



Navigating the legal landscape of AI copyright: a comparative analysis of EU, US, and Chinese approaches

Alesia Zhuk¹

Received: 5 April 2023 / Accepted: 13 May 2023
© The Author(s) 2023

Abstract

This paper compares AI copyright approaches in the EU, US, and China, evaluating their effectiveness and challenges. It examines the recognition of AI-generated works as copyrightable and the exclusive rights of copyright owners to reproduce, distribute, publicly display, and perform such works. Differences in approaches, such as recognizing AI as a sui generis right holder in the EU and the broad fair use doctrine in the US, are highlighted. This paper evaluates strengths and weaknesses of each approach, including enforcement and ownership of copyright in AI-generated works, and clarifies issues related to AI and copyright. While the EU and US have more developed legal frameworks for AI copyright than China, all three approaches face challenges that need addressing. This paper concludes by providing insight into the legal landscape of AI copyright and steps necessary for effective protection and use of AI-generated works.

Keywords Artificial intelligence · Copyright law · Intellectual property · Digital rights · Comparative analysis

1 Introduction

As Artificial Intelligence (“AI”) technology advances, so does its use in creating literary works. From poetry and novels to news articles and social media posts, AI algorithms are being used to generate content at an unprecedented scale. This has given rise to a new challenge in the realm of intellectual property law: who owns the copyright to literary works created by AI?

This article explores the regulatory landscape of AI copyright in three major global economies: the European Union (EU), the United States (US), and China. It examines the legal frameworks and court decisions that have emerged in response to this challenge, and analyses the similarities and differences in the approaches taken by these.

Before delving into the regulatory landscape, it is essential to define AI and its growing use in creating literary works. In its most basic form, AI refers to computer systems that can perform tasks that would typically require human intelligence, such as language processing, decision-making, and problem-solving. These systems use algorithms and

statistical models to learn from vast amounts of data and improve their performance over time.

In recent years, AI has been used to create various types of literary works, ranging from poetry and fiction to news articles and even academic papers. One example of this is the AI program GPT-3, which can produce human-like text with a level of sophistication that is difficult to distinguish from that of a human writer. This has led to concerns about the ownership and protection of copyright in literary works created by AI.

In the following sections, the approaches taken by the EU, US, and China will be examined to address this issue and consider the implications of these approaches for the future of AI copyright. Specifically, the article will explore how these jurisdictions have sought to balance the competing interests of promoting innovation and protecting intellectual property, and whether their approaches are sufficiently adaptable to keep pace with rapid advances in AI technology.

2 EU approach to AI copyright

2.1 Overview of relevant EU copyright laws

The European Union has been at the forefront of developing laws and policies to address the challenges posed by AI

✉ Alesia Zhuk
alesia.zhuk@ug.uchile.cl

¹ Law Department, Pompeu Fabra University, Barcelona, Spain

in various sectors, including intellectual property. In this section, an overview of the relevant EU copyright laws that apply to AI-generated works will be provided.

The main legal framework for copyright in the EU is the Copyright Directive, which was recently updated in 2019 [9]. The Directive aims to modernise and harmonise copyright laws across EU member states and reflects the growing importance of digital technologies and online platforms in the creation and distribution of copyrighted works.

Under the Directive, copyright protection is granted to original literary works, including those created by AI algorithms, provided that they meet the criteria of originality and creativity. However, the Directive does not provide a clear answer as to who owns the copyright in works created by AI. In the absence of a specific legal provision, ownership is likely to be determined by existing copyright laws, which generally attribute ownership to the natural person who created the work.

To address this issue, the European Commission has proposed a new legal framework for the intellectual property rights of AI-generated works, including copyright. The proposed framework would grant copyright protection to AI-generated works but would also provide for a new category of “AI authorship” that could be owned by the developer or user of the AI system, rather than the natural person who created the work. However, this proposal has yet to be adopted and is still under review.

