

New requirements on Copyright Law facing Artistic Style Transfer

Jihong He

Intellectual Property Institute of Chongqing, Chongqing university of technology, Chongqing, 400054, China

ABSTRACT

With the rapid development of artificial intelligence technology, art style transfer, as an emerging form of artistic creation, has attracted widespread attention in the contemporary art world and technology field. Style transfer technology can apply one artistic style to another image through AI algorithms, creating a completely new artwork. However, the widespread application of this technology has brought many challenges to existing intellectual property law, especially copyright law. This paper will preliminarily explore the potential impacts of style transfer on intellectual property law.

KEYWORDS

style transfer; copyright; originality; authorship

The core of style transfer technology lies in extracting the content features of the input image and the style features of a stylized image through artificial intelligence algorithms, and then applying the style features to the input image, thereby generating a brand new image. The application of this technology greatly simplifies the creative process and allows anyone to create using the styles of classic artists, thus expanding the boundaries of artistic creation. However, this trend of popularizing artistic creation has also brought unprecedented challenges to intellectual property law. Does the work generated by style transfer have originality? Does it infringe on the rights of the original artist's work? These questions pose severe tests to existing copyright law.

1 Conflict between Originality and Copyright Protection

A fundamental principle of copyright law is that only works with originality can be protected by law. In Chinese copyright law, the requirement for originality of a work is that it is "independently completed through intellectual creation," but in style transfer generated works, the concept of originality faces many challenges.

(1) Determination of Originality in Style Transfer Works

In style transfer technology, the style elements of the generated work usually come from reference artworks, while the content part is based on the input image. This raises the question of originality determination: does the style transfer work truly reflect an independent, innovative "expression"? From a legal perspective, the traditional requirement for originality requires that the creative process depend on human intellectual activity, while the process of style transfer is more based on algorithmic automated processing. The focus of debate on this issue is whether machine-generated works can enjoy the same copyright protection as human-created works.

Under the current copyright law framework, originality usually depends on individual creative judgment and choice. However, the degree of automation in style transfer makes the creative process no longer dependent on human creativity, but on the design and operation of algorithms. In this case, the originality of the work seems to depend more on the design of the programmer or operator, rather than the uniqueness of the work itself. Therefore, whether style transfer works meet the originality standards in copyright law remains an unresolved issue.

(2) The Problem of "Expression" and "Idea" in Style Transfer Works

According to the "idea-expression dichotomy," copyright law protects "expression," not "ideas." This means that artistic style itself, as a creative technique or concept, is not protected by copyright. However, when a certain artistic style is embodied in a specific work and has a unique form of expression, it may be considered as protected expression.

Style transfer precisely transfers artistic style as part of the expression to a new image, which to some extent blurs the boundary between "idea" and "expression." Especially in works generated by style transfer, do the style characteristics of the original work (such as brushstrokes, use of color, etc.) constitute "expression" in the sense of copyright law? If so, does style transfer infringe on the copyright of the original work? These questions have not yet been clearly resolved in current law.

2 The Problem of Author Identification for Machine-Generated Works

In the traditional copyright law system, the author of a work refers to the natural person or legal entity that creates the

work. Although style transfer works are generated through AI algorithms, their generation process is not completely independent of humans, but requires the participation of programmers and operators. This raises a key question: who should be the author of a style transfer work? Is it the algorithm designer, the operator, or artificial intelligence itself?

(1) The Problem of Author Identification for AI generated Works

There are different provisions in the laws of various countries regarding the identification of authors for AI-generated works. For example, UK copyright law stipulates that the author of a machine-generated work is "the person who made the arrangements necessary for the creation of the work," a position that recognizes the key role of programmers or operators in the creative process. U.S. copyright law, on the other hand, is more conservative, emphasizing that only natural persons can be considered as authors of works and enjoy copyright protection.

This legal difference reflects the divergence in the identification of authorship for machine-generated works. In the application scenario of style transfer, the operator directly influences the generation of the final work by selecting the input image and the style of the reference artwork. However, at the same time, the actual creation process of style transfer works relies more on the execution of algorithms rather than the direct creative behavior of the operator. Therefore, who is actually "creating" this work remains a core issue that the legal community needs to discuss and resolve.

(2) The Controversy of Whether AI Can Become an "Author"

Moreover, whether artificial intelligence can be regarded as an "author" and enjoy copyright protection is still a hot topic of discussion in legal and academic circles. In many legal systems, copyright protection is limited to natural persons, and machines cannot enjoy legal personality. Therefore, even if AI plays a key role in the creative process, the copyright of the work still needs to be attributed to human participants. However, with the continuous advancement of AI technology, AI-generated works are becoming increasingly close to the level of human creation in form and content. Some scholars have proposed that in the future, it may be necessary to revise the existing legal framework to allow AI to become an "author" or give AI a certain authorial status. Although this view has not been widely accepted, with the continued development of AI technology, it will occupy an increasingly important position in the discussion of future copyright law.

