A Study on the Intellectual Property Challenges of AI-Based Algorithms in International Law

1. Sina Vakili*: Department of Law, Science and Research Branch, Islamic Azad University, Tehran, Iran

*Correspondence: sinavakili.law@gmail.com

Abstract

The contribution of this paper is that it seeks to answer several legal challenges facing the intellectual property rights of products in which artificial intelligence plays a minimal or maximal role in their creation. First, if artificial intelligence can improve the underlying algorithm of the program with methods (such as machine learning methods, which will be discussed later) or if the programmer with the help of artificial intelligence can improve the underlying algorithm of the program, can artificial intelligence be granted a patent and does it include the rights of inventors? What challenges will not taking into account the role of artificial intelligence in the case of a role in the invention create? Then, it is examined whether the underlying algorithm of the program can be protected in the laws of developed countries according to copyright laws and what legal solutions, if possible, have been proposed in international law for this challenge so far? Results showed that supervised, semi-supervised, and reinforcement algorithms can be covered by copyright protection in legal systems if human creativity is observed in their algorithms and their choices completely change the model.

Keywords: Intellectual Property; Algorithm; Law; Artificial intelligence.

Received: 11 December 2024
Revised: 21 March 2025
Accepted: 2 May 2025
Published: 1 June 2025

Citation: Vakili, S. (2025). A Study on the Intellectual Property Challenges of AI-Based Algorithms in International Law. *Legal Studies in Digital Age,* 3(2), 1-8.

1. Introduction

Artificial intelligence (AI) cannot yet be considered advanced enough to say that it works completely like humans and without any human assistance. However, in many fields, artificial intelligence makes new inventions using only background information and processing this information, and in this way acts independently. In fact, artificial intelligence, with its advances, has been able to process small algorithms independently of humans, and this development itself is the beginning of the question of how these processed algorithms can be called an invention.

Thinking is a factor that distinguishes humans from other creatures (Pearlman, 2017), and intellectual property rights are a factor that tries to defend this feature (Hughes, 1988). The question arises whether intellectual property rights can be applied to an agent other than humans? (Khoury, 2016) Can artificial intelligence use the tools of intellectual property rights as an inventor? Patents are one example of intellectual property (Taylor & Inman, 2017). In fact, by registering a patent, the

intellectual property rights of the patent holder can be considered official and definitive, and by using it, his ownership can be defended against others (Savale & Savale, 2016). Whether these works can be called new inventions, and in whose name these inventions should be registered, and also how the rights arising from their patent registration are managed, can greatly contribute to the progress and growth of these intelligent machines.

Patents provide incentives for individuals to continue their efforts to invent and to protect their inventions when the knowledge is publicly available ("Conditions for a patent,").

In a broader sense, the public disclosure of technical knowledge in a patent and the exclusive rights granted by a patent provide an incentive for competitors to seek alternative solutions and create an invention (Gebru, 2018). These incentives and the dissemination of knowledge about new inventions encourage further innovation, which ensures that the quality of human life and the well-being of society are continuously improved (Henry & Stiglitz, 2010).

The contribution of this paper is that it seeks to answer several legal challenges facing the intellectual property rights of products in which artificial intelligence plays a minimal or maximal role in their creation. First, if artificial intelligence can improve the underlying algorithm of the program with methods (such as machine learning methods, which will be discussed later) or if the programmer with the help of artificial intelligence can improve the underlying algorithm of the program, can artificial intelligence be granted a patent and does it include the rights of inventors? What challenges will not taking into account the role of artificial intelligence in the case of a role in the invention create? Then, it is examined whether the underlying algorithm of the program can be protected in the laws of developed countries according to copyright laws and what legal solutions, if possible, have been proposed in international law for this challenge so far?

The organization of this paper is based on this as follows: First, patents arising from artificial intelligence and its intellectual property rights and the challenges ahead in the laws of advanced countries are studied, and then the legal challenges of protecting algorithms in the European Union and the United States are investigated.

2. The Challenge of Patenting AI and Intellectual Property Rights

An invention cannot benefit from patent rights until it is registered (Biagioli, 2006). Inventions based on artificial intelligence are no exception. Registering such inventions based on a non-human system also comes with challenges (Kim, 2020). In this section, we will examine these challenges as well as how to register these inventions and the benefits of registration.

