Legal Analysis and Challenges of Artificial Intelligence as an Inventor: A Study Based on UK and US Patent Law

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Abstract: With the continuous advancement of Artificial Intelligence (AI) technology, the role AI plays in the innovation process has sparked a profound discussion regarding patent law. Particularly as AI systems become capable of independently generating inventions, the question of whether AI can be recognized as an inventor has emerged as a crucial issue in contemporary legal discourse. This paper aims to explore whether AI can be regarded as an inventor under the patent law frameworks of the United Kingdom and the United States and to analyze the implications of this issue on patent law. In particular, it adopts a literature analysis approach, reviewing relevant legal texts, case judgments, and academic discussions, with key sources including major patent law cases in the UK and the US, such as Thaler v. Comptroller of Patents and Thaler v. Vidal. The results indicate that both UK and US patent laws explicitly state that AI systems cannot be recognized as inventors. The term "inventor" in patent law is strictly defined as a natural person, which creates a barrier to recognizing AI as an inventor. Despite its significant role in innovation, AI cannot be seen as an inventor under current legal definitions. In the future, patent law may need to be adjusted to address the new challenges posed by AI technology.

Keywords: Artificial Intelligence, Patent Law, Inventor, Legal Definition, Innovation

1. Introduction

As artificial intelligence (AI) technology evolves quickly, its influence on innovation is becoming more pronounced, especially with AI systems now able to create inventions on their own. And the question of whether AI should be recognized as an "inventor" within the framework of patent law has become a significant issue in the legal field. While scholars have explored whether AI qualifies as an inventor under current legal definitions, most existing studies focus on individual countries, lacking in-depth cross-jurisdictional comparison and analysis. At present, both UK and US patent laws explicitly state that only natural persons can be recognized as inventors, making the issue of AI as an inventor particularly complex. Therefore, the paper aims to investigate whether AI can be recognized as an inventor under the current patent laws of the UK and the US, analyzing relevant legal provisions and judicial practices, with a focus on the challenges AI technology presents to existing patent law. Specifically, it explores how AI's role in innovation affects the definition of "inventor," whether current patent laws are adequate to address this challenge, and whether patent law may need to be amended in the future. Through a comparative analysis of key cases in the UK and the US, this paper will provide a theoretical basis for future reforms of patent law and offer guidance for legal practice. Employing a qualitative research approach, the paper seeks to provide deep insights into how future

legal frameworks can adapt to technological changes, with significant practical implications and long-term societal impact.

2. The definition of inventor in patent law

2.1. The definition of inventor in UK patent law

Under the Patent Act 1977, an AI system cannot be recognized as an inventor in a patent application, and the owner of the AI system does not meet the qualifications to apply for a patent based on the invention [1]. According to Section 7(3) of the Act, an inventor is defined as the person or persons who are the actual devisers of the invention, referring to those who conceived the inventive concept that underpins the patent application. Furthermore, under Section 13(2), the mere ownership of an AI system does not confer the right to apply for a patent, as the necessary legal derivation of rights has not been established. Additional provisions like Sections 2(4), 8, and 37, reinforce the principle that an inventor must be a natural person and that the rights to apply for and be granted a patent are exclusively derived from human inventors [2]. Since an AI system lacks legal personality, it does not qualify as an inventor under the Patent Act 1977 and cannot be designated as such in a patent application.

2.2. The definition of inventor in US patent law

Under Title 35 of the United States Code, AI systems cannot be recognized as inventors. Section 100(f) defines an inventor as the individual or, if there is a joint invention, the individuals who invented or discovered the subject matter of the invention collectively. And the term "individual" specifically refers to a natural person, rather than a machine, corporation, or AI system. While AI systems are advanced tools that assist in innovation, they do not independently "invent" in the legal sense and thus do not fulfill the criteria of an "individual." Additionally, Section 115(a) of Title 35 mandates that patent applications identify the inventors, and each person designated as an inventor must take an oath or make a declaration. This provision is strictly limited to natural persons who have conceived or discovered the invention, excluding AI systems. The United States Patent and Trademark Office has affirmed that these regulations implicitly require inventors to be natural persons. Broadly interpreting inventor to encompass machines would conflict with the clear and explicit interpretation of patent law, which is founded on the premise that inventors must be natural persons [3].

