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AI, Patent and the threshold of Human Invention- A Legal Analysis

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Abstract
The convergence of AI technologies and IP law raises complex questions, most notably about inventorship. The question of the moment is whether AI systems, capable of producing entirely new phenomena and outputs which would qualify as inventions by tradition, can be considered as inventors under current patent law regimes. The dominant legal models, which were carefully designed for a world where only human beings were such a source of innovation, may not be fit-for-purpose when it comes to the changes in the landscape precipitated by AI-facilitated technological innovation. This calls for an in-depth reflection on the legal, ethical and policy issues involved in determining if and how AI-generated inventions should be treated. Under the U.S. patent system, the United States Patent and Trademark Office (USPTO) requires that only a natural person can be an inventor on a patent application, a position that has the potential to disrupt the world's balance between economic incentives and societal costs if inventing-AI is recognized as an inventor.

Keywords: - AI, Patent Law, Intellectual Property Rights, Invention, Human Intervention.

1. Introduction
The convergence of AI technologies and IP law raises complex questions, most notably about inventorship. The question of the moment is whether AI systems, capable of producing entirely new phenomena and outputs which would qualify as inventions by tradition, can be considered as inventors under current patent law regimes (Oriakhogba, 2021). This question fundamentally challenges enduring principles that hinge patent rights upon human ingenuity and creativity (Staňková, 2021). The increasing complexity of AI that we see in machine learning and intricate problem-solving algorithms seems to blur the line between a human's tool and an agent with innovative ability (Kim et al., 2022). Contemporary legal precedents epitomized by cases such as **Thaler v. Comptroller-General**, underscore the ambiguities and uncertainties encircling AI's contribution to the inventive process, thereby instigating a critical reassessment of patent law's foundational tenets. (Abbott, 2016) The debate transcends mere legal technicalities, encompassing broader ramifications for innovation policy, economic incentives, and the very essence of intellectual property rights. Should AI genuinely invent without substantial human mediation, it would precipitate a fundamental transformation in how inventive activity is defined and rewarded. The existing patent system may face challenges in accommodating inventions partially or wholly conceived and developed by AI systems. The dominant legal models, which were carefully designed for a

world where only human beings were such a source of innovation, may not be fit-for-purpose when it comes to the changes in the landscape precipitated by AI-facilitated technological innovation. This calls for an in-depth reflection on the legal, ethical and policy issues involved in determining if and how AI-generated inventions should be treated. Under the U.S. patent system, the United States Patent and Trademark Office (USPTO) requires that only a natural person can be an inventor on a patent application, a position that has the potential to disrupt the world's balance between economic incentives and societal costs if inventing-AI is recognized as an inventor (Fok, 2021).

1.1. Research Problem

The concept of "AI-made inventions" has sparked hot debate over the direction of patent law and policy, yet it remains unclear whether fears concerning "non-human" inventive activity are at all justified (Kim, 2020). There is still a great deal of uncertainty about what AI-made inventions are and where the line on 'computer autonomy' in invention should be drawn (Kim, 2020). The fundamental question the debate circles around is whether creations made, at least partially, by AI would be patentable and, if so, under what conditions. The necessary amendments to support AI innovation under the existing standard of patent subject eligibility deserve careful thought. More research is required to determine if such AI generated inventions should be patentable, especially amidst the upcoming chaos and ongoing debates in this matter (Lamlert, 2020). There is a need for analysis of patentability of AI-generated inventions, of eligibility for AI or its owner as an "inventor", and of who should own patents, notwithstanding the lack of specific guidance on these matters (Abbott, 2020).

1.2. Significance of the Study

The implications of this study are important for intellectual property law and reform, innovation policy, and economic competition. It explores the economic ramifications of AI, recognizing its nature as an innovation and creativity enabler as well as a creativity and innovation destroyer (Cuntz et al., 2024). One must ask if AI-created inventions actually fit with the rationale and goals of the patent system. While the ethical and civil liability implications of AI would need to be extensively covered to create an effective framework, the evaluation of AI impediments on the IPR system could facilitate the updating of laws through flexible policies and guidelines, as AI would be used as a tool to enhance the speed and precision of data handling for inventors (Soni, 2024)(Sampaio & Santos, 2023). Additionally, those nations that create AI-IP structures will be in line to receive more investment in research & development (George & Walsh, 2022).

