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Assessing the Copyright Infringement Risk of Generative AI "Created" Works

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Abstract: The rapid evolution of the Internet and big data technology has ushered in significant advancements in data production and utilization. However, this progress has brought to the forefront the intricate issue of copyright protection. This is particularly evident with the widespread adoption of generative artificial intelligence (AI), where concerns regarding data source protection, data processing standards, and the boundaries of data application have garnered considerable attention from both academia and industry. Big data mining techniques coupled with generative AI algorithms offer robust support for data collection and processing, but they also introduce risks of data infringement and pose challenges regarding algorithmic compliance and ownership rights over generated works. Addressing these issues is imperative. This paper recommends enhancing legal compliance standards throughout each stage of the generative AI process, recalibrating the scope of acceptable copyright use, and establishing a regulatory framework for generative AI works. These measures are crucial for fostering the sustainable and orderly advancement of the generative AI industry.

Keywords: generative artificial intelligence, copyright, data source protection, data processing standards, data application boundaries

1. Introduction

The rapid evolution of networks and technology has revolutionized the process of information acquisition across academia and industry. Online data collection and algorithmic processing have gradually supplanted traditional offline methods such as interviews, propelling the growth of the Internet and big data technology and profoundly impacting the replication and dissemination rights of online data. Concurrently, the emergence of generative artificial intelligence (AI) technology has brought to the fore pressing concerns surrounding data source protection, standardization of data processing, and delineation of data application boundaries. Within this landscape, the author has observed the emergence of a self-sustaining industrial chain of generative AI, encompassing activities ranging from automatic text generation to voice synthesis, and the subsequent commercialization of these outputs across various platforms. Whether utilized for academic research data surveys or optimizing business models through data collection, the subjective judgment and resulting actions concerning the utilization of existing textual and data information play a pivotal role in assessing

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potential risks of copyright infringement and determining the tangible, legal, and temporal value of such endeavors.

Presently, legal scholars are engaged in comparative analyses of copyright protection between China and other jurisdictions, while communication scholars underscore the significance of text and data mining technology for quantitative analysis within the humanities and social sciences domains. The legal intricacies concerning interests and copyright infringement risks within this industrial chain are particularly salient. Yet, despite the widespread adoption of text and large-scale data mining technology, scant attention has been given to delineating the boundary between infringement and legitimate usage within academia and business spheres. Consequently, this paper seeks to explore the varying levels of risk associated with text and copyright infringement throughout the data mining process and offers recommendations informed by the objectives and outcomes of copyright infringement exception systems. Through the examination and comparison of case studies from diverse countries, this paper endeavors to elucidate the appropriate application of copyright in generative artificial intelligence works, ultimately providing guidance for its judicious utilization.

2. Research Landscape on Copyright Risks of Generative Artificial Intelligence Works

The maturation of artificial intelligence (AI) technology has spurred its widespread integration across diverse industries. Consequently, the burgeoning demand for automated content generation has fueled the extensive utilization and dissemination of generative artificial intelligence tools. On July 13, 2023, the Cyberspace Administration of China introduced the Interim Measures for the Management of Generated Artificial Intelligence Services, which delineate generative AI as technology employing algorithms, models, rules, images, audio, video, code, and other content to learn, restructure, or produce novel data. Generative artificial intelligence represents a category of AI technology that assimilates existing data to generate fresh information, exhibiting broad applications across various data formats. Notably, models such as OpenAI's GPT series and Google's BERT model possess the capability to autonomously distill essential information from text and generate succinct summaries. These algorithmic models typically acquire an understanding of words and their semantic associations within a dataset, enabling them to formulate coherent sentences or paragraphs based on this acquired knowledge. Harnessing this functionality, users can employ algorithmic systems to seek out information pertinent to their inquiries and receive linguistically coherent responses by furnishing indicative keywords.

Generative AI encompasses numerous processes and stages, spanning from technology development to release and online dissemination. These stages can be broken down into the background data input and processing phase, as well as the data output and dissemination phase. In the initial stage, deep learning on the database is predominantly conducted through the aforementioned algorithms, utilizing publicly available text datasets, novels, news articles, blog entries, and other textual data for research and development purposes [1].

