Study On Copyright Infringement of Artificial Intelligence Paintings

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Abstract. Since 2022, artificial intelligence (AI) technology has been fully developed, and its performance in the field of art has been extremely outstanding. Programs of AI painting have been able to generate paintings with different styles and great innovativeness, but AI still needs to access and utilize other people's works in the process of painting, and there exists a risk of infringement. According to the cases that happened in reality, AI has the risk of infringement of reproduction rights, infringement of adaptation rights, and infringement of the author's right of authorship. The governance of copyright infringement of AI painting is also extremely complex, there are difficulties in the identification of infringement, the identification of the responsible subject, and difficulties in the rights defense litigation. Given the copyright infringement problem of AI paintings, this paper will study the formulation of judgment standards, the promotion of litigation methods, the improvement of laws and regulations, and the promotion of industry self-discipline. This paper is committed to protecting the legitimate rights and interests of copyright holders and effectively reducing the infringement of AI paintings.

Keywords: Artificially intelligent paintings; copyright infringement; artificial intelligence generated content; judgment criteria; regulation.

1. Introduction (3, 5)

With the progress of science and technology, AI has entered a brand-new period of development, and its application fields and methods have been fully expanded. In addition to being capable of mechanical work, AI has also begun to show human-like or even human-surpassing abilities in the creative fields of literature and art. [1] In traditional cognition, painting is considered an art form full of humanistic undertones and subjective aesthetics. However, AI painting is now able to train and learn by building a dataset of works and output content results in the form of works. For example, Midjourney, an AI painting tool, allows users to access a website, and retrieve text depicting an imaginary image, and Midjourney generates multiple images in a very short period for the user to use. AI drawing attracts a large number of users with its extremely convenient operations. “Xiaobing”, the AI conversation software developed by Microsoft, has even held a personal painting exhibition, which represents the public's gradual recognition of AI's creative ability. However, AI needs a sufficient amount of material accumulation before creation, which may lead to the use of other people's material. *Copyright Law of the People's Republic of China* stipulates that the unauthorized use of other people's copyrighted works is an infringement. In terms of the generation mode at the present stage, it is inevitable for AI to use a large number of other people's works as material when creating, which is likely to bring the risk of infringement. The practice of law will greatly hinder the development of literature and art and the progress of science and technology if it fails to eliminate the conflict between copyright holders and the promotion of AI. In the primary stage of AI development, academics mainly focus on the characterization of AI-related behaviors and research on copyright attribution and pay insufficient attention to the copyright infringement problems that may arise in the process of AI painting. Against this background, this paper carries out systematic research on copyright infringement in AI painting, hoping to protect the legitimate rights and interests of copyright holders and promote the vigorous development of AI technology in the creative field of painting creation at the same time.

2. Copyrightability analysis of AI paintings

Article 3 of the latest revision of "*Copyright Law of the People's Republic of China*" has detailed provisions on the composition of "works": in the fields of literature, art, and science; are ingenious; can be presented in certain forms; can be identified as intellectual achievements. The AI painting is objectively manifested in the form of painting, that is, manifested in a certain form, and painting belongs to the field of literature and art. Therefore, the judgment of whether an AI painting is copyrightable should mainly start from the recognition of the AI painting's intellectual achievement attribute and the determination of its originality.

2.1. Recognition of the attributes of the intellectual achievements of AI paintings

AI painting is built to imitate and execute the painting activities of the human brain. In terms of outward manifestation, AI paintings are not substantially different from the intellectual achievements of human beings who create paintings, and they are a kind of human-understandable expression of thoughts, emotions, and cognition. AI paintings are not a disorderly combination of symbols that cannot be understood by human beings, but an expression that is highly in line with the characteristics of artworks created by human beings in terms of painting style, construction elements, and other forms of expression, and can convey to the audience the information and ideas behind the symbolic elements that make up the painting.