1.3. Research Questions

This research seeks to address the following key questions:

- To what extent can current patent law frameworks accommodate inventions generated, at least in part, by AI systems?
- What are the legal and moral ramifications of regarding AI as an inventor for patent law?
- What implications could the recognition of AI inventors have for innovation policy and the economic incentives for invention?

2. Literature Review

The legal literature has devoted significant attention to the impact of AI on IP, and in particular, on patent law (Unnikrishnan, 2024). The discussion on AI inventorship needs to

carefully assess current legal principles and how they can be applied to AI-created results (Munshi & Barai, 2022). Reflecting growing scholarly interest, recent writings have started to unpack the complex relationship between AI and inventorship, adding their voices to the calls for a thorough rethinking of patent law's basic concepts and beliefs.

2.1. Theoretical Foundations

The analysis of AI in patent law is framed with three theoretical perspectives, utilitarianism, natural rights theory, and incentive theory. Utilitarianism is also applicable to the question of whether or not granting patents for AI-generated inventions would support innovation and serve the society (i.e. general welfare). Natural rights model — arguing that creators have intrinsic rights to their creations raises the question of whether it is AI devices that can be considered "inventors" in the human sense of the term. The theory of incentive, that patents incentivize innovation by conferring to innovate exclusive rights to their inventions, leads to the question how to motivate AI-driven innovation best.

2.2. Key Cases

The Thaler v. Comptroller-General is a key reference when we discuss AI-inventorship (Xiao-qing & Pan, 2021). Determining whether AI is capable to be recognized as an inventor requires a re-assessment of the fundamental notion of human inventorship under existing patent law and policy (Oriakhogba, 2021). This case concerned an AI system called DABUS and asked the question of whether "the inventor" specified in the Patents Act 1977 included an AI (Fok, 2021). Thaler´s attorney Ryan Abbott has publicly rejected the notion of assigning a human´s name to the status of joint inventor, arguing that "no member of the species Man is named as an inventor," according to BBC News (Gibson, 2022). The reason why the court ruled against such a claim is indicative of the legal principle that inventorship cleaves to human agency and ability (Gibson, 2022).

2.3. Alternative IP Models

Different models of intellectual property protection for AI-created inventions have been suggested to address the particular aspects of AI-generated innovations. These possibly-thorny issues range from new intellectual property laws which reward patents for AI generated inventions to the "natural person" who has a "clearly defined relationship" with the AI system (despite potentially playing no or an extremely limited role in the undertakings of the AI's inventive tasks) (Schwartz & Rogers, 2022). Granting ownership directly to the company operating or owning the AI has also been proposed as a possible solution (Engel, 2020). Another proposal involves creating a sui generis system of intellectual property rights specifically tailored to AI-generated works (Frosio, 2022).

2.4. Impact of AI on Patentability

The belief that AI is able to replace human inventors has prompted arguments that the output generated by these systems does not merit IP protection (Kim et al., 2022). Nevertheless, these assumptions lack thorough technical analysis explaining the design of "intelligent systems" and the configuration of computational processes that lead to an invention (Kim, 2020). The existing patent system for human inventors is ill fit to cater to inventions conceived, at least in part, by AI systems. The idea that machines independently create patentable inventions sucking up on resources as certain people claim that machines have

been making patentable inventions for at least 20 years on an auto pilot is just plain wrong because, AI techniques are the tools in the hands of an inventor (Kim et al., 2022).

2.5. The Inventive Step Requirement

Non-obviousness (or inventive step) is an important criterion for the patentability of an invention, although it can be a very subjective test. The ability of AI to process large amounts of data at speed and submission of non-obvious solutions calls into question the conventional analysis of inventiveness (Kim et al., 2022). It is worth thinking about whether AI-derived inventions make the grade, particularly when an AI system can come up with solutions that the human would not be likely to think of (Mukherjee & Chang, 2025).

