

Original Paper

Analysis of the Copyrightability of Artificial Intelligence-Generated Content in the United States

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Abstract

The commercial application of generative artificial intelligence has rapidly brought to the fore the structural tension between machine-generated content (AIGC) and the core presuppositions of copyright law concerning the “author.” This paper examines the protection model and legal mechanisms adopted by the United States on the question of AIGC copyrightability. The research finds that the United States, as represented by the Thaler case, strengthens the “human authorship” requirement from the perspectives of constitutional text, statutory interpretation, and incentive theory, and adopts a result-oriented standard centered on expressive control.

Keywords

artificial intelligence-generated content, copyrightability, originality, human authorship requirement, tiered and classified protection

1. Introduction

The commercial deployment of generative artificial intelligence (Generative AI) has rapidly rendered explicit the structural tension between AI-generated content (hereinafter “AIGC”) and copyright law. When technological systems such as diffusion models and large language models (LLMs) can generate realistic images, music, and text within seconds—often at a level of quality indistinguishable from human creation—the core presupposition of copyright law regarding the “author,” namely that a natural person, through creative labor, imparts a distinctive mark upon a form of expression, faces an unprecedented institutional challenge. From a comparative law perspective, major jurisdictions have already exhibited significant institutional divergence regarding the protection of AIGC. Chinese courts, through the accumulation of individual cases, have explored a copyright protection path centered on “substantial human intellectual input.” The U.S. federal courts and the Copyright Office, by contrast,

have systematically rejected copyright applications for purely AI-generated content based on the “human authorship requirement.” The United Kingdom’s Copyright, Designs and Patents Act 1988 provides a legal fiction-based protection mechanism for computer-generated works through the “person who undertakes the necessary arrangements” provision. Meanwhile, the European Union’s Artificial Intelligence Act, after its entry into force, has profoundly influenced the operational environment of copyright law in terms of transparency obligations and text and data mining exceptions, yet it has not formed a unified rule on the copyrightability of AIGC itself (Note 1).

In recent years, the international academic community has produced significant theoretical contributions in areas such as a three-dimensional framework for AIGC originality determination, a subjective-objective balancing methodology, and the structural boundaries of AI creativity (Note 2), providing crucial academic resources for deepening the above issues. This paper aims to systematically integrate the theoretical insights from cutting-edge international literature into the analytical framework for U.S. AIGC copyright protection, with the goal of providing a reference scheme for legislative improvement and judicial practice that possesses both theoretical depth and operational value.

2. Protection Models for AIGC and the Justification for Copyrightization

2.1 Theoretical Competition among Multiple Protection Models

In the absence of specific statutory provisions on AIGC within the current legal framework, both academic and practical circles have formed a landscape of theoretical competition among four main protection paths: copyright protection, neighboring rights protection, public domain, and competition law protection. This debate over models fundamentally stems from the different philosophical presuppositions of each jurisdiction concerning the concept of the “author”—namely, whether the justification of copyright is grounded in the extension of personality and spirit, or in the utilitarian instrumentalism of incentivizing creation (Note 3). This philosophical divergence determines, from the outset, the basic orientation of each jurisdiction in choosing a protection path for AIGC.

2.1.1 The Essential Nature of AI: Beyond a Tool but Not Fully Creative

Before entering into a specific comparison of protection models, it is necessary first to clarify a preliminary meta-theoretical question: what, in essence, is the nature of AI in creative scenarios? In this regard, an intermediate position framework with methodological significance deserves attention: AI is both “more than a tool” and “not fully creative.” (Note 4)

With respect to “more than a tool,” contemporary AI systems have demonstrated capabilities in creative scenarios that far exceed those of traditional graphic design software or physical creative tools. The substantive execution of creative labor has undergone a structural shift from the human mind to the AI system. If one continues to characterize AI as a mere tool, this would be equivalent to improperly concluding that the user has completed an independent intellectual effort. With respect to “not fully creative,” contemporary large language models tend to converge, in their generative mechanisms,

toward statistically probable outputs (the so-called “safe options”), lacking the capacity for active deviation from high-probability paths and risky exploration under low-success-probability conditions that characterizes human creative processes (Note 5). At a deeper level, while AI certainly has considerable potential in combinatorial creativity and exploratory creativity, it faces structural limitations in producing transformative creativity—that is, creativity that fundamentally changes existing paradigms of thought—because such models are designed to operate within the patterns of training data, and the upper bound of their innovation is constrained by the distribution boundaries of the training corpus (Note 6).