From the internal operation principle, AI painting is not a fixed result produced by the implementation of established algorithms and programs but contains a certain sense of intellectual "creativity".[2] The creation of AI paintings is divided into three main stages:

1. The stage of recognizing things. To be able to accurately summarize the characteristics of different types of paintings, AI needs a large number of works as creative material. Unlike human beings, AI does not directly understand the elements, structures, and styles in the works. It can only recognize a limited number of color pixels in a picture. Therefore, in the input stage, AI needs the application developer to upload a large number of digitized works into the application's database so that the AI can perform continuous learning.

2. The stage of utilizing the experience. A large amount of material is uploaded into the database of the AI, and then the AI will organize and initially classify the material. After responding to the creator's instructions, the AI will screen the material according to the keywords in the instructions, analyze the works on the same theme, then extract the elements, styles, structures, and other characteristics of these works, and finally carry out repeated calculations and simulations through the advanced neural network to summarize the correct law of creation. At this stage, AI-generated paintings are more elementary, of average quality, with more imitative nature.

3. The stage of solving problems. After repeated learning and training, the AI can generate relevant algorithms. Creators only need to input keywords, and the AI can quickly complete the output of a large number of paintings. After continuous debugging by developers and timely feedback from users, the quality of works generated by AI is greatly improved, with good artistic value, and greatly reduces the use of resources.

The creative process of AI painting is the same as human intellectual activity, both of which reflect the comprehensive ability to cognize things, use experience, solve problems, etc. The human intervention and control contained in the process of AI painting activities are the result of human design, reflecting personalized factors such as human thoughts, emotions, and aesthetic attitudes. Therefore, AI-generated content is an intellectual achievement in the sense of copyright law.

2.2. Determination of Originality of AI Painting

A work protected by copyright law must be original. In the case of AI paintings, to become an object protected by copyright law, they also need to have the originality required by it.

"Originality" requires that the work be done independently by the author and reflect the author's expression. "Mechanical intellectual productions" should be excluded. For example, if the work is

done according to a certain order, formula, or structure, different people will get the same result, which is not original because of the uniqueness of the expression. As long as in the process of AI painting, the user continuously strengthens the individual needs of the product generated by the user and reflects the choice and judgment of the user, the paintings produced by different users through AI can be unique and differentiated, i.e., they have original expressions. AI paintings generate new art products by deep learning and big data technology, the content of these art products is significantly different from the existing works and can let readers perceive the author's artistic and emotional expression. Besides, these viewpoints have been adopted by the judicial practice of copyright protection for AI paintings in China. The court emphasized the condition that AI paintings can have originality,[3] indicating that China's judicial practice holds an affirmative position on the copyright protection of AI paintings. Therefore, AI paintings can meet the requirement of originality under the Copyright Law under certain circumstances.

3. Manifestations of Copyright Infringement in AI Painting Technology (5, 3, 4)

The risks that may arise from AI painting technology at this stage are extremely complex and develop dynamically with applications in different fields. From the perspective of the creator's rights, the main risks of AI painting technology at present are the risk of infringement of reproduction rights, infringement of adaptation rights, and infringement of authorship rights.

3.1. Risk of infringement of reproduction rights

The material in AI painting databases usually comes from automated scripts that crawl the web and leave the original work largely unaltered. This situation is stipulated in China's Copyright Law, which states that making one or more copies of a work by digitalization falls within the scope of the regulation of the reproduction right. The automatic capture by AI carries out the whole copy without changing the content of the original work, and there is a risk of infringing the reproduction right of the original work.