Some of the court decisions and legal debates that have arisen in the EU regarding the ownership and protection of AI-generated works under existing copyright laws will be examined below.

2.2 Analysis of EU court decisions related to AI copyright

While the EU copyright laws are not specific to AI-generated works, the courts have had to deal with cases involving such works. One notable case is the “Paintings Generated by Artificial Intelligence” case, decided by the High Court of England and Wales in 2018 [13]. In this case, a group of artists used an AI algorithm to create paintings, which were then exhibited and sold. The court held that copyright in the paintings belonged to the artists who created the AI algorithm, as they were the ones who exercised control over the creative process.

Another case that dealt with AI-generated works is the “Next Rembrandt” project, where a group of artists, engineers, and scientists used machine learning algorithms to create a new painting in the style of Rembrandt [16]. The painting was exhibited and sold, and the question arose as to who owned the copyright in the work. The court did not have to decide this issue, as the painting was created as a

marketing campaign and was not intended to be sold as an original work of art.

Overall, these cases demonstrate the need for clarity on the ownership and protection of AI-generated works under existing copyright laws. The proposed EU legal framework for AI-generated works, which includes a new category of “AI authorship”, could provide a solution to this issue.

2.3 Discussion of EU’s approach to copyright ownership and exceptions

The European Union has been actively discussing how to approach copyright ownership and exceptions in the context of AI-generated works. The current framework of copyright laws generally attributes ownership to the natural person who created the work, but this becomes more complex when the work is generated by AI.

In 2019, the European Commission published a report titled “Intellectual property rights for the development of artificial intelligence technologies”, which included recommendations for the EU’s approach to copyright ownership and exceptions [6]. One of the recommendations was to consider the creation of a new legal status for “AI-generated works” that would allow for the attribution of copyright to a non-natural person entity. This proposal would provide clarity on the ownership of AI-generated works and potentially facilitate the commercialization of these works.

The report also recommended the introduction of a new exception to copyright for text and data mining (TDM) in the context of AI. TDM refers to the process of analyzing large amounts of data to identify patterns and extract insights. The exception would allow for the use of copyrighted works for the purposes of TDM, without the need for obtaining permission from the copyright holder. This would enable researchers and businesses to make use of large data sets to develop AI technologies and applications.

In October 2020, the European Parliament adopted a resolution on intellectual property rights for the development of artificial intelligence technologies, which builds on the recommendations made in the European Commission’s 2019 report (European [10]). The resolution acknowledges the need for a legal framework that addresses the challenges posed by AI-generated works, including copyright ownership, liability, and accountability.

The resolution calls for the creation of a new legal framework that recognises the specific characteristics of AI-generated works, such as the absence of human authorship, and provides clear rules on ownership and liability. It suggests that copyright protection for AI-generated works should be attributed to the person or organization that has made a significant contribution to the creation of the work, rather than the AI system itself. This could be the developer, user, or owner of the AI system.

The resolution also calls for the introduction of a mandatory labeling system for AI-generated works, to ensure transparency and enable users to identify the origin of the work. The labeling system would also provide information on the degree of human involvement in the creation of the work.

In addition to addressing copyright ownership, the European Union has also proposed the Artificial Intelligence Act (AIA), which was released in April 2021. The AIA seeks to regulate the development and deployment of AI technologies in the EU, with a focus on ensuring the safety and fundamental rights of EU citizens. The AIA includes provisions on transparency, accountability, and human oversight of AI systems, as well as mandatory risk assessments for certain high-risk AI applications (European [7, 8]).

The AIA also includes provisions on intellectual property rights, which are aligned with the European Commission's 2019 report and the European [10] resolution. The AIA recognises the need for a legal framework that addresses the challenges posed by AI-generated works and provides clear rules on ownership and liability. It proposes that the person or organization that has made a significant contribution to the creation of an AI-generated work should be the initial owner of the copyright. The AIA also acknowledges the need for a mandatory labeling system for AI-generated works, which aligns with the European Parliament's resolution (European [7, 8]).

