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PATENT REGISTRATION CRITERIA FOR AI INVENTIONS: A CRITICAL ANALYSIS OF EVOLVING STANDARDS

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ABSTRACT

Artificial intelligence is essential in every field. Artificial intelligence plays an essential part in all industries. Very intricately linked with the rapid advancement of Artificial Intelligence presents unique challenges and opportunities for the patent system. The author of this research paper contemplates the fast advancement of artificial intelligence has culminated in revolutionary changes throughout several industries, requiring a rethinking of patent registration criteria it helps in exploring the ever-evolving patent law related to AI concepts, looking at how traditional criteria like originality, inventive step, and industrial application are being questioned and reinterpreted. The next trend that the author is going to interpret is the legality of AI.

Artificial Intelligence has become increasingly prominent in this tech era, transforming machines into creative work-generating systems as AI has no legal structure hence comparative analysis of other countries will provide a significant inception. Lastly while concluding the chapter, the author has taken the liberty to gauge the feasibility and accuracy of patent protection for AI inventions. The author, in his final note, raises a necessary question for valued readers to consider, about the mentioned "Patent Protection ownership is to be provided to the invention or the inventor" which is, subtly but impactfully, taking the patentability criteria of registration to an altogether different level with time.

KEYWORDS: Artificial Intelligence, Novelty, Non-obviousness, Inventorship, Information Technology Law, Patent Law.

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INTRODUCTION

With the advancement of technology, observed keenly that artificial intelligence has become one of the most efficient tools with numerous advantages in various industries. According to many scientists, by 2030, AI technologies will entirely replace the old human ways. Numerous advances have improved within the past four to five years, making AI a safer tool than humans. Coming to intellectual property, observed by the annual reports of WIPO meta versions of various social networking sites are booming like Facebook, Instagram, etc. With a lot of advancement of AI in various sectors, the prime issue that arises in patent laws of India is - Who'll be the owner of AI inventions?

Moreover, the patentability criteria possess various intricacies about the inventorship of AI inventions, whether novelty and non-obviousness/ inventiveness are there in the AI inventions. As there's an exponential growth of AI, the main aim in performing the research by the researchers is to provide a significant inception about the know-how of AI inventions and the scope of patentability. Secondly, the researchers are going to discuss the legality of patent protection in various international jurisdictions & challenges/ loopholes of the patentability of AI inventions.

The research conducted by the researcher is doctrinal, the researcher dealt with various IPR journals, periodicals, etc. The research is divided into four chapters:- Firstly, the authors would like to contemplate the scope and development of AI inventions with the significant inception of the Indian Patent regime. Second chapter will focus on the instances of AI machines that create various innovations highlighted for Patent protection. Assessment of Novelty and Inventive steps has come into the limelight on whether the AI machines will be made eligible to become creators of inventions through ownership. Third chapter deals with the comparative analysis of the legality of Patent protections for AI innovations in various jurisdictions like UK, South Africa, and USA. Lastly, the authors will discuss the challenges faced by AI inventions and Patent protection. How much the criteria for Patent protection in India is beneficial has been contemplated. Lastly, the authors will suggest some recommendations for readers to gain significant inception for future perspectives.

ARTIFICIAL INTELLIGENCE & ITS INCEPTION

AI encompasses a wide range of disciplines such as reasoning, information representation, robotics, natural language processing, and neural networks.[3] It is challenging to define AI in a few words due to its dynamic nature. However, several definitions provide a comprehensive understanding of the concept. Initially, machines were used for computations, but advancements

[3] Ana Ramalho, *Patentability of AI-Generated Inventions: Is a Reform of the Patent System Needed?*, SSRN JOURNAL (2018), https://www.ssrn.com/abstract=3168703 (last visited Oct 25, 2023).

in AI have transformed them into problem-solving devices similar to the human brain.

John McCarthy introduced the concept of AI in 1956, defining it as the science and technology of developing intelligent machines.[4] Elaine Rich defines AI as the study of making computers perform tasks that humans do better. The application of the Turing Test is crucial in AI, as it determines whether a machine possesses intelligence. Intelligence refers to the cognitive ability to learn, reason, remember, and cope with daily living.[5] AI aims to create machines that exhibit intelligent behaviour. The Turing Test[6] involves a human inquisitor interacting with a machine and a human, to identify which is which. If the machine successfully confuses the questioner, it passes the Turing Test and is considered intelligent. Alternative proposals, such as the Face Model and Idea Model, have been suggested to address the limitations of the Turing Test[7]. The Face Model focuses on computational creativity in AI inventions, demonstrating that machines can produce art. The Idea Model aims to quantify artistic endeavours by considering software development, execution, and appreciation cycles. It goes beyond traditional AI concepts and emphasizes the software's ability to establish its standards. These models provide new perspectives on evaluating AI performance.

i. *Inventiveness of AI*

Advances in artificial intelligence have elevated computers from being creative tools to major contributors to creation. Microsoft is developing a computer named 'Hanover' to store data connected to cancer therapies, anticipating the most profitable blend of medicines per every patient diagnosis. Innovative AI robots, such as Dr. Stephen Thaler's "Creativity Machine," have contributed to innovative innovations without little or no human involvement. Thaler's system features a computerized neural network that links to create software without human interaction, detecting useful and useless data. The machine created 11,000 novel tunes and the visual appearance of the Oral-B cross-action toothbrushes. Another example is IBM's Watson, which in 2011 frustrated previous Sleuth! Champions Ken Jennings and Brad Rutter. Watson can store 200 million pages of material and analyze queries using more than 100 algorithms. It assesses the best potential replies using millions of logic rules after identifying possible solutions. Such imaginative artificially intelligent robots have

[4] The True Father of Artificial Intelligence | OpenMind, https://www.bbvaopenmind.com/en/technology/artificial-intelligence/the-true-father-of-artificial-intelligence/ (last visited Oct 25, 2023).

