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Determining Copyright Ownership of AI-Generated Text-to-Image and Text-to-Video Works in the Context of Human-Machine Co-Creation

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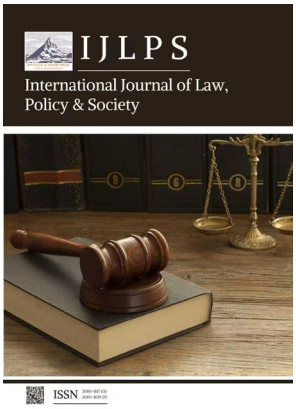

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Abstract: The widespread application of generative artificial intelligence in text-to-image and text-to-video scenarios has transformed creation into a human-machine collaborative process, challenging the traditional attribution of rights under copyright law. Current academic discourse lacks a comprehensive theoretical framework for determining copyright ownership of AI-generated content. A novel framework centered on the "operator as rights holder" offers a promising solution. From a legislative perspective, operators should be recognized as qualified rights holders when they make minimal yet objectively identifiable personalized choices during the creative process, thereby contributing originality. This approach to rights allocation aligns with the fundamental purpose of copyright law and reflects the technical reality that operators effectively control the means of expression. At the same time, operators should bear corresponding obligations to inform the public about the human-machine collaborative nature of their works. Copyright law may establish relevant certification and disclosure mechanisms through legislative and technological measures.

Keywords: rights holder; operator; attribution of rights; human-machine co-creation

1. Introduction

With the rapid advancement of generative artificial intelligence technology, human-machine co-creation has become increasingly common in text-to-image and text-to-video scenarios. This represents an intermediate state in which the operator makes minimal yet objectively identifiable personalized choices-such as prompt wording or parameter settings-thereby contributing originality to the generated output. This model differs from situations where humans merely issue simple instructions for AI to generate content independently, as well as from cases involving deep collaboration through complex human operations alongside AI.

This emerging model has sparked substantial debates regarding rights attribution within copyright law. Technologically, the creative capacity that AI acquires through learning vast bodies of work fundamentally differs from the original expression of human creators. Notably, as AI technology continues to advance, AI-generated content increasingly approaches or even surpasses the average human creator in expressiveness and completeness, making legal disputes over rights allocation more salient [1].

From a legal perspective, when AI participates in the entire creative process, existing copyright frameworks face challenges in determining the originality of the work, defining authorship, and allocating rights. Against this backdrop, intense discussion has emerged within academia and the legal profession. This paper argues that resolving the copyright

dilemmas posed by AI-generated works requires moving beyond traditional theoretical constraints and constructing a more inclusive legal interpretative framework from a legislative perspective. Specifically, in determining authorship, attention should be given to the actual human involvement and creative contribution; in rights allocation, innovative models such as "contributor rights" may be explored; and in institutional design, licensing mechanisms and recognition standards adapted to the characteristics of AI technology need to be established.

2. Retrospective: Current State of Research

2.1. The AI Tool Theory and Its Limitations

2.1.1. The AI Tool Theory

The AI tool theory represents one of the prevailing perspectives on copyright attribution for AI-generated content. Its core argument is that artificial intelligence functions merely as an auxiliary tool for human creation, with the resulting output fundamentally constituting intellectual achievements produced by humans through technological means. Consequently, such content should be regarded as human works protected under copyright law. This perspective essentially frames human-machine co-creation as human creation using tools, negating the notion of true "co-creation."

This theoretical construct comprises three key elements. First**;** it emphasizes the tool-like nature of AI**;** denying it any subject status. AI is viewed as a tool for human creation**;** comparable to paper**;** pen**;** or brushes**;** and its output is thus considered the product of human effort using these tools. Second**;** it characterizes the technical generation process as an extension of human intellectual activity [2]. AI systems substitute for or alleviate human mental labor**;** and the intellectual contribution involved in AI-generated content can broadly be regarded as human mental labor**;** thereby constituting human creation. Third**;** at the normative level**;** the theory advocates applying existing copyright systems for protection without altering traditional legal structures. In early AI text-to-image cases**;** rulings were premised on the assertion that AI is a tool created by humans**;** and the operator's actions-inputting prompts**;** setting parameters**;** and making iterative adjustments-constituted personalized expression. AI**;** lacking free will**;** functions solely as a tool**;** with the operator regarded as the author

2.1.2. Limitations of the AI Tool Theory

Although the AI tool theory exerts considerable influence in both practice and academia, it approaches issues through a mechanistic lens. First, AI cannot be equated with traditional creative tools. The underlying control mechanisms differ fundamentally. Traditional tools yield outputs entirely controlled by humans, who do not participate in determining creative content, resulting in highly predictable outcomes. AI, however, autonomously selects, combines, and expresses content through algorithms, with its expressive elements primarily determined by the model and training data. Human prompts provide only abstract instructions.

