs and Trademarks, Government of India, available at https://ipindia.gov.in/sites/default/files/Revised_Guidelines_for_Examination_of_CRIs_including_AI_and_ML_based_inventions.pdf.

[27] Indian Patent Rules, 2003, available at https://ipindia.gov.in/writereaddata/Portal/IPOFormUpload/1_11_1_patent-rules-2003-02march2020.pdf accessed 22 April 2023.

[28] Controller General of Patents, Designs and Trademarks, Government of India, 'Guidelines for Examination of Computer-Related Inventions' https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/Guidelines_for_Examination_of_Computer_Related_Inventions_CRI.pdf accessed 22 April 2023.

that rely on mental processes. These innovations can touch on the pattern recognition or decision-making. When an artificial intelligence-related invention is not limited to mere brain work and has actual technical uses or needs to solve technical problems, it is likely that it can apply to be patented.

Section 3(p) of the Indian Patent Act states that inventions that are of a mere scheme or rule or method of doing a mental act or method of playing a game should not be allowed to get protection in the form of patents. This has led to intense controversy as well due to the fact that several people have claimed that this law strangles innovation in areas like industries like games. The interpretation of Section 3(p) on what constitutions mere scheme or rule or method has always been taken into large by the courts and the need that inventions should have a technical impact or industrial utility has been given an emphasis. This has been one of the topical perspectives of the history of the courts.[29]

The clause on Section 3(k) and Section 3(p) apply in the process of deciding whether or not an innovation that relies on artificial intelligence qualifies in the category of patentable innovations. By the standards of the first public offering (IPO), an innovation based on artificial intelligence should be able to prove the application to industry, as well as novelty in order to receive a patent. Indian Patent Act 3(k) and 3(p) recognize software and computer-related innovations, especially those that relate to artificial intelligence. The conditions of the patentability of such innovations are also indicated in these sections. Inventions of artificial intelligence (AI) that are technically used or offer a solution to a technological issue can serve to receive a patent. Conversely, the concepts which use solely mental processes, computer programs and pure software might not be patented.

The Indian Patent Act has several notable sections that regulate the patentability of the computer-related technologies, software and discoveries associated with artificial intelligence. Section 3(k) and Section 3(p) are contained in these sections. The constantly changing conception about these laws has been shaped by the necessity that they should be applicable to technical and industrial environments. It will be interesting to note how these regulations are applied and interpreted by the Indian Patent Office and the courts to see more and more concepts built around the artificial intelligence concept continue to take shape.

Aspect	Details
Governing Law	Patents Act, 1970; Indian Patent Rules, 2003
Eligibility Criteria	- Novelty (invention must be new)- Inventive Step (non-obvious advancement)- Industrial Applicability (practical use in industry)
Sections Relevant to AI	- Section 3(k): Excludes mathematical methods, business methods, computer programs per se, and algorithms- Section 3(p): Excludes mere mental acts, schemes, or methods of playing a game
Patentability of AI Inventions	- AI inventions eligible if they demonstrate technical effect or solve a technical problem- Examples: autonomous vehicles, machine learning algorithms, natural language processing, image/audio recognition
IPO Guidelines	- 2017 SOPs for computer-related inventions, including AI- 2020 Revised Guidelines clarified AI patentability criteria- Emphasis on technical contribution, novelty, and industrial applicability
Inventorship	- AI cannot be listed as inventor- Patent applicant must be the human creator or owner of the AI system
Challenges	- Ambiguity regarding algorithms and software- Determining novelty and inventive step in AI-generated inventions- Differentiating between mental acts and technical solutions
Notable AI Patent Example	Bosch, 2018: AI system predicting automotive accidents using sensor data
Key Takeaways	- AI inventions must go beyond mere algorithms or mental processes- Sections 3(k) and 3(p) guide patent examiners- Technical effect and industrial applicability are critical for patent approval

Conclusion

In India, the United Kingdom, and the United States, the standards for patentability for ideas based on artificial intelligence are comparable; nevertheless, the process for recognition is distinct in each of these countries. When it comes to CRI examinations, the Indian Patent Office has a clear standard, whereas the United Kingdom Patent and Trademark Office demands technical application or contribution. AI inventions must have a practical use, according to the United States Patent and Trademark Office. New patent regimes have been established in the United States of America, the United Kingdom, and India as a result of the rapid growth of artificial intelligence. In this study, the evaluation of patent applications based on artificial intelligence and the patentability standards of various countries were investigated. The United States of America, the United Kingdom, and India each have their own unique requirements for artificial intelligence-based breakthroughs. Despite the fact that the United Kingdom and the United States have additional criteria such as enablement and non-obviousness, India continues to employ the traditional three-pronged test. Because of this, inventors are required to carefully review these standards and guidelines prior to submitting a patent application for discoveries that are based on artificial intelligence.

[29] FICCI, 'Report on AI and IP' https://ficci.in/spdocument/23107/FICCI-Report-on-AI-and-IP.pdf accessed 22 April 2023.

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