[5] STEPHEN LUCCI & DANNY KOPEC, ARTIFICIAL INTELLIGENCE IN THE 21ST CENTURY: A LIVING INTRODUCTION (Second edition ed. 2016), http://www.books24x7.com/marc.asp?bookid=94346 (last visited Oct 25, 2023).

[6] STUART J. RUSSELL & PETER NORVIG, ARTIFICIAL INTELLIGENCE: A MODERN APPROACH (1995).

[7] Simon Colton, John Charnley & Alison Pease, *Computational Creativity Theory: The FACE and IDEA Descriptive Models*, PROCEEDINGS OF THE 2ND INTERNATIONAL CONFERENCE ON COMPUTATIONAL CREATIVITY, ICCC 2011 (2012).

significantly aided the medical sector and facilitated the creation of novel technologies.

ii. Implications of Artificial Intelligence & Intellectual Property Laws

The patentability of AI inventions raises several issues that need further analysis and discussion. It is important to address the various patent-related issues brought about by new technology.

Artificial intelligence development and inventorship are closely related. The patent system grants exclusivity rights to the creator of an invention. If the creator remains unidentified, the patent may be considered invalid. The challenge with AI is determining whether a machine can be considered an "inventor" and who owns the patent rights[8]. The definition of an inventor varies in different jurisdictions, but it commonly refers to a person. The court case of "Diamond v. Chakrabarty[9]" expanded the subject matter criteria for inventions in the United States, making everything produced by a human patentable. This approach aims to keep the concept in the hands of the individual rather than a formal entity like a company.

Ownership of patent rights in AI inventions is a complex issue because AI is not recognized as a legal person. AI cannot own or execute rights independently.[10] Therefore, ownership should be delegated to a human person capable of effectively exercising those rights. Alternatively, the machine can be designated as a co-inventor, and ownership can be vested in a person with a mutual connection. Prior art, which refers to publicly accessible knowledge before the registration of a claimed invention, is crucial in verifying the novelty of an invention. However, AI-generated claims pose challenges due to the vast amount of data generated by AI. It becomes difficult to establish what constitutes significant prior art. Defensive publishing, where breakthroughs are made public to prevent competitors from patenting the same concept, may be a result of the volume of information generated by AI. Reducing the threshold for novelty could lead to patenting existing knowledge in the public domain, which goes against the principles of patent law. Prioritizing the quality of AI-generated information over quantity and enhancing access to data can improve the standard of prior art knowledge. Liability issues arise as autonomous AI systems can create innovative products without much human assistance. The emergence of "inventive

[8] 35 U.S. Code § 100 - Definitions, LII / LEGAL INFORMATION INSTITUTE, https://www.law.cornell.edu/uscode/text/35/100 (last visited Oct 27, 2023).

[9] Diamond v. Chakrabarty, 447 U.S. 303 (1980), JUSTIA LAW, https://supreme.justia.com/cases/federal/us/447/303/ (last visited Oct 27, 2023).

[10] James Daily & F. Kieff, *Anything Under the Sun Made by Humans: Patent Law Doctrines As Endogenous Institutions for Commercializing Innovation*, 62 EMORY LAW JOURNAL 967 (2013).

machines" raises the question of who should be held liable for patent infringement. The current patent system does not consider non-human entities as possible infringers, so the owner or user of the AI system would likely be held accountable. This concept of "absolute liability" holds the owner responsible for AI infringement. While it may address the issue of accountability, it can also impede innovation and investment in AI technology, potentially leading to a societal revolution. Identifying the violator is crucial to protecting both the patent holder's rights and society at large.[11] In summary, AI's implications on intellectual property laws require careful consideration. The patentability of AI inventions, the ownership of patent rights, the challenges of prior art in AI inventions, and liability issues are critical areas that need further analysis and discussion to adapt the existing legal frameworks to the advancements in AI technology.[12]

INTERCONNECTION OF ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY LAWS

AI technology is rapidly evolving, impacting various industries including intellectual property. The European Parliament has recognized the need to address intellectual property protection in the context of AI and has called for new laws to identify smart robots as independent devices with the ability to generate copyrighted works. However, challenges arise in determining ownership of AI inventions under patent law, especially if all ideas are generated by automated systems. This issue is currently before national courts.[13]

The collaboration between patent laws and AI is increasing, as AI is used to simplify processes and reduce human involvement. While AI-enabled systems may appear similar to calculators, they operate in a more complex manner and can carry out activities based on critical insights. This presents novel legal challenges, particularly about patent law.[14]

Patents grant exclusive rights to inventions, which are defined as unique solutions to technological challenges. AI-enabled systems can generate ideas and products that may qualify as patentable inventions. However, the definition of an "inventor" in patent law needs to be reconsidered in light of the importance of AI in innovation.

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[11] Ben Hattenbach & Joshua Glucoft, *PATENTS IN AN ERA OF INFINITE MONKEYS AND ARTIFICIAL INTELLIGENCE*, 19.

[12] Tyagi - 2019 - PATENTABILITY OF Artificial.pdf, https://www.dehradunlawreview.com/wp-content/uploads/2020/02/8_Patentability_of_Artificial_Intelligence_Creations-79-87.pdf (last visited Oct 25, 2023).