It is noteworthy that data sourced from the internet, including text, images, audio, and video, may also be utilized for training deep learning models. For instance, certain algorithms construct large-scale language models or emotion analysis models by scraping web content, social media data, or online forum posts, thereby facilitating the automated generation of content by generative AI to some extent. However, such publicly available data on the internet represents the primary risk point for data infringement at present and is a focal point for numerous scholars' research efforts. From the standpoint of data acquisition and input, it is imperative to exercise reasonable control over algorithm design and training data to ensure alignment with acceptable parameters. Algorithm design should adhere to principles of fairness, transparency, interpretability, and controllability, while training data should be devoid of any infringement or violations. Zhang Jiyu asserts in this regard that countries worldwide [2], operating within varied legal systems and frameworks, have gradually bolstered the

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implementation mechanisms related to copyright algorithms in cyberspace. This is notably achieved through platforms for proprietary algorithms, judicial platforms, and legislative measures aimed at establishing new principles, thus progressively advancing the rational application of algorithms in the online sphere. Through the display of fair and transparent algorithms, the current user confusion regarding unclear algorithmic functions and information protection mechanisms can be mitigated to some extent, facilitating a balance between public power and the judicious application of algorithmic power. Particular emphasis should be placed on the public information available on the internet, with both network platforms and generative artificial intelligence technology providers obligated to safeguard the rights and interests of original content creators. Given the significant reliance of artificial intelligence algorithms on data input, Wu Handong introduces the concept of "machine reader," "machine author," and "machine works" concerning the portion of artificial intelligence spanning from data input to machine learning to final output [3].

Within this framework, the actions of "machine readers" determine subsequent information processing elements and content outputs. In essence, Wu Handong posits that the "machine reading" process constitutes data input and serves as a prerequisite for machine creation. Therefore, standardizing the scope of data collection at the information input level can mitigate the risk of infringement at its source to a certain extent [2].

In the data input process, implementing reasonable and effective standardization and restriction of data content, along with clear limitations on the utilization of generated artificial intelligence works, can mitigate a plethora of infringement risks. Data input entails navigating the database's climbing steps, where disputes may arise concerning the replication right and the right of information network transmission. In accordance with China's Copyright Law, barring legal exceptions like fair use, all works within the protection period of others' rights must be authorized and subject to reasonable fees; otherwise, it constitutes infringement. Given the intricate nature of network information subjects, relevant information platform providers ought to furnish pertinent copyright regulations and elucidate associated systems to forestall the risk of infringing upon other database information, particularly the rights of reproduction, adaptation, and dissemination. The concerns regarding copyright reproduction infringement and network transmission rights stemming from generative artificial intelligence have sparked vigorous debates not only in China but also among numerous users worldwide. On September 19, 2023, a consortium of 17 renowned American writers, including Jonathan Franzen, John Grisham, George RR Martin, and Judy Piccourt, lodged a class-action lawsuit in federal court in Manhattan, New York, via the National Writers Association. They alleged that OpenAI had extensively copied their copyrighted works without consent and incorporated them into OpenAI's expansive language model to cater to user demands for similar texts. OpenAI responded to inquiries from journalists on Tuesday, endeavoring to assuage the concerns among creators globally about AI, and expressed their intent to resolve the issue through dialogue, collaboration, and comprehension. A scrutiny of OpenAI's copyright application in August reveals that the company contends it "misinterpreted the scope of copyright, neglecting to consider limitations and exceptions (including fair use) that allow for innovation, such as contemporary large language models." This underscores how the ambiguous scope of copyright employment poses significant latent hazards for technology firms and creators in the absence of clear delineations.