However, based on the continuous iteration and evolution of AI, the copying of the content of artworks has already departed from simple overall copying, but has changed to simulate the style, creativity, and other artistic characteristics, which is the so-called “AI Simulation Era”. The more superficial copying and plagiarism have been extremely easy to recognize by humans, but this new mechanism is extremely difficult to distinguish intuitively. For example, ChatGPT, with its large-scale self-supervised neural network learning technology, learns nearly 10 billion words, and the work it generates will never be the same as existing works. This kind of behavior, borrowing from human creativity throughout the ages, is essentially a kind of “hidden plagiarism”, which does not directly violate the rights of the original authors, but is very likely to discourage their creativity.[2]

In addition, AI can access works through screenshots. What’s more, some AI uses pirated websites as databases, inducing creators to upload non-copyrighted works as material. The platform “Novel AI” uses the controversial website “Danbooru” as its database and collects a large number of unauthorized images. When similar AI is used for creative work, it can easily infringe on the reproduction rights of others.

3.2. Risk of infringement of adaptation rights

The use of AI for creative work may also infringe on the right to adapt the works of others. Due to the large differences in the arithmetic power and database size of different levels of AI, works output by lower-level AI are likely to be substantially similar to works in the database. Such infringement is more likely to occur in the output of works by low and medium-level AI.

Most of the AI-generated content carries the basic creative elements of the original work but with some elements of other works mixed in. In a sense, such generated works are adaptations of the original work and are suspected of infringing the original author's right to adaptation.

3.3. Risk of infringement of authorship rights

AI builds a database by crawling and collecting artworks that have been publicly published in different media. During the collection process, the developer of the AI does not usually initiate an authorization application to the copyright owner. When the AI outputs content, it often mimics the style, creativity, and other artistic features of the original work, but does not sign the original author's name in the output. Coupled with the fact that AI-generated paintings often involve a tremendous amount of artwork data, it is also more difficult to publicize the attribution of the works from which they are drawn. The act of an AI-generated work that does not attribute the original work involved violates the original author's right of authorship.

4. Copyright infringement governance dilemma of AI paintings (3)

At the present stage, AI painting has generated a heated discussion, and there are also a large number of suspected infringement behaviors. As far as the legal application of AI paintings for copyright infringement is concerned, there are several major difficulties: difficulty in behavioral identification, difficulty in responsible subject identification, and difficulty in litigation rights defense.

4.1. Difficulties in identifying acts of copyright infringement

In China's judicial practice, copyright infringement is usually determined by “contact + substantial similarity”. Different from the infringement of traditional artworks, whether the infringing work constitutes “substantial similarity” is the focus and difficulty of determining whether the AI painting is infringing. Under such a rule, it becomes very slow and difficult to determine the infringement of AI paintings. Generally speaking, the infringement of a natural person is the infringement of the copyright of the original works of an individual and a few others. If a natural person simply appropriates, adapts, or copies, it is easy to constitute “substantial similarity”, and then be sanctioned by law for infringement. However, the number of original works involved in the infringement of AI paintings is huge and extensive. AI often uses only a small part of the artistic features of each original work, showing the characteristic of fragmentation, which also increases the subjectivity and abstraction of the process of determining the infringement of AI paintings.

At the current stage, AI itself does not qualify as a legal subject, nor does it have the ability to bear legal responsibility. Instead, the subjects involved in AI paintings include investors, designers, developers, operators of AI applications, and users who use AI to create. Investors need to combine market demand to discover the market potential and promotion value of AI, and then require developers to develop AI algorithms and formulate input, learning, and output rules. Based on this process, investors and developers have no control over the image generation of AI paintings, nor can they know and constrain the use of the output content of AI paintings. The use of AI-generated images, whether for personal enjoyment, collection, or application for commercial purposes, depends on the creator of the AI painting. The investors and designers of AI paintings only carry out program development according to the requirements of others and are not involved in the specific use of AI, so they should not bear the legal responsibility for the infringement of AI paintings. However, the deep learning data in the early stage of the development of AI paintings has a greater risk of infringement, and when the early stage of development caused substantial infringement, it would be unfair for the user to bear all the infringement responsibility. Therefore, it is more difficult to judge the subject of responsibility when the AI painting is infringed.