The current practical approach in most patenting jurisdictions appears to be to not recognize AI as an inventor (Sun, 2022).However, this approach has recently been challenged. The European Patent Office received a patent application in which an artificial intelligence was considered the inventor. In this case, Dr. Stefan Thaler had applied for a patent in the European, UK and US Patent Offices (Taylor, 2021). In all three patents, Thaler claimed that an artificial intelligence named Dabus was the true inventor of a beverage container, a food container, and a warning light. All three applications were rejected by the patent offices. According to the respective offices, Thaler's application lacked the name of the inventor. A month later, the European Patent Office asked the applicant to fill in the blank for the inventor's name. The applicant listed the artificial intelligence Dabus as the inventor. Dabus's artificial intelligence is a system that is able to compare, combine, and separate neural networks, each of which contains related memories of a linguistic, visual, or auditory nature. The applicant's team argued that the machine was trained solely on general knowledge and independently understood the invention and identified it as an innovation. According to the applicant, the artificial intelligence did this without human assistance. Dabus is able to transform simple concepts into complex ones. This representation of ideas and their ability to interact and evolve can be considered a stream of consciousness and thought. Then, through a self-evaluation process that acts as a reward and punishment system, the machine is able to recognize valuable concepts. This is why, says Dr. Stefan Thaler, the creator of Dabus, "representing machines as inventors facilitates the protection of the moral rights of human inventors and allows the valuable work of inventive machines to be known to the world."("https://gowlingwlg.com/en/insights-resources/articles/2021/ai-invention-denied-patent-in-dabus-case,") Furthermore, Thaler argued that Rule 19 of EPC1 does not mean that the inventor must necessarily be human (Zipper, 2021) and the real purpose of this article was to correctly identify the inventor. He also argued

that, given that the AI system had created the invention on its own, naming another person (even himself) as the inventor would violate important principles of patent law. Furthermore, Thaler argued that the design of Dabus as the inventor was in line with the main objectives of the patent system, namely to encourage the disclosure, commercialization and development of inventions. Finally, Thaler claimed that he had obtained the patent from Dabus by way of a successor in title. He argued that, as the owner of the machine, he had the right to any intellectual property generated by the AI. The patent office rejected both applications on the grounds that no human being had been designated as the inventor, which was presumed to be contrary to Article 81 and EPC1. The office noted that under the latter law the design must include a surname, and a specific address, and that it would not be sufficient to write the name of the machine. Furthermore, it argued that the latter law consistently refers to the inventor as a natural person.

The interpretation of the term inventor as referring to a natural person is an internationally applicable standard (Stierle, 2021). The declaration of humans as the sole inventor is followed by various domestic courts and 100 major patent offices, including the offices of Japan, the United States, and China, and some EPC agreements.

Governments explicitly define an inventor as a natural person who created an invention, and most national laws do not yet recognize an AI machine as an inventor (Comer, 2020).

The European Patent Office rejected Thaler's argument that the failure to admit AI systems as inventors effectively deprives AI-generated inventions of patentability and violates Article 27 of the TRIPS Agreement (Peter, 2017), stating that, as noted, there is no discrimination on the basis of technology in the granting of patents. The report stated that identifying the inventor and addressing the issue of whether the invention meets the requirements for registrability are two distinct aspects, the former occurring prior to and independent of the substantive assessment carried out by the Office.

Ultimately, the EPO rejected the argument that the applicant was the employer of the applicant and therefore rejected the applicant's claim under Article 60 EPC (1)[1]. The reason for this was that artificial intelligence systems and machines in general, due to their lack of legal personality, cannot be used or transfer any rights to a human being (Tan, 2024).

The UK Intellectual Property Office reached a similar ruling in the case of Dabus in December 2019, which was later upheld by the High Court of England and Wales (Abbott et al., 2021). In the UK proceedings, the key questions were whether a non-human inventor could be considered an inventor under the UK Patents Act 1977; and whether Thaler (the applicant) was entitled to apply for a patent (in priority to Dabus) simply because he owned the AI (Klobucnik, 2024). In response to the first question, the UK accepted that Dabus had created the inventions but argued that a machine could not be named an inventor because it was not a natural person. The English court held that as Dabus is a machine which, due to its lack of legal personality, cannot own intellectual property, it has no rights to its inventions and cannot enter into any contract to assign the patent to the applicant. Since Dabus is not a person, the machine cannot transfer its property to Thaler or anyone else. The court made it clear that the law is currently not suitable for inventions generated by AI and any change to this position would require a change in the regulations. Parliament could theoretically amend sections 7 and 13 of the Act to treat AI systems as inventors and, for example, automatically grant any patent generated by AI to the owner of the machine.