In addition to the copyright risks stemming from the database and its deep learning capabilities, the latent originality of the algorithm itself warrants attention. The lawsuit between the plaintiff Beijing Philippine Law Firm and the defendant Beijing Baidu Netcom Technology Co., Ltd., concerning infringement of the right of authorship, the right to protect the integrity of the work, and the right of information network communication, represents the inaugural case in China where AI-generated work is subject to copyright adjudication and entangled in a copyright dispute. The crux of this case revolves around two key disputes: firstly, whether the content produced by AI possesses

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originality, a matter pivotal in determining whether AI-generated products qualify as works deserving of copyright protection; secondly, assuming copyright exists, its rightful ownership and the delineation of reasonable usage parameters. Representing the plaintiff, Beijing Lin Law Firm contested whether our first library's automatically generated analysis could be classified as works. The Beijing Internet Court's verdict stated that "originality, while important, is not a sufficient condition for classifying works. Additionally, as per the 2019 provisions, text-based works must be authored by a natural person." The analysis report process involves two stages implicating natural persons: software development and software usage. The Beijing Internet Court identified both the software owner and the software user, asserting that neither entity autonomously input nor output content during the analysis report's production process. Consequently, the court concluded that the analysis report couldn't be deemed a work completed by a natural person. Despite the resultant report not qualifying as a work, the court acknowledged that the software owner and user provided financial and transmission support. To safeguard the legitimate rights and interests of software users and uphold the public's right to information, the court ruled that software users may, through reasonable means, assert relevant rights and interests. One such means includes conspicuously marking the software's signature alongside its report generation process.

3. Discussion on Infringement Risk Based on the Production Process of Generative AI Works

The infringement risk associated with generative artificial intelligence (AI) works can be delineated into two stages: information processing and content output release. Within this process, specific infringement risks manifest with certain distinctions, primarily evident in the information input and processing phase, which predominantly encompasses the risk of replication infringement and algorithmic infringement. Subsequently, during information processing and dissemination, risks extend to encompass infringement upon adaptation and network transmission rights.

3.1. Risk of Infringement of the Right of Replication

Following algorithmic logic control and restrictions, the replication and storage of online works and associated information entail the risk of copyright reproduction right infringement. Prior to the production of works by artificial intelligence, it undergoes information retrieval and processing based on specific prompt words provided by users. During data collection, besides replicating and processing textual content, relevant information processing technologies are employed to handle images, videos, and other forms of content. Consequently, existing works in cyberspace retain elements of the original content to a certain extent, being "transferred" to the artificial intelligence system, replicated, stored, and processed before presentation. Such actions already fall within the purview of "copying" behavior protected by copyright, hence posing a risk of replication right infringement [4].

In discussions regarding replication rights, it is observed that establishing unified judgment criteria across diverse legal systems globally is challenging. However, user perception factors consistently play a crucial role in assessing direct infringement. Jiang Ge, in a study on Chinese replication infringement judgments, noted the significant similarities between judgments concerning information network transmission rights and replication rights [5].

Therefore, when defining such criteria, consideration should be given to "user perception" while incorporating the weight of "expert judgment" to accurately reflect the focal points of infringement judgments by the courts. Early scholars emphasized the necessity of involving experts from various intellectual property and market domains in infringement judgments. This interdisciplinary approach

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aids in assessing infringement from technical intricacies, a depth beyond the reach of judgments solely made by consumers or aggrieved parties [6].

Consequently, it is contended that the issue of replication right infringement exists throughout the production process of artificial intelligence works from inception. However, confirming and establishing a unified specification at the level of objective accountability remains challenging.

Scholars investigating the origins of replication behavior and delving into algorithmic infringement assert the imperative for both academia and industry to elevate discussions within the realm of data-driven creation or algorithm creation. This emphasis stems from the recognition that data serves as the vital nourishment for artificial intelligence creation, while algorithms furnish the requisite avenues for the development and commercialization of artificial intelligence products. Furthermore, the advancement of content algorithms for artificial intelligence creation epitomizes the tangible manifestation of data-driven innovation [7].

The elucidation of clear specifications for artificial intelligence algorithms facilitates the acquisition of data and database access rights, thereby fundamentally mitigating the risks of information replication and infringement within the online domain. It is evident that while addressing the ethical implications of algorithms at the algorithmic level, ensuring the accessibility of online information resources necessitates collaborative communication between information providers and users. This collaboration aims to preempt the utilization of non-public resources and the attendant risks of copyright infringement.