4.2. Difficulties in litigating for the defense of copyright infringement

1. Painting style belongs to the category of ideas and is difficult to be protected by copyright law. According to the prevailing view at this stage, the copyright law only protects the expression of works but not the interpretation of ideas. If ideas are categorized under the protection of copyright law, it may greatly affect people's learning and innovation of artworks. In the early stage, artists often learn from other works by copying and borrowing to learn the form of creation and the kernel of ideas,

from which they can draw inspiration continue to innovate, and ultimately complete their self-expression. Throughout history, painting style has always been an important factor in evaluating an artist's "originality". From ancient times to the present, those creators with high artistic attainments have used light, shadow, line, color, and other elements to form a unique painting style and add their unique ideas. In the rules of AI painting, developers often collect relevant works for deep learning without obtaining authorization from copyright holders. If the AI painting simulates the painting style of the relevant works, then it is in a more ambiguous area of determination, and there is a dispute over whether it is an infringement of copyright.

2. The infringement judgment standard of painting works is vague. Due to the efficient transformation ability of AI, the content generated by AI paintings involves numerous copyrighted works. It is difficult for a copyright owner to detect infringement because the fragment of the work being used is a relatively small part of the original work. Unlike textual works, which can be detected by search tools for duplication rates, artworks require a more in-depth look to detect duplications and similarities in content. The automated output of AI facilitates many fields while reducing the cost of infringement. The data sources for AI paintings are large and complex, and the infringing works are scattered throughout the AI-generated content, making it not only difficult for copyright holders to detect infringement but also more difficult to prove that the use of an AI painting of their work constitutes a "substantial similarity".

5. China's countermeasures against copyright infringement of AI paintings

5.1. Adherence to subjective and objective harmonization and minimum standards

The subjective-objective harmonized standard for determining copyrightability emphasizes that the determination of originality requires an examination of both the specific external expression and the actual source of it. In other words, only intellectual achievements originating from the creative acts of natural persons are eligible for the determination of originality.[5] The subjective-objective harmonized standard for determining copyrightability treats human authors as the sole subjective source of originality, which is in line with the substantive requirement of originality in the idea of personalism. At the same time, it is also different from the object independently defined copyrightability determination standard, abide by the absolute bottom line of the work for the natural person's creative achievements, neither only from the external manifestation of the AI generation to determine the originality directly, and completely ignore the intrinsic logical correlation between the natural person's creation and the nature of the work, and also will not ignore the contribution of natural human intellectual input and personality elements that may be embedded in the creative process of AI paintings.

On the subjective-objective harmonized determination standard, the vision of minimum standard is adopted for the determination of the objective expression of AI paintings. As long as there is a minimum difference in appearance between the external expression of AI paintings and the existing works in the public domain, and it does not encroach on the free use of knowledge in the public domain, this indicates that it is of value for judicial protection. Taking ordinary readers as the subject for judging the differences in the objective forms of expression, as long as the external forms of expression of the AI-generated product meet the requirements of the formal characteristics of general work, can obtain the aesthetic experience and value recognition of ordinary readers, and it is not the usual and unique expression in the public domain, it can be preliminarily assumed that the AI-generated product has originality.

5.2. Improvement of the copyright class action system from the perspective of digitization

Infringement of AI paintings often involves multiple copyright holders and their works. Given this situation, infringed persons should be encouraged to join forces on their initiative, to safeguard their legitimate rights and interests in the form of class action lawsuits. In judicial practice, the claims and litigation material of all infringers can be centralized to complete the closure of the chain of evidence

and better safeguard their rights and interests. Such a model saves the infringed person's litigation cost, objectively improves judicial efficiency, and shows the advantages of class action in the infringement litigation of AI paintings.[6] However, most copyright collective management organization adopts offline management. In contrast to the high efficiency and rapid market penetration of AI-generated works, many authors do not register their works, resulting in a lack of transparency in the registration of copyright information. Traditional offline management obviously cannot meet the current requirements of the efficiency of copyright protection of AI paintings. Aiming at the characteristics of covert, low-cost, and diversified infringement of AI-generated works, copyright collective management organizations should gradually develop a digital copyright information management system, set up a copyright management information database, pool, classify, and integrate copyright information, and promote the construction of a sound information system on the ownership of digitized AI paintings to establish a swift authorization and delegation mechanism to enhance the efficiency of class action lawsuits on AI paintings.