3. The role and legal challenges of artificial intelligence in invention

3.1. Limitations of AI as an innovative tool

AI systems excel at processing and analyzing vast amounts of data at high speeds, enabling humans to identify potential patterns and trends. For instance, in legal research, AI can swiftly search for similar cases and identify relevant legal provisions that may inform a given case. Additionally, AI can simulate complex scenarios and predict outcomes, assisting humans in making informed decisions. As a result, AI-powered tools are increasingly being used in fields like patent law, where law professors teach students how to leverage AI in patent drafting, and even prestigious law firms have adopted AI tools for their work [4]. However, AI's role in innovation remains auxiliary and functional, rather than creative. While AI can assist in discovering patterns based on existing data, it lacks true originality and cannot independently produce creative inventions. For instance, in a case where AI was used to generate images, the plaintiff employed an AI model to create a picture by inputting prompt words and modifying parameters [5]. The AI merely played an auxiliary role in generating the

image, with the key creative input like aesthetic judgment and personal preferences, originating from the plaintiff [6]. This demonstrates that, while AI systems are valuable tools, they cannot independently generate novel, creative ideas without human input. Reducing patenting costs, AI has the potential to democratize innovation. However, it could also strengthen the dominance of larger entities, raising concerns regarding fairness and accessibility. Moreover, AI's ability to generate vast volumes of descriptions for new or even speculative technologies presents challenges for patent examiners, who may struggle to distinguish between human and AI contributions when reviewing patent applications.

3.2. Legal requirements for the identity of "inventors"

Under the patent laws of both the United Kingdom and the United States, "inventors" must meet the criteria of novelty (non-obviousness) and independence. Regarding novelty, an inventor must contribute to the inventive concept in a meaningful way. The United States Patent and Trademark Office (USPTO) explicitly clarifies in its "Inventorship Guidance for AI Assisted Inventions" that merely recognizing the products generated by AI systems as inventions, especially those whose features are obvious in comparison to existing technologies, does not suffice for designating natural persons as inventors. Specifically, merely following instructions or analyzing data without offering original thought does not qualify an individual as an inventor. The essential requirement for novelty is that the contribution to the invention must go beyond simple data processing or reproduction of existing knowledge. Independence requires that the work be created solely by the inventor, without reliance on or copying from others. Put simply, the contribution must be original and not derived from prior inventions or plagiarized ideas. This ensures the invention results from independent thought, not merely an adaptation of existing concepts. The case of Thaler v. Hirshfeld underscores this, as the court ruled that inventorship is determined by original contributions to the invention's conception, requiring independent creativity rather than mere participation or reliance on existing ideas [7]. This reinforces the necessity for inventors to demonstrate genuine originality and. Further legal provisions, such as the Patent Act Section 101 (US), clarify that a patent may only be granted for inventions that are novel and non-obvious, reinforcing the requirement that inventors contribute their unique ideas. These provisions help distinguish between independent inventions and those that merely aggregate or modify existing concepts. Therefore, in both the UK and US legal contexts, novelty ensures that the invention is original and not a mere reworking of existing knowledge, while independence ensures that the inventor's contributions are original and not the result of copying or undue reliance on prior works.