The U.S. Patent Office emphasized that various U.S. patent regulations consistently refer to inventors as natural persons. The designation of a machine as an inventor does not qualify under patent law (Abbott, 2016). Ultimately, it rejected Thaler's argument that recognizing a machine as an inventor would lead to the creation of more advanced AI systems and advances in the field. Following this decision, on August 6, 2020, Thaler's legal team filed a lawsuit against the Patent Office in the Eastern District Court of Virginia. Dabus was named as the inventor's pseudonym and the AI-created invention as the family name.

In Thaler v. United States Patent Office, the AIP team at the American Institute of Physics argues that the office should follow the 1943 report of the National Patent Planning Commission, which stated that patentability should be determined on a case-by-case basis by the nature of the contribution to the advancement of industry and inventions, rather than in a general, pre-determined way. This argument paves the way for AI inventors. The American Institute of Physics continued: "What we want is to innovate. Artificial intelligence has been used to help innovate for decades, and AI is getting better and better at doing that."

[1] European Patent Guide

In July 2021, Dabus was finally able to register his first patent in South Africa (Oriakhogba, 2021). The patent relates to the invention of a special food container based on fractal geometry and designed to be easily moved by robots. It should be noted that South African patent law lacks a definition of inventor and the country also lacks a patent examination system. However, this recognition of Dabus as an inventor is an important step towards recognizing the rights of the inventor's artificial intelligence.

That same month, the Australian Federal Court also ruled that artificial intelligence systems can be legally recognized as inventors, reaching the historic conclusion that an inventor can also be a non-human.

British patents require a description of the invention. In this patent model, the inventor is not named and the patent application begins with the description that is essential for the registration of an invention. However, there are numerous references to the term "person" in practice to the inventor.

In fact, one of the common phrases in this law is "inventor or any other person," which can be interpreted in a way that only natural persons can be inventors.

In contrast, other countries have chosen not to define the term inventor. Some examples of this approach are the Chinese Patent Law and the Spanish Patent Law, which describe the requirements for patentability without mentioning the personality of the inventor, only occasionally referring to the term "person" in relation to their rights.

The European Parliament published three resolutions in October 2020 on establishing a legal framework for the functioning of artificial intelligence, one of which focused on inventions resulting from artificial intelligence (Rene, 2020).

Patent applicants may now choose not to disclose the role that AI played in arriving at an invention, identifying themselves instead as the inventor, to avoid being challenged on the grounds that patent offices have raised.

Rather than indirectly encouraging dishonesty, patent offices should introduce a requirement for applicants to be transparent and disclose the role of computers and AI in the inventive process. By not allowing patent applications to name AI as inventors, there is a risk that inventors will prefer not to name AI in the invention process, thus violating the basic principles of patent law (where both the inventor and the public benefit from the disclosure and commercialization of the invention).

Using utilitarian patent theory, Abbott (Abbott, 2019) further argues that AI can be inventors because, although AI will not be motivated to invent with the prospect of patenting, it will incentivize AI inventors and thus further develop these creative machines. There still seems to be a traditional view of declaring someone other than a human to be an inventor. In fact, the traditional view sees granting this patent to AI as creating a frightening future.

The term invention is only granted to works that are suitable, novel, involve an inventive step, and are capable of industrial application. For example, inventions that rely on machine learning or artificial intelligence to solve a specific problem may be considered patentable, often without limiting the solution to a specific algorithm. Given the high level of machine intelligence in the current century, the inventive output of the invention in many cases meets the threshold of the required inventive step.

An AI invention has features and claims (Feng & Pan, 2021). The features section includes descriptions of the invention, including the technical knowledge and roadmap of an invention, as well as claims that specify the scope of the invention for the exclusive use of its inventor. Patents for AI inventions are granted based on the claims and declaration (Schwein, 2020). Every patent has rights that the patent owner enjoys. One of them is the exclusive right to manufacture. The owner of an AI patent can prevent other people from manufacturing the patented invention, and this right is exclusively available to the owner of the AI patent. Another right that the owner of an invention has is the right to sell the invention. Others cannot sell these works without the permission of the owner of the AI patent. Another of these rights is the prohibition of the import of invented products that are produced outside the scope of the patent. If AI can be considered an inventor, these rights should be considered for it.