3. Methodology

The research uses an interdisciplinary method, combining legal analysis, comparative research, and policy analysis to answer the research questions in full. The legal analysis includes a comprehensive review of patent laws, court decisions, and legal literature on the subject of patents so as to assess whether existing patent law regimes are well calibrated to the emerging field of AI powered inventions.(Dzuong et al., 2024).

3.1. Doctrinal Legal Analysis

The analysis adopts a doctrinal legal approach which involves the in-depth analysis of current patent laws, case law, and academic commentary relating to inventorship and AI. With this method, it is possible to get a good overview of the legal and technical issues presented by AI-invented inventions in the current legal context (Ndlovu, 2021). It examines the written law in its own terms, to determine the interpretation and extent of the law and its application to particular factual situations. Rather, in dissecting the literal language of statutes, regulations, and legal codes for how they do - or do not - account for the kinds of discrete concerns raised by AI inventorship.

3.2. Comparative Approach

The comparative perspective is to study patent laws and practice of the foreign and international systems and identify the possible best practice and need for reforms. Through comparisons of methods and alternatives, this research seeks to find possible responses to the concerns raised by AI inventorship. A study of the patentability of AI would look at different approaches in different countries.

3.3. Evaluation of Policy Implications

The study considers the broader policy implications (positive or otherwise) of granting or refusing patent protection to AI-generated inventions. It assesses the potential effects on innovation, economic competitiveness and the public good. That includes considering how different policy options could influence the speed and direction of AI development, incentives for investment in AI research, and the potential benefits and harms to society. By focusing on such wider implications, the research will seek to inform evidence-based policy advice to encourage responsible and beneficial innovation in the AI era.

3.4. Case Studies

Case studies will be used to illustrate the practical implications of AI inventorship and to examine how patent offices and courts have responded to AI-related patent applications (Getman et al., 2023). Because each case study was analyzed in great detail, the choice was

made to provide one core-AI patent, and one AI-application for the selection of AI-related patents (Guillén & Jurado, 2023). The analysis of use cases illustrates the real-world consequences of AI inventorship and examines patent offices and courts in handling patent applications which claim AI (Turdialiev, 2024).

4. Legal Threshold of Human Invention

The legal standard of human invention is an important part of patent law: for something to be an invention, it must be made by a human rather than generated by a machine or merely a matter of trial-and-error routine ("Artificial Inventors," 2020). Whether AI-generated outputs satisfy these thresholds are up for debate, as AI technology evolves toward being able to create an inventive step (Wibowo, 2023).

4.1. Statutory Interpretation

Statutory construction applies to the detailed requirements of patent laws to unpack how they intersect with the AI-generated inventions. The courts frequently resort to well-settled rules of statutory interpretation to discover the will of the legislature and to clear up an ambiguity in the statute. Judges will need to consider the words that are used in patent statutes, like "inventor" and "patentable distinct and useful," with attention to the particular facts of individual cases related to AI. This includes taking into account the legislative history of the relevant provision, the entire purpose of the patent system, and the respective impacts of different interpretations.

4.2. Judicial Precedents

Case law is crucial to the development of the law on AI inventorship, as courts consider the novel challenges posed by AI-created inventions. The courts, which are reviewing patent cases, often consult previous decisions to interpret patent laws and apply them to new technologies (Giuffrida, 2024). Landmark cases, for example, Thaler v Comptroller-General established key principles that will be relied upon in gauging the legal status of AI as an inventor and the criterion for human intervention in an invention (Henderson, 2025). These benchmarks may also influence the patentability of AI-generated inventions and investment in the AI arena.

4.3. Person Skilled in the Art

The question of whether an invention claimed to have been AI-assisted would have been obvious to a person having ordinary skill in the art is difficult to answer because it turns on the level of skill and expertise a theoretical expert in the field actually has. The advancements of technology demands for modernization of the concept of a "person skilled in the art", it would be fit to treat as someone who has the opportunity and capability to work an inventive machines (Abbott, 2020). The obviousness standard will evolve to accommodate these new AI capabilities (Abbott, 2020).