4. Judicial practice of artificial intelligence as inventor problem

4.1. Thaler v. Comptroller of patents and the issue of AI inventorship

In Thaler v Comptroller (UKSC 2023), the court conducted a detailed analysis of whether DABUS (Device for the Autonomous Bootstrapping of Unified Sentience), as an AI system, met the legal requirements for inventorship under the UK Patents Act 1977 [8]. The court's decision was rooted in an interpretation of the Patents Act 1977, particularly sections 7 and 13, which govern the definition of an "inventor." The UKIPO previously ruled that DABUS, an AI system, could not qualify as an inventor under the Act, and consequently determined that Stephen Thaler, as the owner of the AI, could not validly apply for a patent solely based on his ownership of the machine, due to an inability to establish a lawful derivation of rights from the purported inventor. This stance was upheld by the Supreme Court, which ultimately agreed with the earlier ruling. The key reason the court rejected the idea that DABUS could be an inventor lies in its interpretation of the term "inventor" under the Patents Act 1977[9]. According to section 7(3) of the Act, the inventor is defined as the actual deviser

of the invention. The court stressed that deviser refers to a person who creates a new, non-obvious product or process with industrial application. It concluded that only a human can fulfill this role, as "devising" depends on human creativity and cognition. Also, the Supreme Court referenced provisions of the Patents Act 1977, particularly sections 2(4), 8, and 37, which define the inventor as a natural person. The Court emphasized that these sections reinforce the view that inventors must be capable of intellectual creativity and decision-making, abilities that an AI system lacks. The court concluded that DABUS could not be recognized as an inventor, as it is not a natural person, and that Thaler, as the AI's owner, could not claim inventorship on its behalf.

4.2. The USPTO's stance on AI inventorship and the future of patent law

The USPTO has definitively established that only humans can be considered inventors under U.S. patent law, based on an interpretation of the U.S. Patent Act. Specifically, 35 U.S.C. 100(f) defines an inventor as "the individual... who invented or discovered the subject matter of the invention," implicitly requiring a natural person. In addition, 35 U.S.C. 101 and 115 use terms like "whoever," "individual," and "himself or herself," which the USPTO interpreted as unambiguously referring to a human being. The agency argued that interpreting "inventor" to include non-human entities, such as machines or AI, would contradict the plain meaning of these statutes, which consistently define inventors as persons or individuals. The USPTO's reasoning is reinforced by case law, including Mohamad v. Palestinian Authority, which emphasizes that Congress's use of the term "individual" in the Patent Act directly associates inventorship with human beings. The requirement within the Patent Act that an inventor must sign an oath or declaration affirming their belief that they are the original inventor or a joint inventor of the invention also reinforces this view [10]. This oath, which requires the inventor to personally affirm their inventive role, further suggests that inventorship is a concept rooted in individual human agency, which cannot be delegated to a machine. From a legal and policy perspective, the USPTO's position raises important questions about the scope and nature of intellectual property rights as technology advances. The clear demarcation between human and non-human inventors reflects a fundamental distinction in the law: inventorship, as it currently stands, is based on human creativity and agency. This interpretation, however, may face increasing challenges as AI systems like DABUS and other autonomous technologies become more advanced and capable of contributing to the innovation process. The USPTO's decision upholds traditional inventorship but highlights the need to reconsider the definition of inventor as technology advances.

4.3. International perspectives on AI as an inventor

The legal recognition of AI as an inventor is an evolving issue across multiple jurisdictions, with each country addressing the challenge in its own way. In Germany, the Federal Court of Justice ruled in 2024 in the case of President of the German Patent and Trademark Office v. Stephen L. Thaler, rejecting the notion that an AI system like DABUS could be considered an inventor [11]. The court emphasized that the inventor under German patent law must refer to a natural person, reinforcing the view that AI is simply a tool used by human inventors, not an independent creator. This decision reflects Germany's traditional stance on inventorship, restricting it to humans only. Similarly, in Australia, Thaler's attempt to list DABUS as the inventor of an AI-generated invention was rejected by the Deputy Commissioner of Patents [12]. The Commissioner argued that the Australian Patents Act 1990 requires inventors to be human and that granting a patent to an AI would be impossible [13]. However, in a later ruling, the Australian Federal Court adopted a more progressive stance, suggesting that excluding AI-generated inventions from patent protection could hinder technological progress [14]. The Court acknowledged that patent law's purpose is to foster innovation and argued that the definition of inventor should not be narrowly construed. This shift