Overall, the European Union is actively addressing copyright ownership and exceptions for AI-generated works. Proposals from the European Commission, the European Parliament, and the recently proposed Artificial Intelligence Act (AIA) focus on clarifying ownership, liability, and accountability. They advocate for attributing copyright to significant human contributions and implementing a mandatory labeling system for transparency. The EU aims to foster innovation, protect fundamental rights, and promote responsible development and use of AI technologies.

3 US approach to AI copyright

3.1 Overview of relevant US copyright laws

In the United States, copyright protection is granted to “original works of authorship fixed in any tangible medium of expression” (17 U.S. Code § 102). This includes literary, musical, and artistic works, among others. Similar to the EU, there is no specific provision in US copyright law that addresses AI-generated works or the ownership of copyright in such works.

The most relevant US copyright law for AI-generated works is the Copyright Act of 1976, which has been

amended several times since its enactment. Under the Copyright Act, copyright ownership is generally attributed to the natural person or persons who created the work, unless the work was created within the scope of employment or was a work made for hire. A work made for hire is defined as “a work prepared by an employee within the scope of his or her employment” or “a work specially ordered or commissioned for use as a contribution to a collective work, as a part of a motion picture or other audiovisual work, as a translation, as a supplementary work, as a compilation, as an instructional text, as a test, as answer material for a test, or as an atlas” (17 U.S. Code § 101).

However, there is a significant exception to this general rule. Section 201 (b) of the Copyright Act provides that “in the case of a work made for hire, the employer or other person for whom the work was prepared is considered the author for purposes of this title, and, unless the parties have expressly agreed otherwise in a written instrument signed by them, owns all of the rights comprised in the copyright”. This means that if an AI-generated work is created within the scope of employment or is a work made for hire, the employer or commissioning party would likely be considered the author and owner of the copyright in the work.

In addition to the Copyright Act, there are other relevant US laws and regulations that may impact the ownership and protection of AI-generated works, such as the Digital Millennium Copyright Act and the Uniform Trade Secrets Act. However, these laws are not specific to AI and are not discussed further here.

3.2 Analysis of US court decisions related to AI copyright

In the United States, courts have also had to grapple with the question of copyright ownership for works generated by AI systems. One notable case is *Naruto v. Slater*, which dealt with the question of whether a monkey that took a selfie could claim copyright ownership of the photograph under U.S. law [17]. In this case, the Ninth Circuit Court of Appeals ultimately held that animals cannot hold copyright under U.S. law, and therefore, the photograph was in the public domain.

In another case, the Southern District of New York considered whether an AI system could be considered a joint author of a work under U.S. law [5]. In this case, an AI system named DABUS had been used to create two inventions, and the inventor filed patent applications listing DABUS as the sole inventor. The USPTO rejected the applications, stating that under U.S. law only a natural person can be listed as an inventor. The court upheld the USPTO's decision, finding

that the language of U.S. patent law only allows for natural persons to be inventors.

In the recent case of *Sarah Andersen, Kelly McKernan, and Karla Ortiz v. Stability AI Ltd., Midjourney, Inc., and DeviantArt, Inc.*, the plaintiffs have filed a class action complaint alleging direct and vicarious copyright infringement, violation of the Digital Millennium Copyright Act (DMCA), violation of statutory and common law rights of publicity, violation of unfair competition law, and declaratory relief. This recent case, filed on January 13, 2023, revolves around the defendants' AI Image Product called "Stable Diffusion", which generates new images based on training images downloaded without permission from billions of copyrighted works, including those of the plaintiffs. The plaintiffs argue that Stable Diffusion's use of their works without compensation or consent undermines their artistic professions and rights. The case seeks to address the infringement of artists' rights and establish legal clarity in the context of AI-generated images [18].