4.4. AI's Role

"The consideration of whether something is AI-made is one of the most critical questions for while it doesn't change the underlying qualifications for patent eligibility in terms of subject matter, it is a threshold question for deciding whether a patent was directed to an abstract idea." If a human inventor uses AI as nothing more than a tool, the invention still might be patentable. But if AI is behind the invention as opposed to humans playing a minor role in creating the invention, the AI invention is unlikely to qualify as having human inventorship.

This distinction poses challenging questions as to the degree and type of human input necessary for a subject matter to be patent-eligible, especially where AI is heavily involved in the development of new and inventive solutions.

5. Case Study: The DABUS Controversy

The DABUS dispute is a test case which has focused attention on the question of AI inventorship both legally and in the court of public opinion (Picht & Thouvenin, 2023).

5.1. Facts of the Case

The DABUS case revolved around two patent applications provided by inventor Stephen Thaler that listed an AI system he had built, called DABUS, as the inventor of the inventions referenced by the applications. The two inventions in question consisted of a fractal container and an apparatus for increasing attention. Thaler claimed that DABUS had invented those 'inventions' independently and substantially without many human interventions and thus DABUS was deemed to be the originator.

5.2. Legal Arguments

The legal questions in the DABUS case revolved around whether an AI system, under current patent laws, can be conceived as an inventor. Thaler contended that the word “inventor” should be interpreted in a “technology-neutral” way that would encompass AI systems, though patent offices and courts around the world have so far tended to hold that an inventor should be a human being. The case also highlighted the issue of whether a human contribution was necessary for an invention, as well as the level to which AI could be an independent actor in a device invention.

5.3. Jurisdictional Responses

The case of DABUS has made its way through several jurisdictions, including in the US and the UK and also in Europe, with different results. On the whole, patent offices and courts have thrown AI out as an inventor, arguing that this would not be possible because the inventor’s role is one to be played by a natural person. Nevertheless, the case has prompted discussion regarding the desirability of amending patent laws to reflect the nature of AI-driven innovation and exploring alternate mechanisms for recognising and rewarding AI-generated inventions.

5.4. Implications of the DABUS Case

The DABUS case will be incredibly important in helping to form a legal framework surrounding the emergence of AI innovation. It has also created debate over how AI-invented inventions should be regulated, and more broadly sparked conversations about AI’s role in innovation. The case has also raised broader issues about the incentives for AI innovation, and what impact AI might have upon the patent system.

AI systems can now tackle a wide range of problems and produce human-equivalent text, images, videos and art, which means that the way we use our brains to create and communicate, is beginning to change rapidly (Hacker, 2023). AI is getting smarter, and increasingly we’re seeing amazing humanlike feats out of the technology (Svedman, 2020). This may be a concern if the output created by an AI is original, yet it is difficult to enforce copyright law on AI generated works (AHUJA, 2020).

6. Policy Alternatives and Recommendations

The increasing capacities of AI demand a careful consideration of existing IP law in the context of AI creations. There are a few policy options for maintaining the legal framework and facilitating innovation in the era of AI.

Option 1: Amend Patent Laws
One option is to reform patent laws to make explicit reference to the issue of AI inventorship. Legislatures could define whether AI systems can be identified as inventors or if human involvement is necessary, and to what degree. Changes could also clarify issues related to ownership of AI-generated inventions and the roles and responsibilities of AI system developers and users.

Option 2: Create a Sui Generis System
Alternatively, a sui generis approach can also be developed for AI-generated inventions. This might require a new form of intellectual property right taking account of the specific features of AGW and providing the level of protection and incentives for creation that is needed. A sui generis regime could also cover questions of ownership or liability and duration of protection in relation to AI generated inventions.

Option 3: Adopt a "Human-in-the-Loop" Approach
A "human-in-the-loop" rule might also be considered where some level of human being participation in creative work is necessary in order to have an invention that can be patented. Perhaps this would take the form of human inventors needing to have played a material role in the invention – or that, say, human beings should have been in control of the AI system when the invention was being created or developed. Such an approach would help to ensure that human creativity remains at the core of the patent system, while recognizing the artificial intelligence's contribution to helping and assisting - or perhaps even augmenting - the human inventor when it comes to generating inventions. AI's movement from providing advice to acting proactively is challenging the way traditional law, creativity and economics are conceived (Mukherjee & Chang, 2025).

