

Research on the Main Problems and Countermeasures of Copyright Protection in the Digital Age

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Abstract

In order to cope with the impact of digital content generation and dissemination on copyright protection, this study analyzes core issues such as vague identification of digital works, hidden infringement diffusion, cross-border rights protection dilemma, and lagging legal adaptation. It is believed that systematic promotion should be made from the aspects of standard refinement, technical supervision, international cooperation, and institutional reconstruction. The results indicate that building a copyright protection system that is compatible with the digital ecosystem is a key path to achieving creative incentives and orderly industrial development.

Keywords

Digital Copyright; Infringement Governance; Cross Border Rights Protection; Institutional Adaptation.

1. Introduction

Digital technology is driving profound changes in content production methods and dissemination pathways, and the copyright system is facing unprecedented adaptation pressure. Traditional systems are unable to effectively respond to new situations such as dynamic generation, algorithmic participation, and cross-border circulation, and the risks of infringement and obstacles to property rights recognition are becoming increasingly prominent. Exploring the reconstruction path of rights protection mechanisms in the digital context has become a key issue in building a healthy digital cultural ecology and ensuring creative vitality.

2. The Importance of Copyright Protection in the Digital Age

Creators are the core of digital content production, and only when their copyright is effectively protected, are they willing to continue investing time and effort in polishing high-quality content, rather than losing their creative enthusiasm due to frequent infringement. Especially for small and medium-sized content creators, they lack the rights protection resources of large enterprises, and copyright protection directly affects their ability to obtain stable income and maintain creative continuity through content creation. From an industrial perspective, the development of the digital content industry relies on the support of a large number of original works[1]. Copyright protection can regulate market order and avoid "bad money driving out good money" - if infringing content is spread recklessly, the reasonable income of the original creator is encroached upon, and the enterprise loses the motivation to develop high-quality content products, the entire industry will fall into innovation stagnation. On the contrary, a sound protection mechanism can attract capital investment and promote innovation in content monetization models, such as paid reading and copyright authorization. This not only safeguards the individual rights and interests of creators, but also builds a healthy digital cultural ecosystem, providing a sustainable source of content for social innovation.

3. The Main Problems Faced by Copyright Protection in the Digital Age

3.1. Difficulty in Defining and Identifying Digital Works

The "non-material" nature of digital works naturally blurs their boundaries, and many contents contain both creative attributes and functional elements, making it difficult to directly determine whether they belong to the category of "works" protected by copyright law. What's even more tricky is that the core standard of "originality" in traditional recognition is difficult to quantify in the digital creative scene - many contents are formed through algorithm splicing and material recombination, which cannot clearly distinguish the difference between "creative labor" and "mechanical integration", nor can a clear threshold for innovation level be set. In addition, the "dynamism" of digital works exacerbates the difficulty of identification, as some content may change in real-time with user interaction and technological iteration, resulting in inconsistencies between the "form of the work" during property rights confirmation and subsequent use, making it impossible to define it using fixed standards. The most crucial issue is that there is a gap in the existing rules regarding the identification of "digital creators"[2]. When algorithms, software, and humans jointly participate in content generation, it is difficult to clarify the contribution weights of each subject, and it is also difficult to determine who should be considered as the "copyright owner". This fundamentally makes the definition and identification of digital works lose its core basis.

3.2. Copyright Infringement Has Strong Concealment and is Easy to Spread

Infringers can easily erase traces of infringement with the help of digital tools. After using web crawling software to automatically capture content, they can completely eliminate the original copyright identification by modifying metadata, splitting content fragments, and other methods. Conventional detection methods are difficult to identify these processed infringing contents. These infringing contents are often disseminated through non-public channels such as online storage, forum private messages, etc[3]. The dissemination path is scattered and jumps across platforms. When tracking, clues are often interrupted due to the infringing subject being a shell company or overseas account. Once the infringing content enters the public dissemination stage, the diffusion speed becomes difficult to control. Algorithm recommendations will accurately push similar content based on user profiles, enabling infringing segments to reach a large potential audience in a short period of time. Distributed storage technology also allows the same content to be automatically backed up on multiple nodes, even if the platform deletes one of the propagation sources, the content of other nodes can continue to spread. The current "notification deletion" mechanism on the platform has a natural lag, and the time from uploading infringing content to being reported and verified is enough for the content to complete multiple rounds of dissemination. This "first spread, then process" model further amplifies the actual harm of covert infringement.