3.2. Risk of Adaptation Right and Network Communication Right

Technological innovation has ushered in the convenience of altering the forms of works, concurrently amplifying the risks associated with adapting and disseminating works. Consequently, it is imperative and pressing to bolster the development of legal frameworks in contemporary society. Notably, on March 14, 2023, OpenAI unveiled the latest ChatGPT 4.0 language model. A notable advancement from the ChatGPT 3.5 version, the latest iteration demonstrates the capability to input text content through various mediums such as pictures and text. Similarly, on December 6, 2023, Google launched Gemini, heralded as the "most powerful and versatile AI language model to date." Of particular interest in Google's technical reports is its utilization of model training data sourced from network documents, transcripts, and code, encompassing image, audio, and video data. This signifies that as algorithmic models adeptly process multimodal information, the challenge of autocratic data formatting diminishes, concurrently escalating the risks associated with conversion and transmission between disparate information formats. Illustratively, in a 2021 civil judgment concerning copyright disputes between Hkust Xunfei Co., Ltd. and Shanghai Xuan Ting Entertainment Information Technology Co., Ltd., the Hefei High-tech Industrial Development Zone People's Court addressed two pivotal behaviors instigating the complaint. Firstly, the provision of the "Listening Book Artifact APP's" entire network search book function was deemed to potentially infringe upon information network transmission rights. Secondly, the text-to-voice function within the "Listening Artifact APP" was perceived as constituting direct infringement of the right to copy and information network transmission. However, the court determined that the "Listening Artifact APP's" search function relied on Baidu's search engine technology, accessing search results via the open crawler protocol link. Furthermore, due to the inherent difficulty in restricting user-entered keywords and combinations during searches, iFlytek lacked the capability to manage search engine results. Additionally, the voice conversion function provided by the "APP" was executed through third-party links, thus negating any replication or infringement of information network transmission rights. Consequently, the court affirmed that the "Book Listening Artifact" APP operated by the plaintiff, iFlytek Co., Ltd., did not infringe upon the copyright held by the defendant, Shanghai Xuanting Entertainment Information Technology Co., Ltd., for the works in question. Although iFlytek's

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services were not adjudged as copyright infringement, the involvement of third-party platforms may still pose infringement risks when examined as the primary focus. Evidently, as generative artificial intelligence information conversion technology matures, the risks associated with transmission infringement arising from format conversions such as image, text, audio, and video are poised to escalate incrementally.

On the flip side, this advancement also intensifies the challenges associated with copyright management and protection. As ChatGPT 4.0 language models and other multimodal algorithmic models undergo continual updates and optimizations, there's potential for deeper comprehension of human language and culture, thereby laying the groundwork for further advancements in natural language processing. However, it's imperative to acknowledge that alongside technological progress, there arises the need to revise and enhance pertinent laws and regulations. This is crucial to ensure the reasonable protection of creators' intellectual property rights and mitigate the risk of copyright infringement stemming from technological advancements.

4. Coping with Copyright Risks Associated with Generative Artificial Intelligence Works

Through data training and responsiveness to user demands, algorithms can to some extent generate works anticipated by users. Consequently, the issue of copyright ownership of such works becomes imperative to address. Firstly, from the perspective of work protection, delineating the ownership subject and object clarifies the entity eligible for legal protection. Secondly, from the standpoint of tort liability, specifying the infringing subject enhances the efficiency of identifying the culpable party.

Copyright disputes involving generative artificial intelligence works typically involve two categories of entities: the infringing party and the infringed party, representing the active and passive participants, respectively. Given the complexity in determining and standardizing these entities, this paper distinguishes them based on their active and passive roles. The infringing party comprises individuals or institutions generating copyright works through the utilization of generative artificial intelligence technology. Conversely, the infringed party encompasses the genuine creators or individuals/institutions holding copyrights, whose works are often utilized without authorization. Given the unique nature of generative artificial intelligence technology, such copyright disputes are inevitable, necessitating more robust legal frameworks and technical solutions for resolution. Simultaneously, differentiated approaches are required to manage and regulate both infringing and infringed parties, ensuring the equitable protection of intellectual property rights and fostering the continued advancement of technology and culture.