[13] European Parliament, EUROPEAN PARLIAMENT, https://www.europarl.europa.eu/portal (last visited Oct 28, 2023).

[14] Artificial Intelligence in Society | en | OECD, https://www.oecd.org/publications/artificial-intelligence-in-society-eedfee77-en.htm (last visited Oct 26, 2023).

The European Union is encouraging countries to broaden copyright laws to include works created by AI as "own intellectual production." This recognition of AI's uniqueness in generating artistic works is a positive step. Patent protection should also be considered for AI and robot innovations, as they possess a high level of autonomy and can perform tasks without human support. However, protecting AI-created concepts through patents can be challenging, as they need to pass the three-step test of novelty, distinctiveness, and industrial applicability.

Further research and clarification of existing legislation and regulations are needed to address patentability and other concerns related to AI-based concepts.

JUDICIAL TRENDS OF EU & OTHER JURISDICTION ON THE ISSUE OF AI PATENTABILITY

i. Patent Law in Europe

Patent law includes worldwide, European, EU, and national legislation. The current study concentrates on the patentability of AI inventions in Europe, hence worldwide regulation will be briefly discussed. International legislation has influenced the creation and interpretation of legislation in several nations, making it an important factor to consider in the research.

The EPC currently consists of 38 Contracting States. Article 2(1) in the EPC refers to[15] patents were given to the EPC as European Patents. European Patents do not provide a single patent that protects the invention in all Contracting States. European patents generally have the same impact and terms as national patents granted in the Contracting States. Yet, European patents can be requested for several Contracting States. The EPO awarded European patents under Article 4 in the EPC. The EPC covers general and institutional rules, substantive patent law, European patent applications, various processes, and their influence on national law[16].

ii. The High Court's AI patent decisions: a watershed moment in terms of patenting of AI?

A recently issued decision by the UK High Court ended with a highly favourable identification for AI developers, potentially changing the influence of how the patenting of AI-related ideas is determined in the UK. In "Emotional Perception, AI Ltd v Comptroller- General of Patents, Designs, and Trade Marks, [2023] EWHC 2948 (Ch), the

[15] Guidelines for Examination in the European Patent Office.

[16] Article 2 – European patent, https://www.epo.org/en/legal/epc/2020/a2.html (last visited Jan 18, 2024).

High Court ruled that the UKIPO was incorrect in rejecting Emotional Perception's patent application because it was not patentable.[17]"

If the decision is followed, it indicates that the UK Intellectual Property Office (UKIPO) represents a more beneficial destination to obtain patents for AI-related creations compared to the European Patent Office (EPO), and may widen the door over patent protection for the subject matter that might have before have been eliminated[18].

a. *Background of the case*

The rise in AI usage and research has increased patent applications for AI-related technologies. Many AI-related ideas are patentable, yet getting protection from the UKIPO and the EPO is difficult due to European patentability exclusions. The EPO and UKIPO consider AI training and implementation to be mathematical techniques carried out by computer programs, which are not patentable under legislation. While not all AI ideas are unpatentable, they must have a significant technical impact, either by adding to a technological challenge outside of the computer or by taking special care of the underlying technology. It makes it challenging for many high-profile AI developments to get patent protection at the UKIPO and EPO.

b. *Applicability of the case*

Emotional Perception's patent application focuses on the use of artificial neural networks (ANNs) to detect semantically related material, such as subjective semantic representations in music files. The ANN is trained on a set of file pairings, creating two types of distances: semantic (semantic) distances and property (property). The ANN is taught to provide second distances that converge with the initial distances. Once trained, the ANN computes output distances concerning a database of reference files, determining semantic similarity between the new and reference files. It assists in identifying reference tracks in the database and recommending related music to users.

c. *Judgement*

The UKIPO rejected an application for patenting as it emphasized a computer program, claiming that learning or installing an Artificial Neural Network (ANN) had no

[17] AI Update in the UK: UKIPO to Appeal Emotional Perception AI Decision - Pearl Cohen, https://www.pearlcohen.com/ai-update-in-the-uk-ukipo-to-appeal-emotional-perception-ai-decision/ (last visited Jun 24, 2024).

[18] HGF Ltd-Nick King, *High Court's AI Patent Ruling: A Turning Point for the Patentability of AI?*, LEXOLOGY (2023), https://www.lexology.com/library/detail.aspx?g=076c001b-dc9e-4f8c-ad5c-c3fef365cafe (last visited Jan 18, 2024).

technological advances effect. The High Court disapproved, holding that an ANN is not a computer program, despite being implemented as software, and functions at a different level than the machine's underlying software. The court also determined that a software emulation of an ANN is equal to an ANN implemented in specific hardware, that was claimed not to be a computer that can be programmed and hence not subject to the constitutional limitation of computer programs.

The High Court also assessed whether the innovation might be regarded to offer a technical contribution, and disagreed with the UKIPO. The court ruled that the ANN recognized a file as semantically similar to a target file and that delivering a file taken by the trained ANN had a technical impact outside of the computer, regardless of whether the user getting the file listening to it. The High Court's opinion underlined that an ANN functions based on what it has learned itself rather than code provided by a human.

d. Rationale

The UKIPO has made a decision that has the potential to revolutionize the review process for AI-related creativity within the UK. The decision implies that an ANN taught using machine learning functions at a different level than the underlying computer program, possibly opening up patentability for a wide variety of subject matter. The notion that a trained ANN is a technical entity due to its weights and biases applies similarly to any model learned via machine learning. The decision also indicates that the patent claim includes applications for video, audio, picture, and text files.