3.3. Difficulties in Cross Border Network Infringement Evidence Collection and Rights Protection

There are differences in the criteria for determining infringement in different legal systems of countries. When rights holders initiate the process of safeguarding their rights, they will first encounter the problem of ambiguous jurisdiction. Even if the jurisdictional court is reluctantly determined, the delivery of cross-border documents will be greatly delayed due to differences in judicial procedures in different countries. The evidence collection process also faces multiple obstacles. Legal requirements for data localization make it difficult to directly retrieve infringing data stored on overseas servers. When transferring electronic evidence across borders, countries have different requirements for evidence format and authentication processes, and many key records may lose their probative value due to non-compliance with local standards[4]. The cost of the process of safeguarding rights is also daunting. Rights holders

not only need to hire a team of lawyers familiar with multiple countries' laws, but also have to bear additional expenses such as language translation and evidence notarization. These expenses will continue to accumulate as the period of safeguarding rights extends. Even if the lawsuit is ultimately won, the execution of the judgment may still be deadlocked. If the country where the infringer is located and the country where the judgment is made have not signed a judicial assistance treaty, the winning judgment often becomes a piece of paper. This dilemma of "successful rights protection but no accountability" will in turn weaken the motivation of rights holders to protect their rights across borders, forming a vicious cycle of "easy infringement and accountability".

3.4. Challenges of Digital Technology Development to Traditional Copyright System

The traditional copyright system defines "creative subjects" as natural persons and legal entities, while algorithms and AI systems deeply involved in content generation cannot be recognized as "copyright owners" in the legal sense, nor can they clearly define the boundary of ownership between technical tools and artificial creations. The types of rights such as "reproduction right" and "dissemination right" in traditional systems are difficult to cover new usage behaviors such as "cloud caching", "fragmented editing", and "cross platform forwarding" in the digital age. Many ways of utilizing digital content are wandering in the blank space of existing rights definitions. The design of the statutory protection period for copyright is based on the dissemination cycle of traditional works, while digital content can be permanently stored through technology and spread at an extremely fast speed. The fixed protection period either prematurely releases rights, causing damage to the creator's income, or excessively restricts the circulation of content, hindering cultural dissemination. The "three-step test method" in the fair use system lacks operability in digital scenarios. When platforms review "user generated content", it is difficult to quickly determine whether the interception and adaptation behavior meets standards such as "minor citation" and "non-commercial", resulting in the system being either abused or strictly applied to inhibit reasonable creation, putting the traditional copyright system in a passive situation of "difficult adaptation".

4. Suggestions on Countermeasures for Copyright Protection in the Digital Age

4.1. Improve the Recognition Standards and Registration System for Digital Works

In response to the issue of vague definition mentioned above, the legislative department needs to refine the criteria for determining "originality", clarify the quantitative threshold for the proportion of "artificial creative contribution" in scenarios where algorithms participate in creation, distinguish the boundary between "algorithm tool assistance" and "algorithm self generation", and avoid disputes over recognition due to subject ambiguity. For dynamically changing digital works, registration agencies can establish a "phased rights confirmation" mechanism, which not only records the initial form during registration, but also allows creators to upload timestamps and change explanations for subsequent modifications, forming a complete chain of rights evolution. The registration system needs to transform towards convenience and low cost. Relevant departments should establish a nationwide unified online registration platform, connect with the blockchain certification system, and achieve a "one-stop" process for uploading, certifying, and registering works, reducing the tedious process of offline material submission. For small and medium-sized creators as well as individual creators, regulatory authorities can waive registration fees for small-scale digital works and develop intelligent classification tools to automatically match work types and registration requirements,

reducing operational barriers. The platform also needs to embed a "recognition assistance module" to help users preliminarily judge whether the work meets the registration conditions by listing typical situations and providing comparison references, achieving seamless connection between recognition standards and registration processes, and reducing the difficulty of property rights recognition from the source.