This dual characterization has profound implications for copyright system design. Treating AI as a purely tool would lead to an oversupply of copyright protection, allowing users to claim full copyright over content to which they have contributed virtually nothing of substance. Conversely, treating AI as a fully creative subject likewise lacks a proper foundation, because AI’s “creativity” is essentially retrieved from training data rather than being a genuine conceptual reconstruction (Note 7). It follows that the most reasonable institutional response is to establish a differentiated, tiered protection framework, in which the intensity of protection is positively correlated with the actual creative contribution of humans.

In alignment with the above assessment of the international academic community, domestic Chinese scholars have also developed analytical paths with independent theoretical value. Some commentators, from the “non-tool” dimension, point out that the validity of the tool theory must be premised on “effective human control over technology.” Yet generative AI, in its actual output process, is not under the complete control of developers or users and lacks precise predictability; it plays a decisive role in the generation of outputs, which fundamentally contradicts the definition of a tool. From the “non-subject” dimension, current generative AI cannot understand the meaning of “illegality” and “bearing legal consequences,” and the punitive aspect of law cannot be reflected; thus, it does not satisfy the basic constitutive requirements for a civil subject (Note 8). This intermediate characterization—“neither subject nor tool”—establishes an important constraint for the institutional design of AIGC copyright protection paths: whether relying on the “tool theory” to treat the user as the natural author, or on the “subject theory” to grant copyright holder status to AI, both lack sufficient legal foundation at the current stage.

2.1.2 The Neighboring Rights Protection Model and Its Critical Examination

The neighboring rights protection model is centered on the logic of investment protection, advocating for the establishment of a *sui generis* right for AI system developers or operators, akin to the protection mechanism for databases under the EU Database Directive (96/9/EC), which is conditioned on “substantial investment.” However, this model suffers from unavoidable systemic defects that require critical examination.

First, there is a misalignment of institutional positioning. The historical function of neighboring rights is to protect the “dissemination” of pre-existing works, whereas AIGC constitutes “original output.” Incorporating it into the neighboring rights framework entails a fundamental logical mismatch in the characterization of the subject matter: using copyright protection would be overreaching, while using neighboring rights protection would be a case of “apparent agreement but actual discord.” Gaffar and Albarashdi, in analyzing candidate attribution subjects, also point out that positioning AI developers or operators as neighboring rights holders would create a serious institutional dilemma of “double recovery”: the developer already obtains intellectual property protection for the AI system itself as computer software, and granting rights over the content generated by that software to the same subject would allow it to obtain two layers of protection from the same creative act, which lacks legitimacy and would structurally invert the incentive effect, awarding rights to large technology enterprises that often have no substantive creative input in the specific AIGC generation process, while excluding the users who actually invest creative effort.

Second, there is a significant absence of international treaty support. Copyright protection relies on a highly mature multilateral framework comprising the Berne Convention, the TRIPS Agreement, and the WIPO Copyright Treaty, whereas AIGC neighboring rights currently have almost no treaty basis at the international level, which would exacerbate cross-border coordination difficulties.

Third, the legislative costs are high. From the perspective of the proportionality principle in law and economics, the copyright protection model can be accommodated within the current copyright law framework through doctrinal expansion, with significantly lower institutional transformation costs.

In summary, the neighboring rights model exhibits systemic deficiencies across five dimensions: institutional positioning, definition of rights holders, incentive effects, international compatibility, and legislative costs. It is therefore insufficient to serve as the dominant solution for AIGC protection.

2.1.3 The Public Domain Model and the Competition Law Protection Model

The public domain model advocates that AIGC should not be subject to any exclusive rights protection. Its theoretical basis lies in the following: the copyright system is designed to incentivize the creation of “human” authors; AI-generated outputs lack a human subject that can be incentivized, so granting copyright would lose its functional justification. Moreover, the development of AI technology will significantly reduce the scarcity of copyrighted works, and the status and value of fair use should accordingly be elevated. However, if AIGC were completely unprotected, this might undermine the sustainability of investment expectations in the AI industry, and it would inevitably be too crude for content that includes substantial human original input. The competition law protection model, as a supplementary path, regulates “free-riding” behavior in the AIGC field through the good faith clauses of anti-unfair competition law. In Chinese judicial practice, there is already a precedent in the Feilin Law Firm v. Baidu case, but its scope of protection is bounded by “commercial competitive order” and cannot respond to the rights claims of natural person users; it is only suitable as an auxiliary tool for the

copyright protection system.