The semantic evaluation of text files, which was previously classified as a non-technical purpose by the UKIPO, is now patentable under this ruling. The Emotional Perception patent application, on which the judgment is based, has also been submitted in other jurisdictions, especially before the European Patent Office (EPO), where it encountered substantial opposition. If the verdict is upheld, the UKIPO may become a more appealing venue for patenting AI-based technologies.

PRESENTLY LEGAL SYSTEMS FOR AI INNOVATION PATENTING

A patent is defined as the exclusive right to an innovation. This 'innovation' has been defined as any product or procedure that provides people with a novel way of achieving an objective, even those that offer a fresh approach to existing technological difficulties.[19] The owner of such a right has a legal obligation to prevent others from creating, selling, or even using the patented inventiveness during a limited period. As such, the license given in such a case legitimizes the development of a dominant position for the benefit of the person who created it.

Novelty

Novelty is a crucial factor in the creation of AI inventions, as stated by renowned jurist Judge Rich. He emphasized that a good monopoly provides the public with something new and unique, while a bad monopoly takes away what the public already has. In intellectual property laws, novelty is the requirement that only new inventions at the time of patent application can be granted a patent. For an invention to be considered patentable, it needs to be creative, nonobvious, and have practical application. In India, patents are not granted for innovations that were disclosed before the filing of a patent application. The term “state of the art” refers to the condition where an invention was not made public before the application date. The Indian Patents Act of 1970 lacks clarification on what constitutes state-of-the-art. If an innovation has been utilized, patented, or disclosed by someone before the applicant's application, it does not meet the requirement of novelty. AI systems face challenges in recognizing novelty and making decisions regarding it. This makes their creative step more difficult. Software programs are often denied patentability due to their technical nature. However, countries like India are relaxing their requirements for computer programs in connection with new hardware, allowing AI-enabled systems to develop software that can be used on generic computers. Nevertheless, existing laws and processes need to be simplified for AI-generated ideas to be eligible for patents.[20]

The concept of prior art or state of prior art is important in determining novelty. An invention must be innovative or novel, meaning it does not already exist in previous art. To establish novelty, inventors must thoroughly investigate existing inventions of the same or similar kind during the creation stage. This requires a comprehensive reading and evaluation of prior art. Only after this process can the inventor claim their creation as a novelty, which is a fundamental requirement for obtaining a patent. Machine learning has access to pre-existing art, must be autonomous in its decision-making process, and capable of considering fresh and unique aspects. This autonomy is

[19] Biswanath Prasad Radhey Shyam vs Hindustan Metal Industries on 13 December, 1978, https://indiankanoon.org/doc/1905157/ (last visited Oct 31, 2023).

[20] Patent Protection and the Novelty Requirement - Gottlieb, Rackman & Reisman, P.C., https://grr.com/publications/patent-protection-novelty-requirement/ (last visited Oct 30, 2023).

essential for ensuring true novelty in AI inventions.[21]

Non-obviousness

The non-obviousness doctrine, also known as the inventive step doctrine, is crucial in determining the patentability of AI innovations. It plays a significant role in the realm of technology, as it is considered the ultimate condition for patentability. The concept of the "true and first inventor" is important in understanding the roles of inventors in these innovations. Under the Indian Patents Act, an application for a patent can only be filed by the true and first inventor or those designated by them. However, the act excludes the first immigrant of an invention into India or someone to whom the invention is first passed on outside India from being considered a "true and first inventor." While AI can be explored as an inventor, it is widely recognized that the true and first inventor is a natural human. It will be interesting to see how the legislation develops regarding this issue, particularly when the designated "true and first inventor[22]" on a patent application is not an actual individual. In the context of An "inventor" is defined as an individual or a group of individuals who developed or discovered the subject matter of the invention under US Patent Law, "Townsend v. Smith[23]"stated that for something to qualify as considered a genuine product of an invention, it must first go through the stage of conceptualization. AI-enabled technologies provide chances to enhance and augment human cognitive abilities while also enriching people's lives and work.

ANALYSIS FOR NOVELTY AND NON-OBVIOUSNESS/ INVENTIVE STEPS

While the concept of computers or robots having creative or imaginative intelligence may sound far-fetched, certain researchers believe it isn't too distant. In his book Everything is Obvious, Professor Ryan Abbott outlines the transition from a human-based inventive phase to a completely AI-dominated inventive phase in which "inventive machines" can generate inventive or innovative results towards a point where no human intervention is required. However, the concept of a future with solely 'independent' Ais that does not require human intervention in the procedure of inventing or producing distinctive and innovative outputs has been criticized. While we may see AI working together with human creative minds within the near future, "autonomy (which must be distinguished from 'automation')" AI-powered machinery remains a utopia. Nevertheless,

[21] Riya Manuja, *Research Paper: Patenting Artificial Intelligence- Legal Implications*, PAPERBACKANDINK (Jun. 17, 2019), https://paperbackandink.wordpress.com/2019/06/17/patenting-artificial-intelligence-legal-implications/ (last visited Oct 29, 2023).

[22] Faizanur Rahman & Mohd Amir, *Exploring the Interfaces between Artificial Intelligence and Intellectual Property Rights*, 12 31955 (2021).