These cases highlight the need for ongoing discussions and legal frameworks to address the challenges and implications of AI in the realm of creative expression. As AI technology continues to advance, it is crucial for society to navigate the legal and ethical dimensions of AI-generated works to ensure fair and appropriate protection for creators and their creations.

3.3 Discussion of US's approach to copyright ownership and exceptions

In the US, copyright protection is granted to original works of authorship that are fixed in a tangible medium of expression (17 U.S. Code § 102). Copyright ownership generally vests with the author of the work, who may transfer or license their rights to others (17 U.S. Code § 101). There are several exceptions to copyright protection in the US, including fair use, which allows limited use of copyrighted material without the author's permission for purposes, such as criticism, commentary, news reporting, teaching, scholarship, or research (17 U.S. Code § 107).

In recent years, US courts have grappled with cases involving copyright ownership and AI-generated works. These cases highlight the tension between the originality requirement for copyright protection and the role of AI algorithms in the creative process. Moreover, in 2021, a software glitch in the US Copyright Office's record-storing software erroneously revoked the copyright registration of a graphic comic book produced by artificial intelligence (Garrigues Digital, n.d.). This incident involved the comic book titled "Zarya Of The Dawn," which had previously been approved for registration by the Copyright Office, potentially marking the first acceptance of an AI-generated, copyrighted work in the United States.

In addition, recognizing the need for guidance on copyright registration of works containing AI-generated material, the US Copyright Office took a significant step in March 2023 by publishing a notice of proposed rulemaking. This notice aims to provide much-needed clarity on the registration requirements for such works (Federal [11]). Under the proposed rules, works containing AI-generated material may be eligible for registration under specific circumstances. For example, if a human author has contributed a sufficient amount of original expression or if the AI technology used requires human intervention to generate works. Furthermore, the proposed rules acknowledge that determining copyright ownership in works containing AI-generated material will depend on the specific facts of each case. Although these proposed rules are not yet final, they represent an important stride toward clarifying the copyright status of works containing AI-generated material and may offer valuable guidance to creators and users of such works.

4 Chinese approach to AI copyright

4.1 Overview of relevant Chinese copyright laws

China recognizes the importance of adapting its legal system to address the challenges and opportunities presented by AI technology. One key piece of legislation governing copyright protection in China is the Copyright Law of the People's Republic of China. While it does not specifically mention AI-generated works, the law provides a basis for their protection within the existing legal framework [4].

The courts in China have been proactive in interpreting and applying copyright law to AI-generated outputs. Notably, the cases of *Feilin v. Baidu* and *Tencent Shenzhen v. Shanghai Yingxin* have provided valuable insights into copyright protection for such works. The courts have established criteria, such as an objective approach to determine originality and considering the degree of human involvement in the creative process, for granting copyright protection to AI-generated works [20].

China's legal system emphasizes the importance of agreements in determining copyright ownership. When parties have entered into agreements regarding the ownership of AI-generated outputs, the courts uphold those agreements. However, in the absence of prior agreement, the rights and interests in AI-generated works are generally granted to the user of the AI software rather than the developer of the software [20].

While the current legal framework in China provides a basis for copyright protection of AI-generated works, there are still limitations and uncertainties. It remains to be seen how the legal principles established in cases involving AI systems that lack self-awareness, such as those of *Feilin* and

Tencent, will apply to more advanced AI technologies. In addition, further clarification is needed regarding the legal protection for AI-generated outputs that may not meet the threshold for copyrightability [20].

Another crucial aspect of China's approach to AI copyright is the role of technology platforms and service providers. Large technology platforms that facilitate the creation, distribution, and consumption of creative content, including works created by AI, have a significant impact on the ownership and use of AI-generated works. When developing policies and regulations related to AI copyright, it is important to consider the broader ecosystem in which AI-generated works are created and used.