2.1.4 The Copyright Protection Model and Its Justification

The copyright protection model advocates granting AIGC a legal status similar to traditional works under copyright law, with the developer or user as the attribution subject of rights. In comparative law practice, the attitudes of various jurisdictions show significant divergence. The Beijing Internet Court of China, in its 2023 copyright case concerning AI-generated images, established a path for copyrightability determination “based on the user’s creative input,” conditionally accepting the copyright protection model. Section 9(3) of the UK Copyright, Designs and Patents Act 1988 designates the author of a computer-generated work as “the person by whom the arrangements necessary for the creation of the work are undertaken,” and Section 12(7) provides for a shortened protection period of 50 years, constituting an institutionalized example of the copyright protection model. New Zealand, Hong Kong, and Irish copyright laws also adopt a similar “necessary arrangements” attribution standard. The United States, representing another path, adopts a cautious stance, with federal courts and the Copyright Office repeatedly affirming that copyright protection is premised on human authorship. The Court of Justice of the European Union, through the cases of *Infopaq* (C-5/08), *Levola Hengelo* (C-310/17), and *Cofemel* (C-683/17), established the standard of “author’s own intellectual creation,” requiring that the work reflect the author’s personality and free creative choices, thereby systematically blocking the copyrightability of purely AI-generated content. Gaffar and Albarashdi specifically point out that the CJEU further clarified in *Cofemel* that if the realization of the work is entirely determined by technical considerations, rules, or other constraints, leaving no room for creative freedom, then the work does not possess sufficient originality. The practical implication of this standard is that only if AI-assisted creation retains sufficient human creative freedom may EU law grant copyright protection to the relevant work.

With respect to cross-jurisdictional comparisons of originality standards, Mazzi, in her research, has distilled a three-dimensional analytical framework that provides a refined operational tool for comparative law studies. First, the EU adopts the “author’s own intellectual creation” standard. *Infopaq* established that originality does not require lengthy expression; even a short text fragment, if it reflects the author’s creativity in word choice and expressive combination, can be protected. Accordingly, even relatively brief text prompts, if they embody sufficient creative and personalized choices by the author, may also possess originality. Second, the UK traditionally adopted the “skill, labor, and judgment” standard—the cases of *Walter v. Lane* (1900) and *University of London Press v. University Tutorial Press* (1916) established a judgmental approach centered on the substantive effort and intellectual input expended by humans; after Brexit, the UK faces the institutional choice of whether to converge with the EU’s *Infopaq* standard, while Section 9(3) of the CDPA provides a special provision for computer-generated works that offers an institutional basis for the UK to maintain a relatively independent judgmental path in the AIGC field. Third, the U.S. *Feist* case (499 U.S. 340) established

the “minimal creativity” standard, explicitly excluding the notion that “sweat of the brow” alone constitutes originality. This means that prompts that are merely functional instructions or mechanical compilations of factual information will not obtain copyright protection; but if prompts contain unique expressive choices, novel combinations of imagery, or personalized narrative frameworks, they may cross the threshold of minimal creativity. This three-dimensional framework profoundly reveals the internal logic that jurisdictions adopting objective or input-oriented standards (as represented by the UK and some Chinese cases) tend to favor the copyright protection model, while those adhering to subjective standards (i.e., the “human mind creation” requirement) tend to reject it. Having surveyed the above three protection models, the theoretical necessity of the copyright protection model can be justified from three dimensions.

First, with respect to incentive theory, the incentive logic at the user level is particularly crucial in the AI industry ecosystem. If users incorporate specific visual, narrative, or structural elements into prompt engineering, engage in multi-round parametric iterative adjustments, and make personalized aesthetic selections, granting copyright protection for such human intellectual input helps incentivize users to refine their creative skills and promote an overall improvement in the quality of AI content production (Note 9). However, one must be cautious about the internal bidirectional tension within utilitarianism when applied to AIGC copyright issues: proponents argue that copyright protection can incentivize investment in AI technology R&D and encourage human creators to continuously produce high-quality content; opponents, on the other hand, point out that excessive expansion of copyright protection would restrict access to the public domain and may grant a few entities monopoly control over creative content, thereby hindering innovation and cultural diversity at the macro level (Note 10). This tension suggests that the application of incentive theory in the AIGC context should be premised on “moderate copyright expansion,” rather than granting copyright protection indiscriminately to all AI-generated content.