[23] Townsend v. Smith, 36 F.2d 292 | Casetext Search + Citator, https://casetext.com/case/townsend-v-smith (last visited Oct 30, 2023).

the use of AI in the context of innovation raises serious challenges in the realm of patent law. Although issues such as AI-generated invention ownership, patentability, and so on constitute vital subjects in the discipline of patent law, this post focuses on the difficulty of finding the 'nonobvious' criteria in such circumstances.

iii. Non-Obviousness & Assessing Inventiveness

The Indian Patents Act, of 1970 specifies innovative step as an element of an invention which includes advancements in technology, financial value, and either of which renders the creation unclear to someone with expertise. The existing law restricts the evaluation of creativity to an impartial review of the innovation against the extent of relevant art to the akin prior art and relies on this for defense against a combination suspected of making claims evident. The Indian Patents Act does not define the term "inventor," but it does allow an individual alleging as the real and original inventor, in addition to the assignee of such a person, to file an application for a patent. Judicial explanations, including "VB Mohammed Ibrahim v Alfred Schafranek & Ors[24]" and "Shining Industries v Sri Krishna Industries,[25]" were used for clarification inventorship[26]. In short, the Indian Patents Act does not explicitly define the term "inventor" and fails to take into consideration the true or real conditions under which an invention was made, including the amount of time and assets used by the true inventor or if an innovation was created by a human using AI technology or autonomously by AI.

iv. Judicial Trends in the analysis of Non- obviousness/ inventive Steps and Novelty

Judicial trends in the analysis of non-obviousness and inventive steps have been observed in both American and Indian patent laws. In American patent law, the concept of obviousness was embraced in the landmark case of "Hotchkiss v. Greenwood[27]" in 1851. The court stated that unless an invention required more inventiveness and skill than a common mechanic familiar in the field, it lacked the necessary competence and inventiveness. This test of obviousness was fully codified in Section 103 of the 1952 Patent Act. The Supreme Court later strengthened the evaluation of obviousness in "Graham v.

[24] V.B. Mohammed Ibrahim vs Alfred Schafraneck And Ors. on 4 June, 1958, https://indiankanoon.org/doc/1632880/ (last visited Oct 30, 2023).
[25] Shining Industries And Anr. vs Shri Krishna Industries on 3 May, 1974, https://indiankanoon.org/doc/1663997/ (last visited Oct 30, 2023).
[26] Benjie, *Assessing Inventiveness and Ownership of AI-Related Inventions*, LAW.ASIA (Aug. 22, 2022), https://law.asia/assessing-inventiveness-ownership-ai-related-inventions/ (last visited Oct 30, 2023).
[27] Hotchkiss v. Greenwood, 52 U.S. 248 (1850), JUSTIA LAW, https://supreme.justia.com/cases/federal/us/52/248/ (last visited Oct 31, 2023).

John Deere Co.[28]" by emphasizing that inquiries into the obviousness of the subject matter are a prerequisite to patentability.

In Indian patent law, the concept of obviousness was incorporated in the 1970 Patents Act. An "invention" is defined as a new product or process involving an inventive step and capable of industrial application. The Indian Supreme Court, in the case of "Bishwanath Prasad Radhey Shyam v. Hindustan Metal Industries[29]," stated that "obvious" is equivalent to "inventive step" and must be strictly and objectively judged. The court relied on previous judgments to determine that an invention should not naturally suggest itself based on what is already known. The High Court of Madras, in the case of "Bajaj v TVS,[30]" further clarified that an inventive step to be eligible for a patent must pertain to an innovation that includes technological growth or monetary value. The invention mustn't be obvious to a person skilled in the art. The court explained that even though the Patents Act does not define "obvious," it can be understood as a circumstance where a person with experience in the subject matter while reviewing the specification, would complete the product. Overall, both American and Indian patent laws emphasize the importance of non-obviousness and inventive steps in determining the patentability of an invention. The courts consider factors such as prior art, conventional competency, differences from prior art, and unbiased proof of non-obviousness to assess whether an invention meets these criteria.[31]

v. Judicial Interpretation of TVS Motor Vs. Bajaj Case

The Supreme Court case of TVS Motor Company Limited v/s Bajaj Auto Limited in 2009 involved two cases. Bajaj Auto Limited filed a complaint under Section 108 of the Patents Act, 1970, seeking a permanent injunction against TVS Motor Company's use of a patented technology in their motorcycles. TVS Motor Company filed a lawsuit under Section 106 claiming that the threats made by Bajaj Auto Limited were unfounded. The court determined that TVS Motor Company did not infringe on the patented technology because they made advancements and used a different valve system. The court also emphasized the significance of intellectual property rights and ordered all tribunals and

[28] Graham v. John Deere Co. of Kansas City, 383 US 1, Supreme Court 1966, (BitLaw), https://www.bitlaw.com/source/cases/patent/Graham-v-John-Deere.html (last visited Oct 31, 2023).
[29] Biswanath Prasad Radhey Shyam vs Hindustan Metal Industries on 13 December, 1978, *supra* note 17.
[30] Bajaj Auto Ltd., State Of ... vs Tvs Motor Company Ltd. on 16 February, 2008, https://indiankanoon.org/doc/1058259/ (last visited Oct 31, 2023).
[31] RADO V. JOHN TYE AND SON LIMITED | Reports of Patent, Design and Trade Mark Cases | Oxford Academic, https://academic.oup.com/rpc/article/84/11/297/1601136 (last visited Oct 31, 2023).

lower courts to resolve intellectual property cases within two to three months. The court ruled that if a combination or technique differs from the original procedure and produces the same outcome, it is not considered infringement. The court also highlighted the importance of interpreting patent claims with their purpose in mind rather than a literal meaning. Future trends in AI and patent laws have presented challenges, and there have been calls for a re-evaluation of current patent laws. One potential solution is to differentiate between patents granted for AI-assisted inventions and those developed solely by human inventors. However, there is a lack of technology expertise among Indian courts dealing with patent law, which complicates the assessment of AI technology and its impact on obviousness. The recent ruling in the Bajaj case has added to this issue.[32] The proposed draft bill to abolish the Intellectual Property Appellate Board (IPAB) further exacerbates the situation. The use of AI in inventions could prompt a re-examination of the core principles of patent law to ensure fairness and equity in the patent system.