3. Challenges of Algorithm Protection in EU and US law

In the European Union, there are generally two ways to create literary and artistic works that justify supporting algorithms: a) As a work b) As computer programs (Bonadio & McDonagh, 2020).

Article 2 of the Berne Convention only protects literary and artistic "works" and makes no mention of "computer programs." Paragraph 1 of Article 10 of the TRIPS Agreement confirms that "computer programs" shall be protected under Article 2 of

the Berne Convention. Article 4 of the World Intellectual Property Organization (WIPO) Copyright Treaty (WCT) reaffirms that "computer programs" fall within the scope of the Berne Convention.

None of these international instruments defines "computer programs", but Article 2 of the WCT states that ideas, procedures, operational methods and mathematical concepts are excluded.

In 2001, the European Union adopted the Infosoc Directive34 to implement the WCT. In 2009, IP law was codified in the European Union (this law was first adopted in 1991) (Solbrekk, 2021) and it was determined that the laws contained in this law, based on the principle of lex specialis (the priority of specific law over general in a specific subject), take precedence over the rules and regulations contained in Infosoc.

Article 1 of the IP law states that "computer programs" are protected under the Berne Convention. According to Article 2 of the WCT, ideas, procedures, methods of operation or mathematical concepts are not protected. Paragraph 7 of the same article defines “computer programs” as programs in any form, including programs embodied in hardware. Paragraph 11 states that only the expression of a computer program is protected and that ideas, principles of programs and their interfaces are not protected. Logic, algorithms and programming languages are also not protected. Therefore, algorithms are explicitly excluded from the scope of protection.

This interpretation was also accepted by the Court of Justice of the European Union (CJEU), which confirmed that copyright in "computer programs" only covers expressions derived in any form from a computer program that allows reproduction in different computer languages, such as source code and object code. The Court also confirmed that the functionality of a program, the programming language, the design materials used in the preparation and the format of the data files used in the program could not constitute a protected computer program and stated that they could potentially be protected by copyright under the Infosoc Directive. These cases show that the Court strictly adheres to the definition provided by IP Law. Therefore, algorithms cannot be protected separately in this framework as part of the "computer programs" that underlie them under IP Law.

We now investigated whether algorithms can be supported in the form of work under the Infosoc directive. In order to be supported in this structure, algorithms must meet two criteria: First, they must be authentic.

In the famous Brompton Bicycle case (Fhima, 2020), the Belgian court, unsure to what extent the decision in this case was compatible with EU law, referred two questions to the Court of Justice of the European Union on the interpretation of Articles 2 to 5 of the InfoSoc Directive (29/2001) (Triaille et al., 2013). In this case, the Court stated that, in order to be original, 1- It is necessary that the author's personality is expressed and manifested in his free and creative choices. Therefore, if the realization of a subject is dictated and imposed by technical considerations, laws or other restrictions that leave no room for creative freedom, it is not original and has no place for copyright protection. The author's own intellectual creation requires some kind of creative human participation to be considered an original work. 2- The work must be an expression of creation. Therefore, an expression must be identifiable with sufficient precision and objectivity and not merely by virtue of its technical performance.

The European Union is obliged to comply with the Berne Convention under the WCT, and the Court of Justice of the European Union has confirmed this (Van Eechoud & van Es, 2023). Article 2(1) of the Berne Convention provides for the protection of works, whether scientific or artistic, in any form or mode of expression. This provides a way to protect algorithms.

But there is an important point in this section. It cannot be said that all types of algorithms meet the conditions considered by the Court of Justice of the European Union. Because the role of programmers in some of their models does not involve the mental creativity of the author. In the following, an attempt will be made to categorize the algorithms and discuss them independently.