Such traditional problem-solving is the part of history, from archaic hunter gatherings to the age of Fourth Industrial Revolution with the support by advanced computing power (Kappos & Kling, 2021). With AI becoming more embedded in society, regulators have to walk a fine line between legal constraints and the pace of change in tech (Wu & Liu, 2023)(Wu & Liu, 2023). The aim is to harness the power of AI, addressing challenges - some of which are common across the various applications of AI: namely, the establishment of roles of actors involved, including government, the accommodation of public interest demands, support to research innovation and responsible commercial application (Lewis et al., 2020).

Option 4: Maintain Status Quo
One is to stick with the current legal framework and to let judicial interpretation and case law deal with towards the AI-generated inventions when and where they appear. This might afford room for maneuver with new emerging issues, but the consequence could be confusion and an inconsistency in the way patent law is applied to AI. The IP regime needs to evolve to support the enormous potential of AI (Kappos & Kling, 2021). The current legal agreements and other legal instruments as they are established for the world in which only human beings were the source of technology can fail to address the market forcing created by AI based technological acceleration.

7. Conclusion

The intersection between AI and IP law is a daunting challenge that requires a coherent and proactive solution. The fundamental issue of whether AI systems can be considered inventors under prevailing patent law rests at the intersection of well-established tenets that grant patent rights based on human ingenuity and creativity. Given the dynamic nature of AI and its growing influence on the innovation process, it is important to foster open discussions between policymakers, legal scholars, and industry players to arrive at a consensus as to how AI generated inventions should best be handled (Picht & Thouvenin, 2023). Reflections from the economic analysis of patents could feed into AI's legal issues (Uzunidis, 2020).

The regulatory terrain is also getting complex in India with the transformational role being played by AI across sectors there, leading to efficiency and innovation. But, as AI technology has evolved at a fast pace, it has also sparked difficult legal and ethical issues, specifically around liability and responsibility (Bharati, 2024).

7.1. Summary of Findings

Based on the analysis presented in this paper, several key findings emerge:

- AI systems are increasingly capable of generating novel and non-obvious outputs that would traditionally qualify as inventions.
- The question of whether AI can be recognized as an inventor under existing patent law frameworks remains unresolved, with different jurisdictions taking different approaches.
- The current patent system, designed for human inventors, may struggle to accommodate inventions conceived and developed, at least in part, by AI systems.
- Addressing the issue of AI inventorship requires a thorough examination of the legal, ethical, and policy considerations involved.

Current civil liability systems might be insufficient to address risks posed by AI systems that have unpredictability and autonomy (Buiten et al., 2021). It goes deep into the difficulty of attributing blame in errors, accidents, and malfeasance by AI systems—an ecosystem of stakeholders that encompasses developers, manufacturers, users, and regulators (Bharati, 2024).

7.2. Future Directions

Moving forward, several avenues for future research and policy development should be considered:

- Conduct further legal analysis to clarify the scope and interpretation of existing patent laws in the context of AI-generated inventions.
- Explore the potential implications of AI inventorship for innovation policy, economic incentives, and the nature of intellectual property rights.
- Investigate the ethical considerations surrounding AI inventorship, including issues of fairness, accountability, and transparency.

The relentless advance of Artificial Intelligence can address many people's societal needs and can cater for many economic sectors, but entails significant risks for both the ones that provide such technologies and the ones that consume such technologies (Montagnani et al., 2024). As such, the coverage of AI ethics and governance is necessary which includes principles and discussions between AI practitioners and the general public (Sun et al., 2024). The analysis finds that while AI holds immense potential to increase productivity and

innovation, it is being embraced faster than the creation of mature institutional protections (Machado et al., 2025).

7.3. Limitations

The ongoing changes in AI technology, regulatory frameworks, and judicial interpretations pose limitations on the depth of this analysis. Additionally, the rapid evolution of AI in India introduces complexities concerning liability and accountability, further underscoring the need for adaptive legal and ethical standards.

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