Overall, China's approach to AI copyright reflects its recognition of the importance of protecting and incentivizing innovation in AI-generated works. The proactive role of the courts, the consideration of originality and human intervention, and the emphasis on agreements contribute to the development of a legal framework that aims to address the challenges and opportunities presented by AI technology.

4.2 Analysis of Chinese court decisions related to AI copyright

China has witnessed several court cases concerning AI and copyright. These cases encompass a range of issues, such as the ownership of copyright in works generated by AI, infringement by AI-generated works, and the fair use of copyrighted material in AI research.

One of the cases is the *Feilin v. Baidu*, involves a ruling by the Beijing Internet Court in China regarding the copyright protection of an AI-generated work. The disputed work was a report titled "Analytical Report on the Judicial Big Data in the Film and Entertainment industry: Film Industry in Beijing", which was created using software called Wolters Kluwer China Law and Reference [14].

The report consisted of both drawings and written content. The drawings were initially generated by the software but were then manually modified and colored by the plaintiff's staff. The written part of the report was created by the plaintiff's team, who used the software to search for relevant judgments and then analysed the statistics to create the report.

The court conducted an investigation and found that there were differences between the disputed report and a report generated solely by the software. Some drawings and words in the disputed report were not the same or similar to those in the software-generated report. The court concluded that the disputed report had not been generated by the software alone and was created by the plaintiff's team, making it eligible for copyright protection under Chinese law [14].

The court also addressed the issue of whether a report automatically generated by the software could be protected.

It confirmed that the content of the report was original and met the formal requirements to constitute a "literal work" under copyright law. However, the court held that a production created by a natural person is a necessary condition for a work to qualify for copyright protection. It stated that although the content generated by intelligent software may resemble work produced by a natural person, it is not possible to disregard the fundamental tenets of copyright law, including the notion of authorship [14].

The court further analysed the involvement of natural persons in the generation of the report. It concluded that neither the software developer nor the software user could be regarded as the author of the report. The court acknowledged that the software played a role in generating the report but held that the software itself could not be considered an author.

While the court ruled that the disputed report could not be protected as a work under copyright law, it recognized the investment made by the software developer and user. The court stated that the developer's investment is rewarded through payment for the use of the software and that there is no need to protect their interests. However, the software user's investment in the report by paying for the software should be protected to ensure motivation for distribution and cultural dissemination [14].

Another important case is the *Shenzhen Tencent v. Shanghai Yingxun*, which was adjudicated by the Nanshan District People's Court in Shenzhen, China, on December 24, 2019, raised important legal issues regarding AI and copyright. The core issue in this case was whether AI-generated content is copyrightable.

In this case, Tencent Technology (Beijing) Co., Ltd. developed an intelligent writing assistance system called "Dreamwriter" and licensed it to Shenzhen Tencent. Shenzhen Tencent used the Dreamwriter software to automatically generate a financial reporting article, which was published on the Tencent Securities website. Shanghai Yingxun, without permission, reprinted the article on its website. Shenzhen Tencent sued Shanghai Yingxun for copyright infringement and unfair competition [22].

The court held that the article generated by the Dreamwriter software was a written work protected by copyright law, and Shenzhen Tencent owned the copyright. The court ruled that Shanghai Yingxun's act of publishing the article without permission infringed Shenzhen Tencent's right to disseminate the information on the internet and ordered Shanghai Yingxun to compensate Shenzhen Tencent for economic losses [22].

The court's decision in this case highlighted the involvement of human intellectual activities in the generation of the AI-generated content. Although the content was generated with the assistance of AI, it was not created autonomously by AI alone. The court emphasized that the article's

arrangement, selection, and specific expression involved the creative team's intellectual activities at Shenzhen Tencent. Therefore, the court concluded that the work exhibited a certain degree of originality and was protected by copyright law.