There are various systems for examining the effectiveness of algorithms, among which machine learning is a suitable system for this case, and its classification is shown in the figure 1:

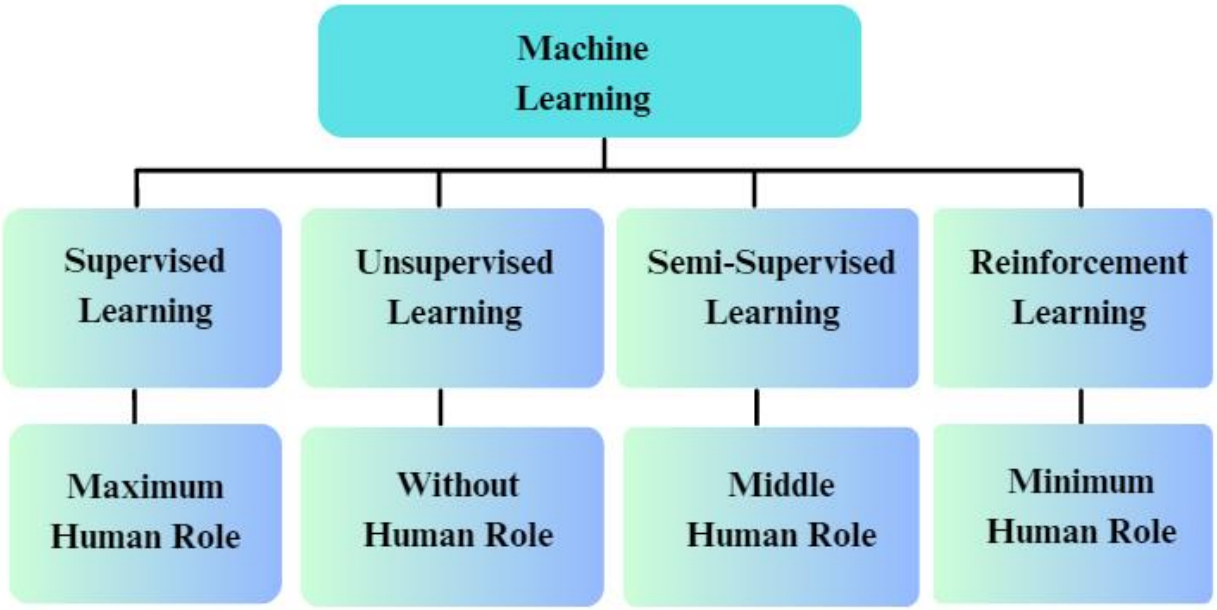

Figure 1. Types of Machine Learning Methods

Unsupervised algorithms discover hidden patterns in unlabeled data without (or with minimal) human intervention, such as clustering, association, and dimensionality reduction. While supervised algorithms, such as regression and clustering, use labeled data, they are considered supervised because proper labeling of the data (which improves the performance of the algorithm compared to the unsupervised mode) requires human intervention. In the semi-supervised mode, a small amount of labeled data and a large amount of labeled data are used, so it is a combination of both algorithms and has applications such as classification and speech recognition. In reinforcement learning, a computer learns to perform a task through repeated interactions with a dynamic environment through trial and error. This method is similar to supervised learning in that developers must give specific goals to the algorithms and define reward and punishment functions. After this type of learning, the computer can act autonomously, but this method is extremely time-consuming and is not recommended for small problems.

According to the Infosoc Terms and conditions for copyright protection mentioned earlier, in unsupervised learning, since the human role is minimal, this type of algorithm cannot be considered effective. In the other three algorithms mentioned in Figure 1, if the programmer makes unforced and creative choices when writing and layering the algorithms, and his choices completely change the model (because as the programmer freely decides about them, the choices reflect his personality), then the two necessary conditions for originality are met and can include copyright protection. The point is that copyright protection only protects the reference code, not the configuration on which the reference code is based.

Article 105 of the US Copyright Law (Joyce et al., 2016) also considers original works created in a tangible medium to be subject to protection, and copyright experts, based on this article, consider three conditions necessary for protection: a) originality; b) creativity; and c) fixation of the work.

The United States legal system has stated that if an artistic or literary work created by an algorithm is so similar to a human artistic or literary work that it successfully passes the Turing test, why shouldn't it be protected against unauthorized copying (Fink Hedrick, 2019)?

In 2019, the United States Copyright Office (USCO) rejected a copyright application for an artwork produced by an AI algorithm ("https://www.smithsonianmag.com/smart-news/us-copyright-office-rules-ai-art-cant-be-copyrighted-180979808,") on the grounds that the image created by the AI algorithms lacked the element of human authorship required for protection and that no human creativity was observed in the algorithm.

Therefore, it follows from the concept of decision-making that human creators of supervised, semi-supervised, and reinforcement algorithms can also be subject to copyright protection in the United States legal system if human creativity is observed in their algorithms.