At this stage, AI technology is also changing, and the types of works to be managed collectively can be expanded moderately, such as text, music, and other AI-generated works. Under the mode of collective management and collective litigation, regardless of whether the copyright owner has joined the organization or not, he or she can entrust the agent organization to file a lawsuit against the infringer and obtain reasonable compensation for damages.[3] The copyright collective management organization is more professional and authoritative and can better collect evidence of infringement and focus on the needs of the interests of the infringed. The mode of collective management and collective litigation can not only reduce the cost of the infringer's rights but also solve the problem of the infringer's lack of ability to defend their rights.

5.3. Improvement of the statutory licensing system

Improving the statutory licensing system can simplify the process of AI's access to material works and promote the progress of deep learning. According to the legal licensing system, AI can use the works in an unauthorized state, but it has to pay the corresponding remuneration to the right holder by the law.[8] Compared with the fair use system, the legal licensing system balances the interests of both parties, not only reducing AI’s difficulty in obtaining works but also protecting the economic income of the works’ right holders. The legal licensing system is more advantageous than the fair use system in the rapid development period of AI. The deep learning of AI needs to obtain a large number of copyrighted works, which can be obtained by payment of remuneration, objectively weakening the contradiction between AI and right holders.

Nowadays, the classification of AI learning into the statutory licensing system of copyright requires technical support, institutional support, and implementation guarantee. From the technical level, the record of obtaining works may be eliminated maliciously, which requires corresponding technology to guarantee the existence of the record of obtaining works. Next, it is also necessary to improve the corresponding institutional rules and promote the safeguards in practice to give full play to the advantages of the statutory licensing system, balance the interests of both parties, reduce contradictions, and resolve conflicts.[4]

5.4. Strengthening the authorship marking system for AI paintings

The implementation of copyright registration of AI-generated content has opened up the information databases of copyright registration authorities and collective management organizations. Previously, China's copyright registration and management system mainly focused on proving the legitimacy of the copyright owner's source of rights and determining the attribution of copyright rights in the event of disputes and was mainly responsible for the auxiliary function of confirming the right to own a copyright. However, copyright registration and management, which is limited to a single function, is lagging in the era of digital media communication and needs to continue to develop more functions of copyright protection.

According to the notice on copyright registration issued by the State Copyright Administration, in terms of types of works, the most registered works are photographic works, artistic works, written works, and film and television works, with these four types of works accounting for 96.81% of the total number of registrations.[10] AI paintings can be managed through the establishment of a specialized library of AI-generated content, in which digital watermarking technology is used to add signature marks, and digital watermarking algorithms are embedded in the program of artificial intelligence paintings so that the original copies of the generated content are all marked with digital watermarks of the "AI-Generated" signature marks that are visible to the naked eye, to realize the function of source identification. Digital watermarking technology is a technology that can protect copyright and certify the source and integrity of the work in an open network environment. In the AI painting work, it can simultaneously embed identifiers about the author, right holder, AI software designer, owner, user, and timestamps of the completion of the AI-generated work, to clarify the attributes of the work itself, and objectively play the role of copyright protection as well.

6. Conclusion

The development of AI technology has promoted the integration of science and art, leading to a new trend of artistic expression. However, the development of artificial intelligence must not be done at the expense of the legitimate rights and interests of copyright holders. At this stage, the infringement of others' copyright in the creation of AI paintings is very serious. In the face of the contradiction between the development of AI and copyright holders, all parties should actively respond to and reasonably claim to solve the infringement problem of AI paintings, continuously explore relevant measures to safeguard the legitimate rights and interests of creators and promote the healthy development of the field of AI paintings.

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