Second, with respect to labor theory, the competitive application of three major philosophical traditions in the AIGC context reveals a core methodological proposition. Locke’s labor theory of property can support the claim of the author of a text prompt to copyright in the AI-generated output, but it requires that the acquisition of property must not lead to monopolization of the underlying AI creative tools and basic prompt formats, otherwise it would hinder continued innovation in the field. Hegel’s personality theory provides a justification for copyright protection of AI-assisted creation, but the dominant intervention of AI in transforming prompts into final outputs may weaken or even sever the direct connection between the author’s personality and the work. Kant’s theory of “proprietary rights of the personality” can justify copyright protection as an extension of the author’s moral right. Even when AI has deeply participated in the creative process, the text prompts provided by the user can still reflect their unique creative intent and personality traits (Note 11). The organic integration of these three traditions—using Lockean theory to justify the property basis of labor contribution, Hegelian theory to

emphasize the necessity of personality connection, and Kantian theory to confirm the scope of extension of individual expression—constitutes the optimal path for the philosophical justification of copyright protection.

Third, with respect to legal certainty, clarifying the copyright ownership of AIGC enables market participants to form stable expectations of rights, reducing information costs and legal compliance costs in content transactions. The copyright protection model can also maximize the use of existing international institutional resources such as the Berne Convention and the TRIPS Agreement, avoiding the high institutional costs of establishing an entirely new protection system from scratch (Note 12).

In summary, the theoretical debate surrounding AIGC copyright protection has yet to reach a widely accepted consensus. This theoretical openness leads major jurisdictions to present distinctly different institutional choices in responding to the AIGC copyright issue, reflecting divergences in value orientations as well as differences in legislative paths and judicial strategies. From a comparative law perspective, the United States and China, as the two core actors in the global AI industry, have both accumulated considerable judicial practice and administrative exploration in their institutional responses, and they present a tension-filled contrast in methodological terms: the United States follows the traditional copyright logic of “author-centered humanism,” with the Copyright Office’s administrative guidance and federal court precedents as the main normative paths; China, within the interpretive framework of the current Copyright Law text, has formed an exploratory model driven primarily by judicial cases and supplemented by administrative compliance regulations. A comparison of the two paths on core issues such as originality determination standards, qualification of rights holders, and evidentiary review rules not only has academic theoretical value but can also provide policy references for the international community at a critical juncture of rule construction. In view of this, this paper will sequentially examine the institutional practices of the United States and China on the AIGC copyright issue, and on the basis of clarifying each logical framework, conduct a systematic comparative study, with a view to providing an analytical framework for constructing more generally applicable AIGC copyright rules.

3. The United States: A Deep Game of Judicial Conservatism and Administrative Reaffirmation

3.1 The Multi-Stage Evolution of Thaler v. Perlmutter

The Thaler case underwent a complete four-stage process: administrative adjudication by the Copyright Office, review by the federal district court, appeal to the D.C. Circuit Court of Appeals, and consideration by the Supreme Court—constituting the most systematic and far-reaching AIGC copyright case in the United States to date.

In this case, computer scientist Stephen Thaler applied to the Copyright Office in 2019 to register an image created autonomously by his AI system, “Creativity Machine,” listing the machine as the sole author. The Copyright Office twice refused the registration application based on the “human authorship