The point is that USCO has explicitly stated that it does not recognize non-human authors (Dadia, 2021). Therefore, one of the challenges of intellectual property of AI-based algorithms in American law is that other intellectual property options such as artificial intelligence itself or no one are recognized. This challenge also exists in European Union countries including France, Germany, Greece and Hungary because, like USCO, it limits authorship to humans and natural persons.

The validity of copyright law in the United States is based on the Constitution, so it must not conflict with it. Article I, Section 8, Clause 8 of the Constitution empowers Congress (Pollack, 2001) to create for limited times for authors and inventors exclusive rights in writings, for the purpose of promoting the progress of science and useful arts.

So, based on the above inference, it can be concluded that the authors and inventors of supervised, semi-supervised, and reinforcement algorithms will have exclusive rights to their algorithms for a limited period of time in the United States legal system.

4. Conclusion

In this paper the legal challenges facing intellectual property rights for products in which artificial intelligence plays a minimal or maximal role was investigated. It then investigates under what circumstances artificial intelligence can be granted a patent, including inventors' rights, if AI can improve the underlying algorithm of a program using various machine learning methods or a programmer with the help of AI. The challenges of not considering the role of AI in the case of a role in an invention are also examined. It then concludes that the underlying algorithm of a program can be protected in the laws of developed countries according to copyright laws, and the legal solutions in international law that have been proposed for this challenge are mentioned. Patents arising from AI and its intellectual property rights and the challenges ahead in the laws of developed countries are also examined, and then the legal challenges of protecting algorithms in the European Union and the United States are examined. Another conclusion is that supervised, semi-supervised, and reinforcement algorithms can be covered by copyright protection in legal systems if human creativity is observed in their algorithms and their choices completely change the model.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

Acknowledgments

Authors thank all individuals who helped us do this study.

Conflict of Interest

The authors report no conflict of interest.

Funding/Financial Support

According to the authors, this article has no financial support.

References

Abbott, R. (2016). I think, therefore I invent: creative computers and the future of patent law. *BCL Rev.*, *57*, 1079. https://doi.org/10.2139/ssrn.2727884

Abbott, R. (2019). The artificial inventor project. *WIPO Magazine*, 3-4.

Abbott, R., Matulionyte, R., & Nolan, P. (2021). A brief analysis of DABUS, Artificial Intelligence, and the future of patent law. *Intellectual Property Forum: journal of the Intellectual and Industrial Property Society of Australia and New Zealand*(125), 10-16.

Biagioli, M. (2006). Patent republic: Representing inventions, constructing rights and authors. *Social Research: An International Quarterly*, *73*(4), 1129-1172. https://doi.org/10.1353/sor.2006.0001

Bonadio, E., & McDonagh, L. (2020). Artificial intelligence as producer and consumer of copyright works: evaluating the consequences of algorithmic creativity. *Intellectual Property Quarterly*(2), 112-137.

Comer, A. C. (2020). AI: Artificial Inventor or the Real Deal? *NCJL & Tech.*, *22*, 447.

Conditions for a patent. https://www.prv.se/en/patents/applying-for-a-patent/before-the-application/conditions-for-a-patent

Dadia, T. (2021). Can AI Find Its Place within the Broad Ambit of Copyright Law? *Berkeley Journal of Entertainment and Sports Law*, *10*, 45-52.

Feng, X. Q., & Pan, B. H. (2021). The evolution of patent system: Invention created by artificial intelligence. *Procedia Computer Science*, *183*, 245-253. https://doi.org/10.1016/j.procs.2021.02.055

Fhima, I. (2020). The CJEU decision in Brompton Bicycle (Case C-833/18): An original take on technical functionality? *European Intellectual Property Review*, *42*(11), 761-767.

Fink Hedrick, S. (2019). I 'Think', Therefore I Create: Claiming Copyright in the Outputs of Algorithms. *Journal of Intellectual Property & Entertainment Law*, *8*(2), 327-330.