In conjunction with the Beijing Internet Court case, when examining generative artificial intelligence (AI) works from the perspective of works, it is essential to consider two key attributes: the involvement of a natural person in production and the presence of a degree of originality. Liang Zhiwen and Li Zhongcheng have highlighted numerous significant instances where data has been instrumental in facilitating the creation of film and TV series works. Notably, productions such as Netflix's "House of Cards" and the Chinese film "Tiny Times" have attained considerable success at the box office, owing to the utilization of data mining and audience consumption demand analysis [8].

These remarkable success stories underscore the significance of data in the era of algorithms, showcasing the ability to create content driven by data and tailor plotlines according to user preferences. However, beneath the veneer of glamorous box office results lies a fundamental disconnection between film and television producers and the resulting works. Within a framework dictated by user demand, creators often engage in "safe" creation within established parameters, raising questions about the true attribution of copyright to these purported creators. In copyright theory, there exists a degree of consensus within both traditional civil law systems and the common

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law systems of Continental Europe and Anglo-American jurisprudence regarding authors' moral rights, which stress the intrinsic connection between authors and their creations. From a copyright protection standpoint, balancing authors' interests in creating works and fostering creativity with public interests, particularly when their informational data contributes to work creation, is paramount. Striking a delicate balance between the interests of both parties is essential. While advocating for the prudent use of data for algorithmic training, it is imperative to promote education, research, cultural industry exchanges, and provide adequate protection for citizens' personal information and original works. Comparatively, from an international perspective, academia and industry have yet to achieve consensus on the subject of copyright for generative artificial intelligence works. Under the legal frameworks of the United States and the European Union, such works may be considered part of computer programs and thus protected under computer program copyright laws. Moreover, if generative artificial intelligence works exhibit sufficient originality, they may also be eligible for protection under general copyright laws [9]. However, Germany's copyright law accentuates the importance of originality and creativity in works, implying that the eligibility of generative artificial intelligence works for copyright protection hinges on their demonstrable originality and creativity [10]. When deliberating the copyright issue within the academic community and industry, the primary focus often revolves around the ownership of works produced by Artificial Intelligence and Generative Computing (AIGC). Within the academic discourse, two distinct perspectives emerge: one advocates for a subjectivist standard of originality for works, while the other recognizes an objectivist standard [11].

Among proponents of the subjectivist theory, some scholars contend that the content production process, akin to human works in expression form, warrants primary consideration. They argue that delving into the internal process logic of works, from creative intent to production, is crucial in determining work attribution [12]. Consequently, the author posits that as AIGC technology becomes increasingly prevalent, it provides a high degree of creative freedom, enabling greater involvement of natural persons in creation. Moreover, by elucidating their creative intent and utilizing AIGC tools to finalize work output, individuals can transform into productive artificial intelligence "work" creators deserving of copyright protection. Facilitating user adjustments to the characteristics, style, or content of generated results based on personal preferences and needs imbues the resulting works with greater subjective creation characteristics. This, in turn, grants creators the qualification to be considered objects of copyright protection.

In light of China's current copyright protection laws, it is imperative to perceive generative artificial intelligence (AI) within the works production process as tools, primarily utilized by natural persons who articulate detailed requirements during communication with algorithms for data collection and processing. This approach serves to elucidate the dominance of natural persons' originality and their identity as the primary creators. Leveraging the creative input of natural persons, it is feasible to attain subject qualification protected by copyright law to a certain extent. By imposing constraints on the data collection logic and database permissions of generative AI algorithms, a conducive environment is established for original authors, while also fostering the healthy evolution of AI algorithms. Moreover, works generated through the utilization of generative AI tools can supplement databases and materials authored by natural persons. From the standpoint of content processing and output, while generative artificial intelligence technology offers users ample creative space, attention must be paid to aligning with user needs and curbing the extent of generated results. Through user demand adjustment facilitated by increased participation of natural persons, content production can be rendered more reliant on the will and expectations of users as natural persons, to a certain extent. Platforms offering such services should explicitly remind users of the reasonable scope for end-use of their works and potential infringement risks to avert the creation of works harboring potential harm or engaging in illegal activities.