4.2. Strengthen Technical Measures Protection and Infringement Monitoring

Copyright holders can integrate the core feature codes of digital content with blockchain authentication systems to generate tamper proof ownership timestamps, coupled with traceable invisible watermarks. Even if infringers split or edit the content, the original rights holder can be traced through technology. Next, industry associations should promote the establishment of cross platform monitoring and collaboration mechanisms, requiring all platforms to open content feature database interfaces, break down data barriers, and avoid infringing content from "fighting guerrilla" between different platforms. The technical team needs to optimize the AI monitoring algorithm in a targeted manner, with a focus on strengthening the ability to identify fragmented infringing content that has undergone a transformation, rather than relying solely on complete content comparison [5]. When the system triggers an infringement warning, the platform needs to initiate a quick response process of "automatic tagging+copyright owner confirmation" to reduce the lag of manual review. At the same time, technology developers need to set reasonable citation thresholds in the protection system, avoid misjudging normal creations through intelligent filtering, and ensure that technology protection and monitoring are both accurate and do not affect the reasonable flow of content.

4.3. Establish a Cross-border Copyright Protection Cooperation Mechanism

The judicial department can first jointly develop a unified guide for the extraction and conversion of electronic evidence, clarify the format requirements and authentication process for cross-border data retrieval, and avoid evidence being excluded due to non-compliance with standards. On this basis, cross-border platforms need to open a "fast access channel for infringement evidence" and connect with the query systems of copyright agencies in various countries. After the right holder submits an application, they can obtain overseas server certification data without going through cumbersome diplomatic channels. Industry associations should take the lead in establishing cross-border rights protection assistance centers, which not only provide multilingual legal advice for small and medium-sized creators, but also integrate legal resources from multiple countries to reduce the cost of rights protection. At the same time, regulatory agencies should promote the signing of regional mutual recognition agreements for judgments, simplify the execution process for small cross-border infringement cases, and clarify the cross-border transfer methods for compensation payments. In addition, all parties involved in the cooperation can jointly build a "Cross border Infringement Warning Database" and share key information such as the account and IP of the infringer in real time. Once duplicate infringement is discovered, the platform within the alliance can synchronously take linkage measures such as removing content and restricting registration, forming a full chain cooperation from evidence acquisition to judgment execution.

4.4. Optimizing the Copyright Legal System to Adapt to Digital Development

The legislative department can first establish detailed rules for the ownership of rights in AI creation, distinguishing between "manually led creation" and "algorithm generated autonomously". The former clearly states that creators enjoy complete rights, while the latter stipulates that algorithm developers and users agree on allocation according to investment ratios, filling the gap in subject recognition. Legal provisions need to supplement specific rights definitions in digital scenarios, such as adding "cloud storage usage rights" and "fragmented

content adaptation rights", clarifying the scope of authorization for these new types of usage behaviors, and avoiding gray areas. Regulatory agencies can promote the establishment of a flexible protection period mechanism, shortening the protection period to 3-5 years for rapidly iterating content such as short videos and online comments, and extending the protection period to over 50 years for long-term value content such as digital picture books and academic databases, without resorting to a one size fits all approach. The judicial department should refine the criteria for determining reasonable use, clarify the specific proportion of "minor citations" and the core characteristics of "non-commercial", and provide clear basis for platform review.

5. Conclusion

Copyright protection faces institutional lag, technological confrontation, and cross-border governance challenges in the digital environment. Although current countermeasures have practical guidance significance, there are still theoretical gaps in defining dynamic creative subjects and applying the principle of technological neutrality. In the future, it is necessary to strengthen the construction of a standardized system for the integration of law and technology, promote the deepening of regional cooperation mechanisms, and respond to the challenges brought by emerging creative models and complex forms of communication.

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References

- [1] Unnithan A. Copyright in the Digital Age: Navigating Challenges and Opportunities in Digitized World[J]. Issue 6 Int'l J L Mgmt. & Human., 2023, 6: 3419.
- [2] Mane V S. Intellectual Property Rights (IPR): Their Role, Challenges, and Global Impact in the Digital Age[J]. InSight, 2024, 1(2): 16-34.
- [3] Yang L, Liang Y, Zhang F. Risk Assessment and Legal Countermeasures for Copyright Infringement in the Cultural Industry under the Background of Digital Age[J]. Journal of Artificial Intelligence and Information, 2025, 2: 80-85.
- [4] Guan X, Feng X, Islam A Y M. The dilemma and countermeasures of educational data ethics in the age of intelligence[J]. Humanities and Social Sciences Communications, 2023, 10(1): 1-14.
- [5] Wang J, Zhao J. Revitalization and propagation approach of Chinese historical dictionaries in the digital age[J]. International Communication of Chinese Culture, 2024, 11(4): 499-513.