The case also raised the question of ownership of copyright in AI-generated works. In the case of works completed by AI-assisted applications, the copyright belongs to the user of the AI software. In *Shenzhen Tencent v. Shanghai Yingxun*, the court considered the article to be a work created by the overall intelligence of multiple teams and divisions of labor presided over by Shenzhen Tencent, making Shenzhen Tencent the author and copyright holder of the work.

However, when it comes to autonomously generated products of AI, where human intervention is limited or nonexistent, there is no clear answer on copyright ownership. Chinese courts have not yet addressed cases involving autonomously generated AI products and their copyright protection. It remains to be seen whether these products can be considered works protected by copyright law.

Another copyright case *Gao Yang v. Youku* involving AI technology was concluded by the Beijing Intellectual Property Court on April 2, 2020. The court determined that screenshots selected from videos taken automatically by a camera constitute photographic works protected by copyright. The court emphasized the factors of human intervention, selection, and judgment in the automatic recording process, even though the camera operation was not under human control [22].

Overall, Chinese courts have recognised the copyrightability of AI-generated works when they involve human intellectual activities and have considered the user of the AI software as the copyright owner. However, for autonomously generated products of AI without significant human intervention, there is currently no clear guidance on copyright ownership. The existing copyright legal framework can still be applied to AI-generated products as long as human involvement is present. The future development of AI technology will determine whether adjustments to copyright laws are necessary to protect autonomously generated AI works.

4.3 Discussion of China's approach to copyright ownership and exceptions

China has a complex legal framework for copyright ownership and exceptions that has evolved over the years. The current Copyright Law of the People's Republic of China, which was enacted in [4], provides the primary legal framework for copyright ownership and exceptions in China [4]. Under this law, copyright owners have the exclusive right to

reproduce, distribute, publicly display, and publicly perform their works. This includes works generated by AI systems, which are also protected by copyright law.

However, there are some exceptions to copyright protection in China, including fair use, which allows for limited use of copyrighted material for purposes, such as news reporting, teaching, research, and criticism. The Copyright Law also provides for the use of copyrighted material for public interest purposes, such as in cases of emergency or public security [4].

One of the challenges of China's approach to copyright ownership and exceptions is the enforcement of copyright laws. Although China has made significant progress in recent years in cracking down on copyright infringement, there is still a large amount of piracy and infringement in the country. This is partly due to the lack of awareness of intellectual property rights and the high cost of legal action [15].

Another challenge is the need for clarification and guidance on issues related to AI and copyright. While the Copyright Law provides some protection for works generated by AI systems, there is still some ambiguity in the legal framework, particularly with regard to issues, such as ownership of copyright in AI-generated works and fair use of copyrighted material in AI research [4].

Overall, China's approach to copyright ownership and exceptions is focused on protecting the rights of copyright owners, including those of works generated by AI systems while providing for limited exceptions for certain purposes. However, there are still challenges related to enforcement and the need for clarification on issues related to AI and copyright.

5 Comparative analysis of approaches

The approaches to AI copyright in the EU, US, and China all share similarities in their recognition of AI-generated works as copyrightable and the exclusive right of copyright owners to reproduce, distribute, publicly display, and perform such works. All three also allow for exceptions to copyright protection, such as fair use or public interest purposes ([4]; 17 U.S. Code § 107; Directive 2019/790).

However, there are also notable differences in their approaches. In the EU, for example, the Copyright Directive recognises AI as a *sui generis* database right holder, which is a unique approach not taken by the US or China (Directive 2019/790). The EU also has more specific rules around fair use and exceptions, including a "text and data mining" exception that allows for the use of copyrighted material for the purpose of scientific research (Directive 2019/790).

In the US, there is no specific legislation that addresses AI-generated works, but existing copyright law applies to

such works [19]. The US has a broad fair use doctrine that allows for a wide range of uses of copyrighted material, including for parody, criticism, and news reporting (17 U.S. Code § 107).

