

Exploring Emerging Challenges, Prospects, and Legal Implications: Copyright and Patent Laws in AI-Generated Works

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Computers today are capable of digesting large data sets, discovering hidden patterns in the data, and learning intuitively from the data - all at speeds far exceeding human capabilities. Artificial Intelligence (AI) has taken center stage in the commercial world, and its impact is both apparent and tangible. Many companies are implementing AI into their products and services to boost their global positioning and performance. As AI continues to revolutionize creative and inventive processes, the interface between copyright and patent law faces unprecedented challenges and opportunities. This article addresses the evolving landscape of AI-generated works and examines the complex balance between intellectual property right (IPR) and technological advances. It examines the current legal framework, analyzes its effectiveness in addressing AI-generated content, and identifies emerging issues. Additionally, this study examines the impact on creators, innovators, and industries that rely on AI-generated outcomes. By examining case studies and current legal precedents, this research sheds light on the ambiguities, potential, and limitations of the copyright and patent laws that govern AI-generated works. Ultimately, it aims to provide insights into managing complexity, fostering innovation and ensuring equitable protection in this dynamic area of Intellectual Property (IP) Law.

Keywords: Artificial Intelligence, Intellectual Property Rights, Regulation of Artificial Intelligence Inventions, Creative Works, Copyright Infringement, Copyright Protection, AI-generated Content, Patent Enforcement, Patentable Subject Matter, Ethical Implications

The aim of AI is to make computers behave more like humans in a fraction of the time it takes a person to do so. Another goal of AI is to encourage the use of computer science in real-world applications. AI's fast progress will have a profound influence on business and society as a whole. These developments, which have serious consequences for productivity, employment, and competitiveness, have the potential to have a direct influence on production as well as the characteristics of a wide variety of goods and services.

Ada Lovelace, an English mathematician and writer who was born in 1815 during a time when women did not actively pursue careers in science, technology and engineering, translated and published an article about the Analytical Engine from Italian into English in 1843. She included her own annotations with the publication about computer science. She contended that Analytical Engine (the predecessor to contemporary computers) has no desire to create anything. Her thesis was that a computer can only perform what it is programmed to do and so can never generate anything new.¹

Alan Turing, the inventor of modern computer science and an English mathematician, was one of the first to consider the possibility of learning machines. Turing's most notable achievements, particularly between 1948 and 1953, were a series of essays and public speeches on the subject of machine intelligence.² In his article "Computing Machinery and Intelligence," in which he devised the famous 'imitation game' (now known as the Turing Test), he examined the topic, 'Can machines think?' Although he could see the promise of computers developed to simulate intelligence, it was still a learning machine to him.³

Despite the heated debate over 'whether robots can think' in the early years, the area of AI was officially formed at the Dartmouth workshop. In 1956, John McCarthy organized the Dartmouth Summer Research Project on AI, a month-long conference at New Hampshire's Dartmouth College.⁴ The conference proposed that "the study will proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it."⁵ McCarthy was a Stanford University computer scientist

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who is credited with establishing the area of AI. He described AI as “the science and engineering of creating intelligent machines.” He invented the term “AI” in 1956 and identified its fundamental objective as a sub-field of computer science.

AI systems have received widespread acclaim from the international community, including from the World Intellectual Property Organization (WIPO). Countries such as Australia and Canada have implemented AI systems in their patent offices to assist them in conducting semantic searches as well as collecting, scrubbing, and analyzing massive datasets.⁶ AI has changed the entire technology environment, opening doors that were previously unimaginable. There has been a lot of activity in the subject of AI, with research and development being carried out to implement AI on a macro level in numerous businesses.

Machines have no desire to create new works and place no importance on rewards. With our current technology, only people can make really innovative judgments. If all original or fresh contributions were the work of a machine, it is unclear who, if anybody, would acquire the rights.⁷ Academics still don't agree on what it means for a machine to be creative. The contours of creation have evolved to the point where humans are no longer needed.⁸

In 2003, Deep Fritz, a German chess computer, drew against Garry Kasparov, former World Chess Champion in four games.⁹ *Alpha Go*, a Google AI software, beat the 2015 European Go champion by five games to none.¹⁰ It was the first time a computer software had defeated a human professional go player, which was an amazing feat in and of itself. These robots can also create music, and the world's first album created and produced entirely by AI was just released.¹¹ It is becoming clear that this fast expanding technology sector is capable of operating without human intervention or oversight. And it begs the question: who should be the beneficiary in terms of IPRs when an AI develops a work without human intervention?