Comparative Analysis of Novelty & Non- obviousness for AI Patent

The researchers conducted a comparative analysis of patentability standards for AI in various countries, examining the background, advancement, patent law structure, and patentability criteria for AI-based innovations. They discussed similarities and shifts in each country's approaches and discussed case studies of patent applications and recognition for AI-based creativity. The study highlighted the potential impact of AI on innovation, patenting, technological access, and market rivalry. AI is rapidly changing our lives, and its legal and ethical implications for patenting are crucial. The analysis provides an exhaustive overview of AI's growth from expert systems to advanced machine learning techniques. It also investigates the role of AI in the innovation process and its potential influence on patentability. The dissertation also reviews patent law frameworks in India, the United States, the United Kingdom, South Africa, and Australia, emphasizing the patentability criteria and barriers related to AI innovations.

The analysis presents a comprehensive investigation of the patentability of AI-based ideas in India, the United Kingdom, Australia, South Africa, and the United States. The report emphasizes the need for equitable innovation and intellectual property protection regimes in the era of fast-growing AI technologies. It recommends clear guidelines and norms to

[32] Analysis of the Test of Obviousness under Indian Patent Law in light of Artificial Intelligence – NLIU Cell for Studies in Intellectual Property Rights, (Jul. 14, 2021), https://csipr.nliu.ac.in/patent/analysis-of-the-test-of-obviousness-under-indian-patent-law-in-light-of-artificial-intelligence/ (last visited Oct 31, 2023).

evaluate AI-based ideas and recommends additional studies into AI's role in the invention process and its influence on patentability.

United Kingdom

The UK "Patent Act (PA) and the European Patent Convention (EPC) both require a person or persons" to be chosen as the inventor in a patent application. Hence AI cannot be considered an inventor. Its antiquated technique came into existence during the period when it was considered unthinkable for anybody other than a human to become an innovator." As society adapts and advances, the law must evolve adequate protection for AI investments. The author is concerned that if the existing system designs before AI was developed and considered, it should be changed or modified now. When nothing shifts, the future of invention is founded on uncertainty and lies, with AI owners assuming responsibility for work that isn't theirs just because they possess it. In 2018, five regions, which account for 80% of all patent applications globally, required an inventor to be a person.[33]

The UK government has argued that not all AI-generated ideas would be patentable, as reaffirmed in the DABUS case[34]. Dr. Stephen Thaler built an artificial intelligence computer called the Device for the Autonomous Bootstrapping of Unified Sentience (DABUS).[35] Dr. Thaler submitted two patents for DABUS's initiatives to the UK's Intellectual Property Office (IPO) and the European Patent Office (EPO). The UK IPO dismissed the applications, arguing that designating the computer as an inventor violated the Patents Act 1977. Dr. Thaler appealed the judgment, claiming that DABUS created a patentable invention and could file for the patent on the AI's behalf. This decision has sparked debate, with other governments, including South Africa and Australia, initially opposing the ruling. AI advocates argue that AI-generated ideas should be patentable to stimulate investment and innovation. Patentability requirements for AI include novelty, inventive step, and industrial capability. AI systems are not yet capable of improving their technical ability or understanding algorithms independently, making them unlikely to qualify for patent protection.[36]

[33] Patent pending: the law on AI inventorship, JOURNAL OF INTELLECTUAL PROPERTY LAW & PRACTICE (2021), https://doi.org/10.1093/jiplp/jpab002 (last visited Jan 21, 2024).

[34] AI cannot be named as an "inventor," top UK court says in patent dispute, https://www.cnbc.com/2023/12/20/ai-cannot-be-named-as-an-inventor-top-uk-court-says-in-patent-dispute.html (last visited Jan 21, 2024).

[35] Patentability of inventions created by AI—the DABUS claims from an Indian perspective | Journal of Intellectual Property Law & Practice | Oxford Academic, https://academic.oup.com/jiplp/article-abstract/15/11/879/5948823 (last visited Jan 21, 2024).

[36] Emilia David, *UK Supreme Court Rules AI Is Not an Inventor*, THE VERGE (2023), https://www.theverge.com/2023/12/20/24009524/uk-supreme-court-ai-inventor-copyright-patent (last visited Jan 21, 2024).

United States

In the US, patentable subjects include methods, devices, manufactures, and compositions of matter. However, the Supreme Court has ruled that natural laws, physical facts, and abstract ideas are not patentable under Section 101. *"The issue of AI-generated intellectual property patenting emerged in August 2019, when DABUS applications raised questions about how uncontrolled AI-generated intellectual property should be granted legal protection."* In 2020, the USPTO announced that an artificial system does not qualify as a scientist and that only "natural persons" can be credited as patent inventors. *"In 2021, the US District Court for the Eastern District of Virginia declared that an artificial intelligence system cannot be regarded as an inventor under the US Patent and Trademark Act. The dispute over AI inventorship and patentability is ongoing, and Congress needs to take action to clarify the law."*[37]

India

The Indian Patent Act of 1970 regulates the validity of patents for artificial intelligence-based creativity in India. However, reviewing AI-based patent applications can be challenging due to examiners identifying the technical features of the invention and whether it fits the statutory standards. Section 3(p) of the Act specifically stipulates that techniques of "performing mental acts" aren't patentable, which is an important factor for AI innovations in India. This has raised questions about whether AI-based innovations incorporating cognitive functions, such as making choices algorithms, are patentable in India.