reflects Australia's growing openness to revisiting inventorship in response to advancements in AI technology. Meanwhile, South Africa's intellectual property policy, while not explicitly addressing AI as an inventor, reflects a positive attitude toward innovation and technological development. The policy highlights intellectual property's role in driving innovation and economic growth, suggesting that AI-generated inventions may be more recognized and protected in the future to support the country's broader technological progress goals. The debate on AI as an inventor highlights a divide between human-centric jurisdictions like Germany and those like Australia and South Africa, which recognize AI's growing role in innovation, suggesting the need for patent laws to adapt.

5. Public discussion and legal prospects of artificial intelligence as an inventor issue

5.1. Perspectives on AI as an inventor from supporters and critics

The debate over AI as an inventor involves contrasting views from supporters and critics, each with distinct legal and social motivations. Supporters argue that, with AI's growing role in the invention process, patent law should evolve to recognize AI-generated inventions rather than exclude them due to AI's involvement [15]. This view sees AI as a critical tool for innovation, with recognizing AI-generated inventions serving to boost further AI development and drive technological progress. These proponents contend that patents play a vital role in encouraging investment in AI research, and denying patent protection to AI-driven inventions would reduce the motivation to invest in this technology. Besides, the American Bar Association has specified that those who use AI to assist in the invention process, like providing training data or recognizing the final results, should be seen as the inventors, not the AI itself [16]. This stance calls for a redefinition of "inventor" to include those who facilitate or contribute to the AI's inventive process. In contrast, critics maintain that the concept of inventorship should remain tied to human creativity and cognition. They argue that the definition of inventor in patent law should not be expanded to include AI, as AI lacks the essential cognitive abilities required for inventiveness. From this perspective, the role of AI is seen as a tool rather than a creator. Critics worry that recognizing AI as an inventor could undermine the patent system by diluting the principle that patents should reward human innovation. This view argues that AI's lack of true creativity makes it incompatible with traditional inventorship, potentially causing legal confusion and reducing transparency.

5.2. Proposed reforms for patent law in response to AI-generated inventions

In many countries, there is a consensus that AI cannot be recognized as an inventor under current patent law. However, to keep pace with the evolving technical landscape, reduce legal and ethical risks, and foster innovation, legal reforms are still possible. Patent laws could introduce specific standards to differentiate between AI-assisted inventions and AI-independent inventions. First, a graded examination system could be implemented. For AI-assisted inventions, traditional patent criteria would apply, thereby requiring human inventors to demonstrate their creative contribution. For AI-independent inventions, evidence of creative contribution would come from human-AI interaction, requiring patent applicants to submit information on their collaboration with AI. This may provide a basis for future disputes over inventorship [17]. Second, a dynamic protection period could be set, varying by technical field. For instance, AI-generated pharmaceutical inventions could be granted 20 years of protection, while AI-developed algorithms might have a shorter protection period of 5 to 10 years. Finally, an "AI owner + contributor" model could be introduced, where the rights to AI-generated inventions are shared between the AI owner, such as enterprise or developer, and the training data provider, acknowledging their respective contributions [18].

6.   Conclusion

The paper shows that current patent laws, particularly in the UK and the U.S., are inadequate to address the challenges posed by AI technology, particularly in recognizing AI as an inventor. Existing legal frameworks, such as sections 7 and 13 of the UK Patent Act 1977 and Title 35 of the U.S. Patent Law, clearly reject AI as an inventor. As AI continues to play an increasing role in innovation, it is crucial to adapt patent laws to account for new technological realities. Immediate reforms could include broadening the definition of "inventor" via case law or judicial interpretation, while long-term solutions might involve creating automated, blockchain-based systems for rights allocation and fostering global patent pools. Moreover, future legal reforms should address ethical concerns related to AI-generated inventions, particularly ensuring fair access to training data.

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