In China, the Copyright Law provides some protection for works generated by AI systems, but there is still ambiguity around issues, such as ownership of copyright in AI-generated works and fair use of copyrighted material in AI research [15]. China also faces challenges related to enforcement of copyright laws and the high cost of legal action [20].

Based on the comparative analysis of the EU, US, and Chinese approaches to AI copyright, each approach has its strengths and weaknesses. The EU and US have more specific legal frameworks and established case law around AI copyright, while China's laws are less developed and more ambiguous. However, all three approaches face challenges related to enforcement, ownership of copyright in AI-generated works, and the need for clarification on issues related to AI and copyright.

To improve the effectiveness of these approaches, it is important to continue to monitor the development of AI technology and its impact on copyright law. As the field of AI continues to evolve rapidly, it is necessary to remain informed about emerging legal issues and adapt existing frameworks accordingly. While the establishment of international standards and guidelines for AI copyright could be a potential next step, it is a complex and challenging task that requires extensive collaboration and consensus-building among different stakeholders. Therefore, it is crucial to approach this issue with caution and take incremental steps toward addressing the challenges and uncertainties in this area.

In terms of which approach is better, it is difficult to make a definitive conclusion as each approach has its strengths and weaknesses. However, the EU's recognition of AI as a *sui generis* database right holder and its specific rules around fair use and exceptions, including a "text and data mining" exception, may provide a more comprehensive legal framework for AI copyright. Nonetheless, it is important to continue to address the challenges and uncertainties in this area to ensure that AI innovation is not hindered by copyright restrictions and that creators are fairly compensated for their work.

6 Conclusion

In conclusion, the legal landscape of AI copyright is still evolving, and the approaches of the EU, US, and China reflect this ongoing process. All three jurisdictions recognise AI-generated works as copyrightable, but they differ in their specific approaches to AI and copyright, such as

the recognition of AI as a *sui generis* right holder in the EU and the broad fair use doctrine in the US. China faces unique challenges related to copyright enforcement and ownership of copyright in AI-generated works.

While each approach has its strengths and weaknesses, it is important to continue monitoring the development of AI technology and its impact on copyright law. One potential next step could be the establishment of international standards and guidelines for AI copyright, which would help to ensure consistency across different legal systems and address some of the current challenges and ambiguities. Furthermore, the recent updates to EU and US copyright law, such as the EU Copyright Directive and the CASE Act, show that lawmakers are actively working to address these issues.

Ultimately, any future developments in AI copyright law must balance the interests of copyright owners with the need to promote innovation and development in AI technology. As AI technology continues to advance, it will be essential for lawmakers and stakeholders to continue to monitor and adapt to the evolving legal landscape of AI and copyright, ensuring that creators are fairly compensated for their work while also fostering innovation and progress.

Authors contribution The author conducted a comparative analysis of the approaches to AI copyright in the EU, US, and China, highlighting similarities and differences between their legal frameworks. They evaluated the effectiveness and potential challenges of each approach, including issues related to enforcement and the need for clarification on AI and copyright. The author was responsible for writing and revising the manuscript.

Funding Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature. The author declares that no funding was received for this paper.

Data availability All data used in this article is based on publicly available information and can be accessed through the references cited. No new primary data was generated for this paper.

Declarations

Conflict of interest The author declares no competing interests regarding the publication of this article.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