The European Parliament highlights in the draft report to the Commission on Civil Law Rules on Robotics¹² that AI would not leave any class of society unaffected in the future and requests the Commission to adopt standards of “own intellectual creation” for copyrighted works generated by AI. There are currently machines that can automatically generate works that would be protected by copyright if made by a person. To date, several high-level computational creative achievements have happened,

raising debates throughout the world on the need to reconsider copyright rules for AIs.

The purpose of this study is to address difficulties of authorship of protectable works made via the use of computers and AI, also known as computer generated works. It begins with the current status of copyright protection to computer programs and patent protection related to computer implemented inventions along with protection of IP for AI-assisted and AI-generated inventions. The following part of the study examines the recent examples of artistic works produced by AI-enabled machine learning computers. Following that, the legal framework of international copyright instruments, as well as the respective copyright cases of the European Union, the United States of America, and Australia, were examined. Following that, the article addresses the important areas where current copyright law falls short in dealing with AI-generated authorship. The research concludes that present copyright and patent law does not acknowledge nonhuman authorship, and that the argument for extending copyright protection to AI created works will fail due to a lack of personality. Finally, it is claimed that copyright and patent law should be amended or re-evaluated in order to identify how laws should approach computer-enabled AI generated works.

Artificial Intelligence: A Creation and Creator

The concept of AI as both creation and creator raises important questions about IPR and ownership. When AI is considered as “creation,” it refers to the use of AI technology as a tool or component within a system or product. In this context, AI could enable functionalities that improve efficiency or improve existing technologies, making them a valuable part of innovation.

On the other hand, AI as “creator” implies situations in which AI generates new content or inventions or works autonomously, often without direct human intervention. This raises challenges in determining ownership of the content or inventions generated. The question of whether AI-generated works qualify for intellectual property protection and who owns the rights is a complex legal and ethical issue.

When it comes to patents, copyrights, industrial design and trade secrets, each offer different forms of protection. Patents typically protect inventions or processes that are new, non-obvious, and useful. Copyright protects original works of authorship that are embodied in a tangible medium of expression. Industrial design protects the visual appearance of a product. Trade

secrets protect confidential information and give you a competitive advantage.

The suitability of AI-generated works for IP protection depends on whether they meet the criteria set out in relevant laws. For example, copyright laws in some jurisdictions may require human authorship, creating a challenge in granting copyright to AI-generated content. Patents may require an identifiable inventor, which could be problematic if the invention relies entirely on AI without direct human involvement.

Determining ownership of AI-generated works is equally complicated. This can include considerations of who owns the AI, who trained or programmed it, and the level of human input in the creation process. The legal landscape surrounding AI-generated content and inventions is evolving and different jurisdictions may have different approaches or precedents.

Ultimately, resolving these issues will require a nuanced understanding of existing IP laws, possible modifications or additions to those laws to accommodate AI-generated works, and perhaps the establishment of clear guidelines or frameworks for dealing with ownership and rights in context with AI-generated works. The solution will likely require interdisciplinary efforts from legal, technological and ethical perspectives to ensure fair and effective protection for all stakeholders involved.

Protection of Copyright for Computer Programmes Using AI Technology

Protecting copyright for computer programs using AI technology requires a nuanced understanding of how copyright applies to AI-generated creative content. Here are the key points:

(i) Copyright protection for computer programs: Under current copyright law, computer programs are protected if they demonstrate sufficient originality and creativity. Original code that is not a direct copy of other works and requires creative decisions by the author may be protected by copyright.¹³

(ii) Implementing an AI algorithm in code: When software contains an AI algorithm written in code, both the source code (the human-readable form) and the object code (the machine-executable form) can be considered literary works and protected by copyright.¹⁴ However, it is important to note that abstract ideas, principles, or functional algorithms/logic in themselves are not protected by copyright. The protection extends to the specific expression of the AI algorithm in the code and not to the underlying idea or functionality.¹⁵

(iii) Limitations of Copyright Protection: Copyright protection is limited for AI systems. AI functionalities, such as certain actions of a robot such as raising its arm, are generally not protected by copyright. Minor changes to the code that produce similar or identical results may not constitute infringement because copyright protection does not cover the functional aspects but rather the specific expression in the code.