3 Copyright Attribution and Fair Use Issues of Artistic Style

Generally speaking, artistic style itself is not protected by copyright because it is viewed as a creative technique or idea. However, when a certain artistic style is combined with a specific work and shows unique personality, it may be seen as an "expression" and thus enjoy copyright protection.

(1) Copyright Attribution of Artistic Style

Art style transfer technology creates images that are extremely similar to the original artist's style by analyzing the specific brushstrokes, color use, and composition techniques of the artist. Whether this behavior infringes on the copyright of the original artist's work is a complex issue. In some cases, using specific style features from others' works may constitute copyright infringement, especially when the combination of that style and specific work reaches a level of uniqueness and high similarity.

For example, Picasso's cubist style and Van Gogh's impressionist style both have extremely high recognizability and artistic value. Style transfer technology copies these style features through algorithms and applies them to new works, which may involve "copying" the style of the original work, thus raising copyright infringement disputes.

(2) Fair Use and Transformative Use of Style

The principle of Fair Use is an important concept in copyright law, allowing limited use of copyrighted works in certain situations without obtaining permission from the copyright owner. When discussing style transfer technology, the scope and standards of fair use application become the focus of attention. In some countries, the standards for fair use include factors such as the purpose of use, the proportion of the original work used, and the impact on the market value of the original work. Works generated by style transfer are to some extent an "adaptation" or "transformative use" of the original work's style, and can therefore be viewed as a form of fair use. However, judging whether this adaptation constitutes fair use requires considering the degree of transformation of the work. If the work generated by style transfer has made sufficient innovation to the style of the original work and has not negatively impacted the market of the original work, then it may meet the standards of fair use. Conversely, if the style transfer technology simply copies the style features of the original work without substantial innovation to the original work, then this use may be considered copyright infringement. Therefore, on the issue of fair use of style transfer generated works, the law needs to further refine standards to balance the relationship between artistic innovation and copyright protection.

4 The Impact of Technological Development on the Current Legal Framework

With the rapid development of artificial intelligence technology, style transfer technology is constantly being

optimized and promoted, making the existing copyright law framework seem outdated. The current copyright law system is mainly designed for human-created works, and when faced with machine-generated works, traditional legal concepts such as "author," "work," and "originality" often cannot cope with the complexity brought by technology.

(1) The Contradiction Between Legal Lag and Technological Progress

The formulation and revision of copyright law often lag behind technological development. The rapid progress of artificial intelligence technology has made machine-generated works move from laboratories to the market in a short time. However, the existing legal framework seems powerless when facing these new types of works. For example, when dealing with style transfer generated works, the current legal provisions do not clearly stipulate the copyright attribution of machine-generated works, and this legal vacuum may lead to difficulty in effectively regulating infringement behaviors.

At the same time, the widespread application of style transfer technology also increases the risk of copyright infringement. For example, through a simple mobile application, users can apply the styles of world-famous artists to their own photos, which may directly infringe on the copyright of the original artist. However, due to the highly automated generation process of these works, the current legal framework faces many difficulties in determining infringement.

(2) The Necessity of Copyright Law Reform

To address the challenges brought by artificial intelligence technology, copyright law needs to undergo deep reform. First, the law needs to re-examine the definition of "work" to include machine-generated artistic creations. Second, the law needs to redefine the identity of "author" to accommodate the role played by artificial intelligence in the creative process. Finally, the law also needs to further clarify the scope of application of fair use, especially for the use of style transfer technology, the law should clarify under what circumstances it can be regarded as transformative use, thereby avoiding copyright infringement.

5 Possible Legal Response Strategies

Faced with the challenges posed by style transfer technology to existing copyright law, the global legal and academic communities are actively exploring possible response plans. Here are some possible directions for legal reform:

(1) Redefining "Author" and "Work"

The development of artificial intelligence technology, especially the widespread application of style transfer generated works, requires a redefinition of the concepts of "author" and "work" in copyright law. The concept of "author" in traditional copyright law is often limited to natural persons, but in the scenario of machine-generated works, programmers, operators, and artificial intelligence algorithms may all play key roles in the creative process. Therefore, future copyright law may need to expand the definition of "author" to allow programmers, operators, and even artificial intelligence itself in certain circumstances to become the authors of works.

At the same time, the law also needs to redefine "work" to clarify whether machine-generated artworks can enjoy copyright protection. For example, the concept of "machine-generated work" can be introduced to distinguish it from traditional human-created works, and establish a special copyright protection system for this new type of work.