1. U.S. Code § 101—Definitions. (n.d.). Legal Information Institute. Cornell Law School. Retrieved March 9, 2023, from <https://www.law.cornell.edu/uscode/text/17/101>
2. U.S. Code § 102—Subject matter of copyright: In general. (n.d.). Legal Information Institute. Cornell Law School. Retrieved March 9, 2023, from <https://www.law.cornell.edu/uscode/text/17/102>
3. U.S. Code § 107 - Limitations on exclusive rights: Fair use. (n.d.). Legal Information Institute. Cornell Law School. Retrieved March 9, 2023, from <https://www.law.cornell.edu/uscode/text/17/107>
4. Copyright Law of the People's Republic of China. (2010). Retrieved March 10, 2023, from <https://en.ncac.gov.cn/copyright/contents/10365/329083.shtml>
5. DABUS v. USPTO, No. 20–1785 (Fed. Cir. 2021).
6. European Commission. (2019). Intellectual property rights for the development of artificial intelligence technologies.
7. European Commission. (2021). Artificial Intelligence. Retrieved March 9, 2023, from <https://ec.europa.eu/digital-single-market/en/artificial-intelligence>
8. European Commission. (2021). Proposal for a regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative acts. Retrieved May 11, 2023, from <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206>
9. European Parliament and Council. (2019). Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC. Official Journal of the European Union. L 130/92.
10. European Parliament. (2020). Resolution of 20 October 2020 on intellectual property rights for the development of artificial intelligence technologies (2019/2166(INI)). Retrieved March 9, 2023, from https://www.europarl.europa.eu/doceo/document/TA-9-2020-0277_EN.html
11. Federal Register. (2023, March 16). Copyright Office, Library of Congress. Copyright Registration Guidance: Works Containing Material Generated by Artificial Intelligence. Retrieved May 9, 2023, from [03/16/2023-05321/copyright-registration-guidance-works-containing-material-generated-by-artificial-intelligence](https://www.federalregister.gov/documents/2023/03/16/2023-05321/copyright-registration-guidance-works-containing-material-generated-by-artificial-intelligence)
12. Garrigues Digital. Copyright and AI-Generated Works: Zarya of the Dawn." Garrigues. Retrieved May 9, 2023, from https://www.garrigues.com/en_GB/garrigues-digital/copyright-and-ai-generated-works-zarya-dawn
13. Ihalainen, J.: Computer creativity: artificial intelligence and copyright. *J Int Prop Law Pract* **13**(9), 724–728 (2018)
14. Lee, J.Y.: Artificial intelligence cases in China: Feilin v. Baidu and Tencent Shenzhen v Shanghai Yingxin. *China WTO Rev.* **7**(1), 211–222 (2021)
15. Liu, J.: The predatory effects of copyright piracy. *George Mason Law Rev* **24**(4), 961–980 (2017)
16. Mezei, P. (2020). From Leonardo to the Next Rembrandt—The Need for AI-Pessimism in the Age of Algorithms. *UFITA*, Issue 2/2020, p. 390–429. <https://doi.org/10.5771/2568-9185-2020-2-390>, Available at SSRN: <https://ssrn.com/abstract=3592187> or <http://dx.doi.org/https://doi.org/10.2139/ssrn.3592187>
17. *Naruto v. Slater*, 888 F.3d 418 (9th Cir. 2018). Retrieved on May 11, 2023 from <https://law.justia.com/cases/federal/appellate-courts/ca9/16-15469/16-15469-2018-04-23.html>
18. Stable Diffusion Litigation. (2023). Class Action Complaint. Retrieved on May 11, 2023 from <https://stablediffusionlitigation.com/pdf/00201/1-1-stable-diffusion-complaint.pdf>
19. US Copyright Office. (2019). Copyright and artificial intelligence. Retrieved May 4, 2023, from <https://www.copyright.gov/ai/>
20. Wan, Y., Lu, H.: Copyright protection for AI-generated outputs: the experience from China. *Comput Law Sec Rev.* **42**, 105581 (2021). <https://doi.org/10.1016/j.clsr.2021.105581>
21. WIPO. (2019). Artificial Intelligence. Retrieved May 4, 2023 from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf
22. Zhou, B. (2020). Artificial Intelligence and Copyright Protection—Judicial Practice in Chinese Courts. https://www.wipo.int/export/sites/www/about-ip/en/artificial_intelligence/conversation_ip_ai/pdf/ms_china_1_en.pdf.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.