In 2019, the Indian Patent Office established rules for examining computer-related innovations, particularly those based on artificial intelligence. These rules provide a structure for patent officers to analyze the patentability of computer-related innovations, including AI-based inventions, while also addressing specific patentability difficulties in this area.

Ferid Allani, a Tunisian citizen, established a concept and submitted a provisional patent application for it in France on 30.12.1999, with the number 99/16704. The PCT petition was submitted on December 29th. Ferid Allani sought to receive an invention patent for a "method and device for accessing information sources and services on the internet". The claims in the patent include both method and device claims.[38]

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[37] Patentability of inventions created by AI—the DABUS claims from an Indian perspective | Journal of Intellectual Property Law & Practice | Oxford Academic, *supra* note 33.

[38] critical analysis of NOVELTY AND INVENTIVENESS IN PATENTING AI INVENTIONS IN INDIA - Google Search, https://www.google.com/search?q=critical+analysis+of+NOVELTY+AND+INVENTIVENESS+IN+PATENTING+AI+INVENTIONS+IN+INDIA&oq=critical+analysis+of+NOVELTY+AND+INVENTIVENESS+IN+PATENTING+AI+INVENTIONS+IN++INDIA&gs_lcrp=EgZjaHJvbWUyBggAEEUYOdIBCTE0Njg3ajBqN6gCALACAA&sourceid=chrome&ie=UTF-8#ip=1 (last visited Nov 6, 2023).

During the proceedings, the petitioner argued that Section 3(k) prohibits computer programs in general, but the innovation delivered an improvement or a technical effect, so it cannot be rejected patent under Section 3(k) of the Act. The respondent contended that the Hon'ble High Court lacked jurisdiction to consider the current case under Article 227 of the Constitution.[39]

The Hon'ble Court accepted the petitioner's views and determined that Section 3(k) interprets connection with the CRI recommendations for optimal implementation. The court also stressed the importance of computer-related innovations, ruling that omitting them would undermine the Act's goal and imperil inventors' efforts. The court referred the application to the Patent Office for reconsideration based on the circumstances of the case and the Court's views on the technical effect of the claims.

Ferid Allani received a patent from IPAB on July 20, 2020, after a 19-year legal fight. The ruling clarifies that there is no absolute bar to issuing patents for computer-related inventions and provides a fresh direction for the patent office's approach in confronting novel applications for computer-related invention assertions in the future.

South Africa

In July 2021, the South African Patent Office (SAPO) issued a patent application for a food container based on fractal shapes, designating an AI system named "DABUS" as the inventor. This was the world's first AI system recognized as an inventor. South Africa's patent laws, unlike US patent law, do not identify an "inventor" as someone's or joint innovation. The DABUS patent was granted at the "Companies and Intellectual Property Commission (CIPC)" under a patent application submitted under the "Patent Cooperation Treaty (PCT)," a treaty to which South Africa is a party. "Sections 43A through 43F of the Patent Law govern such applications, with Section 43F exempting provisions 30 (1), 30 (5), 30 (6), and 30 (6) from jurisdiction."[40]

The DABUS patent application was authorized by the CIPC, naming DABUS as the inventor and Dr. Thaler as the patent owner. The absence of an "inventor" term under South African patent law and the structure of the local patent framework contributed to the grant. The patent's validity has become susceptible to applications filed challenging it in a South African court. Any outsider may petition the Court of the Commissioner of Patents to withdraw the patent, which could be withdrawn for reasons such as lack of ingenuity, uniqueness, and Dr. Thaler's ineligibility to file

[39] Diva Rai, *Patentability of Computer-Related Inventions (CRI) in India : An Analysis of Ferid Allani v Union of India and Ors*, IPLEADERS (Dec. 31, 2020), https://blog.ipleaders.in/patentability-computer-related-inventions-cri-india-analysis-ferid-allani-v-union-india-ors/ (last visited Jan 21, 2024).

[40] AI as a Patent Inventor – an Update from South Africa and Australia, MORRISON FOERSTER, https://www.mofo.com/resources/insights/210910-ai-patent-inventor (last visited Jan 22, 2024).

for it.[41]

Australia

Artificial intelligence (AI) and machine learning are increasingly being used in the life sciences for research and medication discovery. These technologies aid in finding biological targets, identifying hits or leads, drug repurposing, designing new chemicals, developing vaccines, establishing protein structures, and conducting clinical trials. However, the increasing use of AI and machine learning raises concerns about patentability, which is critical for safeguarding and rewarding investments in new drug applicants, therapies, and medical devices.