(2) Introducing Special Legislation for Machine-Generated Works

To address the copyright challenges brought by style transfer technology and other artificial intelligence technologies, the law may need to introduce a new copyright protection system. Current copyright law is mainly aimed at human-created works, and for machine-generated works, the law may need to establish a system similar to "artificial intelligence work rights."

This system can provide protection for a certain period of time for machine-generated works based on their innovativeness and uniqueness. This protection can both encourage technological innovation and avoid the abuse of artificial intelligence technology. For example, it can be stipulated that the copyright protection period for machine-generated works is shorter and their use in certain fields is restricted to promote the widespread use of new technologies by the public.

(3) Strengthening Legal Provisions on Fair Use and Transformative Use

To better address the copyright challenges brought by style transfer technology, the law should further clarify the applicable standards for fair use and transformative use. Especially for art style transfer technology, the law needs to establish clear rules to clarify what kind of use can be regarded as fair use. For example, the law can introduce a "transformative standard" to clarify that when a work makes sufficient innovation to the style of the original work, it can be regarded as transformative use and thus meet the conditions of fair use.

In addition, the law should also clearly stipulate under what circumstances the use of works generated by style transfer technology does not constitute an impact on the market value of the original work. For example, a standard based on market analysis can be established to judge whether style transfer generated works constitute a competitive relationship with the original work, thereby affecting the economic interests of the original work.

(4) Promoting International Cooperation and Building a Global Copyright Protection Framework

As style transfer technology is widely applied globally, legal reform in a single country can hardly effectively address this global issue. Countries can work together through international cooperation to formulate a set of global copyright rules applicable to artificial intelligence generated works.

International cooperation can also help solve cross-border copyright infringement issues. For example, by establishing a unified copyright registration system and cross-border copyright protection mechanism, copyright holders can obtain equal copyright protection in different countries, thereby avoiding cross-border infringement of artificial intelligence generated works.

6 Conclusion

As an emerging creative tool, art style transfer technology has brought unprecedented possibilities to artistic creation. However, the application of style transfer technology has also brought many challenges to existing copyright law, especially in key legal concepts such as originality, author identity determination, and fair use, where style transfer technology has broken the traditional legal framework. Therefore, in the face of these challenges, the legal community should actively respond and promote the reform of copyright law.

In the future, with the further development of artificial intelligence technology, intellectual property law will face more complexity and uncertainty. By adjusting the existing legal framework, introducing new copyright protection systems, and strengthening international cooperation, copyright law can better adapt to technological progress and provide a solid legal foundation for protecting innovative achievements and promoting cultural prosperity.

In conclusion, art style transfer technology is both a revolutionary technological innovation and a complex legal issue. Through the dual progress of law and technology, humans will be able to better balance the relationship between creativity and law, so that emerging technologies can promote artistic creation while being reasonably regulated and guided.

References

- [1] Leung H. & Lam P. (2020). Copyright in the Age of AI: Legal Challenges of AI-generated Works. *International Journal of Law and Technology*, 25 (3), 187-205.
- [2] McCarthy C. (2019). The Concept of Originality in Copyright Law and AI-Generated Works. *Journal of Intellectual Property Law & Practice*, 14 (2), 112-120.
- [3] Samuelson P. (2018). Fair Use and Transformative Use in the Digital Age. *Harvard Law Review*, 131(7), 2320-2334.
- [4] Ullrich H. (2017). Artificial Intelligence and Copyright: Is the Author Still Relevant? *Intellectual Property Quarterly*, 2017(3), 179-192.
- [5] Reed C. (2019). Authorship and Ownership in Machine-Generated Works: Reconciling Copyright Law with AI Technology. *International Review of Intellectual Property and Competition Law*, 50(4), 469-495.
- [6] Frosio G. (2020). AI Creativity and Copyright: The Human Element in AI-Generated Works. *Journal of the Copyright Society of the USA*, 67(2), 321-344.
- [7] Sanders J. (2021). Machine Learning, AI, and Copyright Infringement: Understanding the Risks of Using AI for Creative Works. *Technology and Law Journal*, 14(1), 89-102.
- [8] Hattenstone R. (2019). Digital Art and Copyright Law: Navigating the Legal Challenges of AI-Artistic Creations. *Art Law Journal*, 23(1), 42-58.
- [9] Gervais D. (2020). The Regulation of AI-Generated Works: Copyright Law and the Role of Innovation. *University of Virginia Law Review*, 106(4), 845-874.
- [10] Shemtov R. (2018). Originality and Creative Machines: A Study of AI and Copyright Law. *European Intellectual Property Review*, 40(10), 611-626.