(iv) Challenges and scope of protection: AI-generated content presents challenges in terms of copyright protection because there is a fine line between the original creator's input and the AI's output. Determining the extent of human creativity compared to AI-generated content can be complex.

(v) Future Considerations: Given the evolving nature of AI and its ability to create content autonomously, there are ongoing debates and considerations about adapting copyright laws to effectively protect and regulate AI-generated creative works while encouraging innovation.

Overall, while copyright law provides a degree of protection for computer programs incorporating AI technology, complexities and limitations remain, particularly regarding the distinction between protectable expression and unprotectable functional aspects or ideas inherent in AI systems.

Patent Protection for Computer-Implemented Inventions

In the European context, the legislation on patent protection for computer-implemented inventions relates primarily to the European Patent Convention (EPC) and its interpretation by the European Patent Office (EPO). Article 52(2) EPC describes what are not considered to be inventions eligible for patent protection. However, Article 52(3) EPC stipulates that certain activities are not excluded from patentability if they are of a technical nature.

Patent protection for computer-implemented inventions, particularly in the European context, revolves around the criteria of novelty, inventive step and commercial applicability as per the following:

(i) Novelty: For an invention to be patentable, it must be new and not part of the "prior art", i.e. it must not have been disclosed or made available to the public before the filing date of the patent application.

(ii) Inventive step: The invention must involve an inventive step, that is, it must not be obvious to someone knowledgeable in the field. There should be

some non-obvious progress or improvement over what already exists.

(iii) **Industrial Applicability:** The invention must have practical utility and be capable of being used or made in an industry or a specific area.

The key legal provisions and considerations regarding patent protection for computer-implemented inventions in Europe are:

(i) **Technical character:** According to Article 52(2) and (3) EPC, computer programs “as such” are not considered inventions and are therefore excluded from patentability. However, if a computer program is capable of producing a “further technical effect,” it may be considered patentable.

(ii) **Case Law (Examples):**

1 The ‘Aerotel/Macrossan’ approach and the ‘Comvik’ approach are frameworks used by the EPO to assess the patentability of computer-implemented inventions.

2 ‘Aerotel/Macrossan’ (from a UK court decision) sets out a four-stage test for determining patentability, assessing the contribution to the prior art, whether it solves a technical problem, whether it is technical in nature and whether it is a technical effect.¹⁶

3 ‘Comvik’ (from a decision of the Boards of Appeal of the EPO) emphasizes that an invention must be of a technical nature or involve a technical solution to a problem in order to be patentable.¹⁷

(iii) The EPO requires a “technical effect” or a “further technical effect” that goes beyond the normal physical interactions between software and hardware. This could include improvements in data processing, network communications, hardware operations, etc.¹⁸

(iv) **Industrial Applicability:** Article 57 of the EPC states that computer-implemented inventions must demonstrate industrial applicability, i.e. that they can be used or manufactured in any industry.

These legal provisions are interpreted and applied in specific cases, and the criteria for patentability of computer-implemented inventions have evolved through case law and EPO guidelines. It is important to understand these provisions and their interpretations in order to assess the patentability of a particular computer-implemented invention.

Protection of Intellectual Property for AI-Assisted and AI-Generated Output

IP protection related to AI-powered and AI-generated output poses several challenges to existing intellectual property laws and regulations, such as:

AI-Assisted Innovations

When AI is used as a tool to help human creators develop innovations, the question arises: who owns the rights to the resulting intellectual property? In these cases, where human input is paramount and AI serves as a tool or assistant, a general consensus is often to attribute intellectual property rights to the human author or the entity using the AI.