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This paper delves into the copyright protection threat posed by generative artificial intelligence works and proposes corresponding management measures. Through an examination of generative artificial intelligence technology, it is posited that despite the utilization of copious data, algorithms, and technical means in the creation process, the final works still necessitate refinement and polishing in accordance with the decisive original needs of natural persons. Consequently, natural persons who articulate demands to generative AI platforms should be recognized as one of the copyright subjects of generative AI works.

In practice, determining the copyright ownership of generative AI works proves challenging due to the intricacies of generative AI technology and its widespread application across various fields. Consequently, this paper endeavors to elucidate and compare the establishment of corresponding rules and systems within the copyright laws of different countries and regions, aiming to clarify the ownership and distribution of copyright and related rights and interests pertaining to generative AI works. Additionally, the author advocates for reinforcing supervision and management of technology users to ensure the healthy development of generative artificial intelligence technology. This entails standardizing user behavior and delineating the scope of their responsibilities. For instance, it is proposed that technology users should adhere to relevant laws, regulations, and ethical norms when utilizing generative artificial intelligence technology, while also assuming legal liability for any infringements. Moreover, in safeguarding the copyright of generative AI works, due consideration should be given to the imperatives of public interest and social progress. Therefore, in formulating pertinent laws, regulations, and policies, it becomes imperative to meticulously weigh the interests of all stakeholders, fostering the judicious application and advancement of generative artificial intelligence technology.

To ensure the advancement of generative artificial intelligence while safeguarding the copyright interests of both creators and subjects of the works, the author proposes drawing insights from the legislative frameworks of other nations. Primarily, there is an urgent need to fortify the regulation of data flows and standardize the permissible scope of work utilization. Whether achieved through algorithmic logic constraints or database access restrictions, technology providers and information management platforms ought to delineate clear boundaries for work usage and assume corresponding responsibilities. This regulatory endeavor is essential not only for safeguarding data security and integrity within China but also aligns with the global imperative of protecting information and data circulation. By scrutinizing data presentation, storage, collection, processing, and utilization processes, we can facilitate domestic and international data sharing and collaboration while upholding copyright protection, thereby fostering the circulation and utilization of data. Furthermore, from a governmental perspective, expeditious legislation can furnish the judicial department with timely, illustrative cases to underscore the current stance and measures pertaining to copyright protection. The Japanese government's approach to establishing and enhancing the legal and regulatory framework serves as a valuable model to emulate. Gradually reinforcing law enforcement and fortifying legal awareness can lay the groundwork for the sustainable development of generative artificial intelligence.

5. Conclusion

In conclusion, this paper delves into the current research trajectory and outcomes of generative artificial intelligence (AI) technology, elucidating the disputes and risks surrounding copyright ownership of generative AI works. Presently, research on generative artificial intelligence predominantly centers on information input and output perspectives. Leveraging the technical attributes of generative artificial intelligence algorithms, this paper proposes corresponding suggestions and measures. Firstly, considering the protection level of information sources and databases at the input stage, the author advocates limiting the data collection scope of generative

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artificial intelligence algorithms, with platforms responsible for ensuring user information security and integrity. Secondly, regarding data output, emphasis is placed on the notion that individuals who submit demands to generative artificial intelligence platforms hold copyright ownership over the final works. Drawing insights from the targeted laws and regulations of various countries and regions on the international stage, this paper contends that concerted efforts across national legislative spheres, platform protection levels, and citizens' awareness of copyright are essential. Such collective endeavors are crucial for ensuring the healthy development of generative artificial intelligence technology and upholding the legitimate rights and interests of copyright owners.

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