Second, AI occupies a dual role as both a tool and a content producer. As humans continually develop AI to learn autonomously and achieve specific objectives, the process transforms broad human intentions into ideas realized through AI computation. This creates scenarios in which the underlying concept may be predictable, but its expression remains unpredictable. AI does not execute human intent directly; its output involves intermediary reasoning processes dependent on algorithms.

Third, the instrumentalist view overlooks AI's substantive contribution. AI-generated content arises not solely from user input but from the combination of algorithms and training data. Different models can produce markedly varied outputs when given identical prompts, and variations in hardware can further influence results. This demonstrates that AI expression is now inseparable from the technical system itself, making it inaccurate to regard AI purely as a tool.

Finally, from developmental and economic perspectives, excessive copyright protection for AI-generated content with minimal human input may undermine creators' motivation. Copyright law is grounded in property principles, which rely on scarcity and value. If works become widely available without distinctive human contribution, their scarcity and value are diminished, raising questions about the justification for legal protection.

2.2. The Commissioned Work Theory and Its Shortcomings

2.2.1. Arguments for the Commissioned Work Theory

Some scholars advocate the commissioned work theory. Article seventeen of China's Copyright Law explicitly addresses the attribution of copyright for commissioned works, though it provides no precise definition of such works. Legal interpretations commonly view commissioned works as creations arising from a commissioned creation contract, equating the underlying relationship with civil law concepts such as agency contracts or contracts for services [3].

Grounded in the "commissioned creation" clause, this doctrine regards the designer as the agent and the operator as the principal, treating AI as an advanced tool employed by the human creator. The framework does not recognize AI as a non-human subject. Since human consciousness shapes the final outcome, authorship is initially vested in the agent. Both parties may transfer rights through licensing agreements, following the principle that agreements take precedence; in the absence of agreement, rights remain with the agent. In short, while acknowledging human-machine co-creation, the commissioned work theory applies the ownership rules of commissioned works by treating AI as a fictitious principal.

2.2.2. Limitations of the Commissioned Work Theory

The commissioned work theory exhibits certain logical inconsistencies, particularly regarding the requirement for originality. Traditional commissioned works require that the contractor independently complete the creation, embodying a minimum degree of creative choice. In AI-generated content, however, designers cannot foresee the precise composition, color palette, or lighting combinations of the final output due to AI's probabilistic generation and the scale of training datasets. The causal link between prompts and final pixels is inherently weak. For the operator, selection of algorithmic parameters and data constitutes preparatory conceptual work rather than original expressive labor, failing to satisfy the premise of substantial human control over output that underpins the commissioned work theory.

Furthermore, the doctrine denies AI subject status by prioritizing human agency, yet it effectively transfers AI's expressive capacity to the designer through contractual fiction. This positions designers as both controllers of AI and exclusive owners of its outputs. If algorithmic outputs cause harm, designers may evade liability through standardized clauses, while operators bear strict responsibility for failing to understand the model's internal logic. This arrangement conflicts with broader societal notions of fairness. The commissioned work theory's attempt to preserve normative continuity, promote industrial incentives, and maintain an anthropocentric ethos reveals significant theoretical limitations.

2.3. The Collaborative Work Theory and Its Shortcomings

2.3.1. Advocates of the Collaborative Work Theory

Some scholars advocate the collaborative work theory. While artificial intelligence lacks legal personhood, the essence of collaborative work lies in the creative act itself rather than the subject. This perspective proposes a human-machine collaborative work clause, explicitly designating natural persons as the principal party and AI as a fictitious collaborator. According to this approach, a human-machine collaborative work is jointly

created by a natural person and AI, with the human making a substantial creative contribution. Originality is assessed based on the work itself rather than relying excessively on the author's thought process or identity. By acknowledging factual contributions without conferring legal status on AI, this approach preserves anthropocentric principles while bridging technological gaps [4]. Similar to other theories, the collaborative work theory recognises human-machine co-creation scenarios, treating AI as a de facto co-author and applying existing collaborative work rules to the allocation of rights.

2.3.2. Limitations of the Joint Creation Theory

Although the collaborative work theory offers a potential approach for allocating rights in AI-generated content, it presents several logical challenges. Traditional joint works require explicit or implicit human coordination, yet in human-machine collaboration, AI lacks subjective consciousness and operates unilaterally under human control. Applying an objective standard could classify all AI-generated content as joint works, leading to conceptual overreach. Furthermore, designating developers and operators as joint authors might extend copyright protection to the "last surviving human author," potentially granting AI-generated content protections exceeding those of purely human creations. This outcome conflicts with the principle of limited monopoly inherent in copyright law.