AI-Generated Inventions

The more controversial issue arises with inventions that are generated autonomously by AI and where there is no clear human creator involved in the creative process. This has led to debates about whether AI itself can be considered an inventor and have IP rights. Existing intellectual property laws have been primarily designed to recognize human creators, creating challenges in assigning ownership and protection to AI-generated inventions.

Key Challenges

(i) **Creatorship and Ownership:** Currently, IP laws typically require that a human inventor be named for patents or copyrights. The lack of a human creator in AI-generated inventions calls this fundamental requirement into question.

(ii) **Autonomous Creativity:** Determining the level of autonomy in AI-generated inventions remains a crucial aspect. Despite AI’s capabilities, current AI systems rely heavily on human input for problem definition, data selection, algorithm design, and result interpretation.

(iii) **Adapting the legal framework:** Adapting existing IP laws to AI-generated creations without a clear human inventor is a complex task that requires revisions to laws, definitions and legal interpretations.

Current State and Future Outlook

Scholars and industry experts agree that while AI is advancing rapidly, achieving a state of artificial general intelligence (AGI) or superintelligence is considered distant and uncertain, and unlikely to be in the immediate future. Therefore, for now, the focus of IP laws is on works created by humans with AI support.

Overall, while AI-generated inventions pose challenges to the current IP system, the focus remains on human participation in creating innovative outcomes with AI support, rather than on AI itself as an inventor. Adapting IP laws to possible future developments in AI-generated creations is an ongoing consideration.

Can AI be Given Intellectual Property Ownership under Existing Copyright Law?

Certain requirements must be completed to protect a work by copyright. Because copyright protects the representation of ideas rather than the ideas themselves, the art form must be substantial and inventive enough to be an original work or differ from it. The concept of “authorship” underpins IPRs in the context of copyright. In other words, the person claiming the copyright must be the original creator or have inherited it. Under IP law, creators and inventors have the right to protect their discoveries, designs, and creative works.

The purpose of these provisions is to encourage the public to create significant works for society and benefit from them by making it illegal for others to abuse their work. In the case of *Andrien v Southern Ocean County Chamber of Commerce*,¹⁹ the Court determined that a work is only copyright protected if it was authored by a legally recognized author or creator. Typically, the author or creator is the someone who creates the copyrighted expression and has it corrected or repaired in physical form. Copyright Law, in general, limits authorship to living persons. This is evident in the multiple sections devoted to different sorts of authors, the author’s lifespan, and the author’s death. The application of the Law is uncontested in most cases where the creators of such software are humans because it conforms to the concept of copyright law that a person is the true author/creator, but AI in their role of becoming ‘smarter’ as human helpers in creating a wide range of products and becoming more independent in developing their own individual products, the law does not provide a clear solution. Is AI capable of becoming a creator, author, and IP owner/seller?

When a monkey accidentally took a photo in the famous *macaque selfie case*,²⁰ a discussion erupted about who should own the copyright to the selfie. The ownership of the image was claimed by PETA, an animal rights organization. The photographer who used the camera also claimed ownership since he made significant creative contributions. The Court ruled that an animal’s claim cannot be protected since it cannot be the creator. In these circumstances, the court looks for the closest human connection to the work which could not be determined. Thus, the image was finally made public.

Since a long time, Robot artists have been involved in an array of creative pursuits. Computers have been used to create primitive works of art since the 1970s,

and this attempt continues to this day. Many computer-generated artworks relied primarily on the imagination of the developer; the computer was only a device or tool, similar to a brush or palette. However, we are in the midst of a revolution in technology, which may need a rethink of the connection between technology and the process of creativity. The rapid development of machine learning software and a subset of AI that develops autonomous systems capable of learning without being explicitly taught by a human, is fueling this revolution.

When it comes to works with no or little contribution from humans, copyright can take one of two approaches. It has the power to refuse copyright protection to computer-generated works or to attribute copyright to the programmer of the program.