In the DABUS case, the Australian Patents Office (IPA) denied the applicant's request to designate a natural person inventor, stating that AI systems cannot be considered inventors under regulation 3.2C(2)(aa) as it contradicts the Patent Act. The Deputy Commissioner, Dr. S.D Barker, determined that the ordinary meaning of "inventor" as assessed today cannot include a machine. Justice Beach, however, determined that "there is no specific provision in the Patents Act that expressly refutes the proposition that an artificial intelligence system can be an inventor, and so AI can be an inventor." [42]The debate arose when Justice Beach stated that *"Dr. Thaler might bring himself within section 15(1)(b), which deals with a future conditional and does not require the presence of an inventor. He also stated that Dr. Thaler came under this clause since he obtained rights to the invention through DABUS."*

PATENTING ISSUES AS AN OUTCOME OF ARTIFICIAL INTELLIGENCE

AI is rapidly being used in R&D, with various stages and levels involved. These stages can be divided into three categories: as a tool to aid human inventors, as an intervening stage, and as computer outputs that may be patentable innovations. Projects like 'AllPriorArt' establish patent claims via autonomous technology, raising concerns about uniqueness and creativity. AI is also used to create imaginative machines such as Google's DeepMind and IBM's Watson. Artificial Neural Networks, a type of artificial intelligence that uses binary switches to excite biological brain neurons, have shown to be an effective tool for generating new ideas.[43]

As AI can be invented due to its learning ability, some patent regimes require the inventor to be a human rather than a machine. Knowing the inventor is vital for determining responsibility and

[41] Artificial Intelligence system as inventor in South African patent application: The case of DABUS - The IPKat, https://ipkitten.blogspot.com/2021/08/artificial-intelligence-system-as.html (last visited Nov 1, 2023).

[42] Australian Court determines that an Artificial Intelligence system can be an inventor for the purposes of patent law, DLA PIPER, https://www.dlapiper.com/en/insights/publications/2021/08/australian-court-determines-ai-system-an-inventor-for-purposes-of-patent-law (last visited Jan 22, 2024).

[43] DeepMind's new protein-folding A.I. is already in the fight against the coronavirus | Fortune, https://fortune.com/2020/11/30/covid-protein-folding-deepmind-ai/ (last visited Jun 1, 2022).

other legal repercussions. Governments must address this issue, as the current patent legislation in India is inadequate to address AI inventorship and create barriers to patenting AI-driven advancements.

The *"TVS vs. Bajaj case provided key decisions in the field of patent law, notably involving inventive steps. It underlined the importance of a non-obvious and technically sophisticated innovation to be eligible for patent protection, emphasizing the importance of originality, distinctiveness, and significant deviations from previous art for granting patent protection."*[44]

AI-GENERATED OUTPUTS AND INVENTORSHIP

The concept of AI as an inventor raises significant legal and ethical questions, as traditional patent law assumes human inventors. This section delves into the legal frameworks surrounding inventorship, the challenges posed by AI-generated inventions, and the ethical implications of recognizing AI as an inventor.[45] It also presents case studies of AI-generated inventions, examining how patent offices and courts have addressed these cases. The chapter reviews patent office policies on AI-generated outputs, comparing how different jurisdictions approach the issue of AI-generated inventions and the recognition of AI as an inventor.[46] The analysis assesses the effectiveness and implications of these policies for the future of AI and patent law. The future of AI and inventorship in patent law is explored, considering the evolving nature of AI technology and its impact on traditional concepts of inventorship and patentability.[47]

ETHICAL AND PRACTICAL IMPLICATIONS OF AI PATENTS

The study explores ethical issues in AI patenting, such as fairness, accessibility, and potential monopolistic behaviours. It also looks at the larger socioeconomic implications of patenting AI technologies. AI patents can have a substantial influence on innovation and competitiveness, particularly among small and medium-sized businesses (SMEs) and startups. Balancing invention protection with access to AI technology is difficult, but techniques such as open innovation models, licensing frameworks, and regulatory interventions can assist achieve it. The paper makes policy ideas for enhancing the patent system for AI inventions, as well as future approaches for legal and regulatory frameworks that would better fit the unique characteristics of AI technology while encouraging innovation and resolving ethical issues. The goal is to guarantee that patent

[44] Bajaj Auto Ltd., State Of ... vs Tvs Motor Company Ltd. on 16 February, 2008, *supra* note 28.
[45] Patent pending, *supra* note 31.
[46] Artificial intelligence | Epo.org, https://www.epo.org/en/news-events/in-focus/ict/artificial-intelligence (last visited Nov 1, 2023).
[47] Artificial Intelligence as an Inventor: A brief Exploration of South African Intellectual Property Law - Inventa, https://inventa.com/en/news/article/921/artificial-intelligence-as-an-inventor-a-brief-exploration-of-south-african-intellectual-property-law (last visited Jun 23, 2024).

regimes promote both technological innovation and its equitable distribution.

CONCLUSION

Patent law is exceptional because it overcomes the disparity across science and law. It depicts a harmonious combination of science and law. Still, in the modern era of artificial intelligence, the patent system is currently going through growing pains. Given the rapid advancement of science and technology, it has become essential for the patent system in the world to rethink the conventional tenets of the system of patents. It becomes an evident reality that AI-generated concepts will become increasingly prominent in the forthcoming decades, which will cause increasing difficulties facing the patent system. There is an urgent requirement for an internationally concerted effort to address the challenges that arise from AI and to equip international agreements such as the TRIPS to give an integrated approach to tackle the issue of cutting-edge AI. In contrast to the European, US, and UK patent offices, the Indian Patent Office has not created any guidelines for examining AI technology, and examiners are frequently unsure of the technique they must employ. When it comes to AI techniques and practical uses, they rely primarily on subject matter exclusions of software programs, mathematical methods/algorithms, and company operations, yet they are not specifically accurate about extending such exceptions to AI ideas.

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