Gebru, A. (2018). Patents, disclosure, and biopiracy. *Denv. L. Rev.*, *96*, 535. https://doi.org/10.2139/ssrn.3188311

Henry, C., & Stiglitz, J. E. (2010). Intellectual property, dissemination of innovation and sustainable development. *Global Policy*, *1*(3), 237-251. https://doi.org/10.1111/j.1758-5899.2010.00048.x

https://gowlingwlg.com/en/insights-resources/articles/2021/ai-invention-denied-patent-in-dabus-case. https://gowlingwlg.com/en/insights-resources/articles/2021/ai-invention-denied-patent-in-dabus-case

https://www.smithsonianmag.com/smart-news/us-copyright-office-rules-ai-art-cant-be-copyrighted-180979808. https://www.smithsonianmag.com/smart-news/us-copyright-office-rules-ai-art-cant-be-copyrighted-180979808

Hughes, J. (1988). The philosophy of intellectual property. *Geo. LJ*, *77*, 287.

Joyce, C., Ochoa, T. T., Carroll, M. W., Leaffer, M. A., & Jaszi, P. (2016). *Copyright law*. Carolina Academic Press.

Khoury, A. (2016). Intellectual property rights for hubots: On the legal implications of human-like robots as innovators and creators. *Cardozo arts & ent. LJ*, *35*, 635.

Kim, D. (2020). 'AI-Generated Inventions': Time to Get the Record Straight? *GRUR International*, *69*(5), 443-456. https://doi.org/10.1093/grurint/ikaa061

Klobucnik, L. (2024). Intellectual Property Regulation of Artificial Intelligence: A Matter of Time or a Step Too Far? In *Developments in Intellectual Property Strategy: The Impact of Artificial Intelligence, Robotics and New Technologies* (pp. 91-112). Springer International Publishing. https://doi.org/10.1007/978-3-031-42576-9_4

Oriakhogba, D. O. (2021). Dabus gains territory in South Africa and Australia: Revisiting the AI-inventorship question. *South African Intellectual Property Law Journal*, *9*(1), 87-108. https://doi.org/10.47348/SAIPL/v9/a5

Pearlman, R. (2017). Recognizing artificial intelligence (AI) as authors and investors under US intellectual property law. *Rich. JL & Tech.*, *24*, i.

Peter, K. Y. (2017). The objectives and principles of the TRIPS agreement. In *The Regulation of Services and Intellectual Property* (pp. 255-322). Routledge. https://doi.org/10.4324/9781315085463-7

Pollack, M. (2001). What Is Congress Supposed to Promote: Defining Progress in Article I, Section 8, Clause 8 of the United States Constitution, or Introducing the Progress Clause. *Neb. L. Rev.*, *80*, 754. https://doi.org/10.2139/ssrn.304180

Rene, F. G. I. L. (2020). Artificial Intelligence and the concept of inventor in the patent system. 6.

Savale, S. K., & Savale, V. K. (2016). Intellectual property rights (IPR). *World J Pharm Pharm Sci*, *5*(6), 2529-2559.

Schwein, R. L. (2020). Patentability and Inventorship of AI-Generated Inventions. *Washburn LJ*, *60*, 561.

Solbrekk, K. F. (2021). Three routes to protecting AI systems and their algorithms under IP law: The good, the bad and the ugly. *Journal of Intellectual Property Law & Practice*, *16*(3), 250-252. https://doi.org/10.1093/jiplp/jpab033

Stierle, M. (2021). A de lege ferenda perspective on artificial intelligence systems designated as inventors in the European Patent System. *GRUR International*, *70*(2), 115-133. https://doi.org/10.1093/grurint/ikaa186

Sun, H. (2022). Artificial Intelligence Inventions. *Fla. St. UL Rev.*, *50*, 61. https://doi.org/10.2139/ssrn.4485665

Tan, T. J. (2024). Artificial intelligence as inventor? *SAcLJ*, *36*, 346.

Taylor, E. J., & Inman, M. (2017). Looking at patent law: why are patents often referred to as intellectual property? *The Electrochemical Society Interface*, *26*(1), 41. https://doi.org/10.1149/2.F02171if

Taylor, K. (2021). The patentability of inventions with artificial intelligence listed as an inventor following Thaler v. Hirshfeld. *IPCLJ*, *6*(1).

Triaille, J. P., Dusollier, S., Depreeuw, S., Hubin, J. B., Coppens, F., & de Francquen, A. (2013). *Study on the application of Directive 2001/29/EC on copyright and related rights in the information society (the "InfoSoc directive")*.

Van Eechoud, M., & van Es, R. (2023). *Report on EU Policy Space in Light of International Framework*.

Zipper, T. (2021). Mind over Matter: Addressing Challenges of Computer-Generated Works under Copyright Law. *Wake Forest J. Bus. & Intell. Prop. L.*, *22*, 129.