Until recently, copyright in work produced by AI was never explicitly prohibited. However, it has been proven that non-human copyright is prohibited under the laws of different countries. In a long-ago case in the United States, *Feist Publications v Rural Telephone Service Company, Inc.*,²¹ the Copyright Office said it will register authorship of an original work if the work was created by a human. It specifically states that copyright protects only “the fruits of intellectual labor” based on “the creative power of the mind.” The US Copyright Office, on the other hand, currently considers an AI-generated work copyrightable if the artist can demonstrate that they put significant creative effort into the final result. Digital art, poetry, and literature developed using technologies such as Stable Diffusion, DALL-E, Midjourney, ChatGPT, or even the recently announced GPT-4 are not copyrighted if created by people who merely wrote a description or have used a command line. Similarly, in a recent Australian case, *Acohs Pty Ltd V. Ucorp Pty Ltd*,²² the court concluded that because an object generated by an automated device did not originate from a living person, it could not be copyrighted.

The Court of Justice of the European Union has stated in its landmark decision *Infopaq International A/S v Danske DagbaldesForening (C-5/08)*,²³ that copyright applies only to original works, and such originality must reflect the author’s own intellectual creation. This is often interpreted to mean that a work of originality must reflect the personality of the author, meaning that a copyrighted work must be created by a living being.

Accordingly, granting authorship to programmers, is visible in a number of nations, including India,

Hong Kong, New Zealand, Ireland and the United Kingdom.²⁴ The Section 9(3) of the Copyright, Designs and Patents Act, 1988 (CDPA) best exemplifies this strategy: “In the case of literary, dramatic, musical, or artistic work that is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.”

In addition, Section 178 of the CDPA defines a machine-produced work as one “created by the computer in circumstances where the work has no human author.” The purpose of such a provision is to create an exception to all human authorship criteria by recognising the work that has gone into establishing a programme capable of generating output even when the spark of imagination has been handed to the computer.

Intriguing Patent-Related Case of Dabus: Who Should Own AI Inventions?

The Device for the Autonomous Bootstrapping of Unified Sentience (DABUS) was developed by Dr. Stephen Thaler, President and CEO of Imagination Engines, Inc. and was the first AI system whose inventor was named in an application for a patent. The AI system was tasked with seeking patent protection for a computer invention developed in 2018-19.²⁵ The filing of DABUS was a turning point in the history of patent law, as no AI has yet attempted to claim an AI as a creator for the sake of securing a patent. The Australian Patent Office, EPO, the United States Patent and Trademark Office (USPTO), the South African Intellectual Property Office and the United Kingdom Intellectual Property Office are among the worldwide patent offices with which the application has been filed. Below are decisions from patent offices and courts around the world:

European Patent Office (EPO)

The EPO rejected Dr. Thaler’s two European applications for patents. According to the Office, the content of the application did not meet the legal requirements of the EPC, which is why the patent application was rejected.²⁶ According to the Convention, the inventor named in a patent application must be a living being. DABUS did not meet the legal requirements of the Convention because it was an AI machine. Dr. Thaler appealed to the EPO’s Board of Appeal (BoA or Board). The board said in its preliminary opinion that “the inventor named in the EPC for the purposes of a patent application must be a person with legal capacity.”²⁷

United Kingdom IPO

The patent application by Dr. Stephen Thaler has been rejected by the UK Intellectual Property Office (UK IPO). According to the UK IPO, Thaler’s patent application did not meet the legal requirements for a patent application as an inventor.²⁸ Thaler appealed to the High Court after the UK IPO rejected his application. On appeal, Judge Smith ruled that the title of “inventor” under the Patents Act, 1977 must be given to an individual. Following the Supreme Court decision, Dr. Thaler appealed to the Court of Appeal. However, the appeal was denied due to a different decision.

The three judges all agreed that the author must be a natural person. “We must apply the law as it stands: this is not the time to discuss what the law should be,” said Judge Arnold. “While Dr. Thaler claims that as the owner of DABUS he has the right to apply for patents for inventions on the basis of a rule of law, if such a regulation does not exist,” he explained with regard to the legislation.²⁹ Judge Arnold ruled that the patent applications should be withdrawn immediately as they did not meet the statutory criteria of UK Patent Law.