requirement,” emphasizing that copyright protection is only applicable when a human exercises ultimate creative control. In the district court phase (August 2023), the court established the normative proposition that “human authorship is a bedrock of copyright,” grounding its core argument on both constitutional text and incentive theory: non-human subjects do not require economic incentives, and copyright protection is not designed to encourage non-human creation (Note 13). In the appellate court phase (March 2025), the Chief Judge argued from the statutory interpretation perspective that multiple provisions of the Copyright Act—including those regarding the term of copyright based on the life of the author, succession rights, and nationality and domicile provisions—all presuppose that the author possesses human attributes and cannot be reasonably applied to machines that do not have a lifespan in the legal sense. The court simultaneously clearly delineated the boundaries of policy arguments: even if the human authorship requirement in certain circumstances prevents the creation of original works, this is a policy issue that Congress should resolve through legislation, not a judicial matter that courts can address through interpretation (Note 14). In the Supreme Court phase (March 2026), the Court denied certiorari without explanation (Note 15), thereby conveying a dual institutional signal: first, the Supreme Court has no intention of breaking through the existing system through judicial lawmaking; second, the future of AIGC copyright protection under the U.S. institutional framework depends on active intervention by the legislature, rather than flexible expansion through judicial interpretation.

3.2 The Institutional Implications of the Allen Case and the Zarya of the Dawn Case

If the Thaler case dealt with the extreme scenario of “zero human intervention,” the Allen case pushed the controversy into a more challenging gray area. Artist Jason Allen used Midjourney, through at least 624 iterations of text prompts, to create “Théâtre D'Opéra Spatial,” which won first prize in the digital art category at the Colorado State Fair. The Copyright Office Review Board nevertheless refused registration, holding that even though the applicant had entered a large number of prompts, the final generated result still depended on how the Midjourney system processed the human prompts, and the human did not exercise substantive control over the final expressive elements (Note 16). The core dispute in Allen—“how much human intervention is sufficient”—makes it a leading case for a large number of subsequent similar disputes.

The Zarya of the Dawn case presents another dimension of important institutional implications. The Copyright Office issued a bifurcated ruling: it approved protection for the selection and arrangement of text and images, but denied copyright protection for the individual AI-generated images, finding that Midjourney was the creator of the “expressive elements” of the images (Note 17). This “principle of separation” has important theoretical value: the copyrightability of the prompt itself must be separately and independently assessed from the copyrightability of the AI output; the prompt is a creative guide at the level of ideas, while the AI output is the realization at the level of expression; under the idea-expression dichotomy, both must independently undergo the test of human originality (Note 18).

3.3 Core Positions of the Copyright Office's 2025 Report

On January 29, 2025, the U.S. Copyright Office published the second part of its Copyright and Artificial Intelligence series, the Copyrightability report, which constitutes the most systematic and authoritative policy document to date from the Copyright Office on the issue of AIGC copyrightability. The report establishes four core positions. First, existing law is sufficient to address current AIGC copyright issues, and no legislative change is needed. Second, substantive human control is the decisive standard for copyrightability. Third, prompts alone do not constitute a sufficient condition for human authorship. No matter how many times prompts are modified and resubmitted, the final output reflects the user's acceptance of the AI system's interpretation, rather than authorial control over the expressive elements contained in that output. Fourth, the Copyright Office distinguishes four categories of human contribution, in ascending order: using AI to assist the human creative process, generating outputs through prompts, providing human-authored expressive inputs to an AI system, and human modification or arrangement of AI-generated content; among these, the fourth category is most likely to satisfy the copyrightability standard (Note 19).

3.4 AI Training Data and Fair Use: The Deep Game at the Policy Dimension

A comprehensive understanding of the overall response of the U.S. copyright system to the challenges of AIGC cannot focus solely on the copyrightability issue at the output end; it must also pay attention to the fair use controversy at the input end. This is the "input end" of the copyright issue, which, together with the "output end" of AIGC copyrightability, constitutes the complete picture of the copyright system in the AI era. At present, a large number of mainstream AI models are trained on copyrighted materials on a large scale without authorization, which implicates the reproduction right under copyright law. Unlike earlier cases of non-expressive use (such as the HathiTrust digitization project and Google Books), contemporary generative AI not only extracts statistical patterns from training data but is also capable of generating digital outputs in the same form as the original training materials, and even reproducing specific works with a high degree of similarity. This substantially weakens the fair use argument of "non-expressive use" in the generative AI context (Note 20).

This training data controversy and the AIGC copyrightability issue constitute two poles of institutional tension. If courts rule that AI training constitutes fair use (input end open), while at the same time AIGC is denied copyright protection due to lack of human authorship (output end closed), the incentive mechanism of the copyright system for human creators will face systemic erosion: human creative achievements become "free raw materials" for AI, while AI outputs do not pay any consideration to human creators. This double squeeze pattern of "open input, closed output" constitutes the deepest institutional crisis facing U.S. copyright law in the AI era.

4. Conclusion

The United States, at the cost of logical consistency and constitutional textual constraints, adheres to the institutional boundary of the “human authorship requirement.” This paper argues that the United States should adopt the refinement of a tiered and classified protection system, the construction of a four-dimensional originality evaluation framework, and the systematic development of supporting administrative mechanisms, with the aim of achieving “bounded flexibility”: providing sufficient legal certainty for human-machine collaborative creations while preventing copyright monopoly from unduly encroaching upon the public information domain and the human creative ecosystem.

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Notes

Note 1. See João Pedro Quintais, “Generative AI, Copyright and the AI Act”, 56 Computer Law & Security Review 106107 (2025), pp. 5-8.

Note 2. See Francesca Mazzi, “Authorship in Artificial Intelligence-Generated Works: Exploring Originality in Text Prompts and Artificial Intelligence Outputs through Philosophical Foundations of Copyright and Collage Protection”, 27 Journal of World Intellectual Property 410 (2024); Hafiz Gaffar & Saleh Albarashdi, “Copyright Protection for AI-Generated Works: Exploring Originality and Ownership in a Digital Landscape”, 15 Asian Journal of International Law 23 (2025); Joshua Yuvaraj, “Submission: UK Copyright and Artificial Intelligence Consultation 2024-25”, University of Auckland, 2025.

Note 3. See Gaffar & Albarashdi, *supra* note 2, at 35-36.

Note 4. See Yuvaraj, *supra* note 2, at 2-3 (Parts A-C).

Note 5. See Yuvaraj, *supra* note 2, at 3-4 (para. 12), citing Brandt, Anthony K., “Beethoven’s Ninth and AI’s Tenth: A comparison of human and computational creativity,” (2023) 33 *Journal of Creativity* 1000068, at 5.

Note 6. See Yuvaraj, *supra* note 2, at 4 (para. 13), citing Franceschelli, Giorgio & Musolesi, Mirco, “On the creativity of large language models,” (2024) *AI & Society* 3.

Note 7. See Yuvaraj, *supra* note 2, at 4-5 (paras. 13-17), citing Frosio, Giancarlo, “The artificial creatives,” in *Handbook of Artificial Intelligence at Work* (Edward Elgar, 2024) 239.

Note 8. Yi Zaicheng & Bin Xingyang, “The Nature of Generative Artificial Intelligence and the Ownership of Its Outputs,” *International Business Research*, No. 2, 2025, pp. 94-97.

Note 9. See William M. Landes & Richard A. Posner, “An Economic Analysis of Copyright Law”, 18 *Journal of Legal Studies* 325 (1989).

Note 10. See Mazzi, *supra* note 2, at 419-420.

Note 11. See Mazzi, *supra* note 2, at 417-419.

Note 12. See Berne Convention for the Protection of Literary and Artistic Works, Article 2; Agreement on Trade-Related Aspects of Intellectual Property Rights, Articles 9-11; WIPO Copyright Treaty, Article 4.

Note 13. *Thaler v. Perlmutter*, 687 F. Supp. 3d 140, 146 (D.D.C. 2023).

Note 14. *Thaler v. Perlmutter*, No. 23-5233 (D.C. Cir. Mar. 18, 2025).

Note 15. *Thaler v. Perlmutter*, No. 25-449, cert. denied (U.S. Mar. 2, 2026).

Note 16. U.S. Copyright Office, Review Board, Second Reconsideration Decision re *Théâtre D’Opéra Spatial* (Sept. 2023); *Allen v. Perlmutter*, Civil Action No. 1:24-cv-2665 (D. Colo., filed Sept. 2024).

Note 17. U.S. Copyright Office, Letter re: Registration of *Zarya of the Dawn* (Feb. 21, 2023).

Note 18. See Mazzi, *supra* note 2, at 419.

Note 19. U.S. Copyright Office, *Copyright and Artificial Intelligence, Part 2: Copyrightability* (Jan. 29, 2025), pp. 11-40.

Note 20. See Matt Blaszczyk, Geoffrey McGovern & Karlyn D. Stanley, “Artificial Intelligence Impacts on Copyright Law”, RAND Corporation Expert Insights (Nov. 20, 2024), pp. 4-6.