United States PTO

The USPTO rejected Dr. Thaler’s application of patent. The USPTO determined that the requirement for the inventor to be human is mandated by federal court jurisprudence on inventorship. Judge Brinkema of the Virginia Eastern District Court ruled that the USPTO’s opinion that an inventor must be human is legitimate. Judge Brinkema also noted that the level of sophistication of AI systems will determine how far the concept of innovation can be expanded over time. “As technology advances, there may come a time when AI reaches a sophisticated level where it can meet commonly accepted definitions of inventiveness,” she adds. But that time has not yet come, and when it does, Congress must decide whether to expand the reach of patent rights.³⁰

Australia Patent Office

The DABUS patent application was rejected by the Australian Patent Office. In contrast, Dr. Thaler appealed to federal court. The appointment of Dr. Thaler in Federal Court was unexpectedly successful. According to Judge Beach’s decision, no section of the Patents Act of 1990 prohibits an inventor from being a computer or non-human AI system. It was also noted that an AI system can be considered an inventor under

patent law. The non-human inventor, however, cannot be considered a patent applicant or patent proprietor. Finally, it has been suggested that identifying an AI as an inventor will lead to a significant increase in the amount of innovation. However, later in *Commissioner of Patents v Thaler*,³¹ the entire Federal Court recently overturned the original judge's decision, declaring that the "inventor" in a patent application must be a living being.

The DABUS case has an enormous impact on the future of developments in the field of AI. It is becoming increasingly difficult to predict the extent of human engagement in the age of technological intervention. Companies whose operations rely on AI should be required to subtract the proportion of AI inputs from the proportion of human inputs to understand the extent of AI intervention in the current technology age. According to others, most people use AI as a tool for creation. The tool is built in the DABUS scenario. Even if the lawsuit is dismissed, it will mark the beginning of the battle for a suitable framework for AI technology.

Since current legislation considers the person who 'makes the necessary arrangements' for the development of the artistic works to be the author or owner, there is enough uncertainty that expanding the creative AI industry requires more effort. As a result, defining the specific authorship and extent of it remains a hazy issue. Data-owners (writers of previous works) and data-providers can all be deemed to have 'made necessary arrangements'.

Conclusion

The rise of AI presents a paradoxical scenario in which increased efficiency collides with potential threats to human autonomy and agency. AI could eventually rise or even surpass human intelligence, raising concerns about the extent to which people will rely on these systems in their daily lives. While AI offers enormous opportunities, its integration also presents significant challenges. The pressing question revolves around determining the best legal strategies to protect autonomous AI-developed creations on the global market. This urgency raises a crucial question: Should existing ownership rights be changed or should entirely new legal regulations be enacted to protect these inventions? As AI becomes more integrated into daily life, the justice system may require fundamental adjustments to accommodate the complexities that technological advances bring. Ultimately, this interface between AI and society

requires a delicate balance between harnessing its potential and addressing the multiple challenges it poses, particularly with regard to the legal landscape and maintaining individual autonomy in an AI-influenced world.

The article aims to adapt the legal framework to the changing landscape of AI-generated works, ensuring ethical considerations, human involvement, clear ownership and accountability in the development and distribution of these works as per the following:

(i) Expansion of existing regulations to require human participation in various phases of creative AI development and in the creation of works by AI. This includes defining roles such as 'programmer', 'developer', 'operator', 'server', 'data author', 'data provider' and others in regulatory frameworks.

(ii) Enable contractual agreements on Intellectual Property (IP) ownership pooling among involved parties. This empowers parties like programmers, developers, data authors, etc., to establish the scope of their ownership through contractual arrangements.

(iii) Need for legal entities to assume control and accountability over the works produced by AI. The goal is to prevent harm and set ethical boundaries for these systems. It is proposed to use existing studies, such as the EU study on robotics, to determine whether an author should be commissioned for works created by AI.

(iv) Treat AI-generated works as works for hire and grant rights to the person or organization commissioning the AI. However, this approach could lead to problems such as market saturation or manipulation through excessive work orders.

(v) Current legislation recognizes the difference between human authorship and machine production and considers people who take the necessary precautions to be the creators of the works. As legal cases related to 'authorship' and 'generation' emerge, the laws governing these concepts are expected to become more refined.

(vi) Address challenges such as determining the extent of human involvement in machine-generated works and establishing the basis for human authorship of such works.

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 - 31 *Commissioner of Patents v Thaler*, [2022] FCAFC 62.