2.4. Summary and Discussion of the Theoretical Framework

In summary, examining prevailing theories through the lens of human-machine co-creation reveals that the AI tool theory, the commissioned work theory, and the collaborative work theory all inadequately address the realities of human-machine collaborative creation. The AI tool theory emphasizes human dominance but overlooks AI's autonomy and unpredictable expressive capacity, failing to recognize AI's technical contribution. The commissioned work theory attempts to attribute AI outputs to a single human party via legal fiction but neglects the hybrid origin of originality in human-machine collaboration, resulting in misaligned incentive structures. The collaborative work theory ostensibly recognizes human-machine collaboration, yet its reliance on coordinated human intent struggles to accommodate AI's non-conscious participation, creating issues such as ambiguous rights boundaries and disproportionate protection periods [5].

The existing legal framework does not provide a clear, equitable, or operationally viable pathway for regulating AI-generated content. Judicial practice attempts to bridge these gaps through case-by-case rulings and interpretation but often encounters logical contradictions, hindering the establishment of a stable and predictable system. Therefore, relying solely on judicial adjustments is insufficient. A shift toward legislative theory is necessary, moving beyond the constraints of existing frameworks to proactively establish attribution rules aligned with the technical characteristics of artificial intelligence.

3. Breaking the Deadlock: The Imperative for a Novel Copyright Framework

Assuming AI-generated content constitutes a "work" under copyright law, the attribution of copyright for such content becomes a critical issue for enriching the intellectual property market and ushering in an era of human-machine collaborative creation. Within the traditional copyright framework, AI-generated content is either incorporated into the scope of copyright protection or deemed a public domain work and thus unprotected [6]. This binary approach is increasingly inadequate given the frequent occurrence of human-machine co-creation.

3.1. The Imperative for Specialised Authorisation

Technological trends indicate that AI-generated content has permeated diverse fields, including literature and art, infiltrating all facets of society. Data show that AI-generated outputs are no longer sporadic but have become a pivotal component of the content industry. By May 2025, China had registered over 300 generative AI services, serving a user base of 249 million. Between 2014 and 2023, China submitted over 38,000 patent applications for generative AI technologies, ranking first globally. As generated content proliferates, disputes over ownership in human-machine co-creation scenarios are expected to intensify, signalling an inevitable rise in future legal conflicts. Given both practical demands and the need to maintain legal stability, dedicated legislation-rather than piecemeal judicial amendments-has become necessary [7].

In human-machine co-creation, operators are not passive executors but often deeply engaged in core content generation, contributing substantial intellectual labor. Their subsequent actions embody independent judgment and refinement. Recognizing and protecting such contributions aligns with the principle that those who labor should benefit from their work, as well as the moral foundation that human beings are ends in themselves rather than means. This provides a robust legitimacy for legislative action.

From an industrial perspective, establishing a structured empowerment framework facilitates market transactions by reducing costs. Under this mechanism, operators can access AI tools with lower barriers and deploy them efficiently to generate economic benefits. This creates a strong incentive: driven by profit motives, operators will pursue more efficient and intelligent tools, further promoting technological advancement. As AI usage yields significant returns, users become more willing to pay for superior systems, generating sustainable business models and revenue streams for technology providers. This "use-benefit-reinvestment-upgrade" cycle fosters the overall prosperity of the AI industry ecosystem.

Attributing rights to AI is unwarranted. Current weak AI does not justify conferring legal personhood, and even future strong AI, lacking human characteristics, would not qualify as a legal person since responsibility would remain with natural persons. Reforming legal systems on this basis would be costly and inconsistent with the core principle of intellectual property law: incentivizing human creativity. AI outputs do not require the economic or moral incentives essential to human motivation, and granting rights to AI would diminish the rewards and enthusiasm of programmers and stakeholders, undermining investment in AI development.

Similarly, consigning AI-generated works to the public domain is inadequate. AI creations are not inherently incapable of having identifiable creators-designers, owners, and operators all possess both the motivation and capacity to be rights holders. Automatically placing such works in the public domain would dampen the enthusiasm of creators and hinder AI development, ultimately burdening human intellectual creation and impeding innovation [8].

The distinctiveness of AI-generated content copyright lies in its dual structure of creative agent and rights holder. Determining who holds the rights cannot rely solely on traditional copyright standards; it must incorporate the unique characteristics of AI technology to establish a new framework for rights attribution.

3.2. The Necessity of Empowering Operators

Attributing copyright of AI-generated content to operators aligns with the technical mechanisms of artificial intelligence, recognizes the contributions and interests of operators, and adheres to the humanistic values underlying copyright law. While generative AI's multimodal models and large-scale architectures may enable it to transcend its traditional role as a mere production tool, it remains far from attaining the level of subjectivity that would place it on equal footing with humans. Copyright analysis should therefore focus on the two principal contributors: the designer and the operator.

First, operators occupy a dominant role and make substantive contributions. The public domain of knowledge functions as a shared resource from which individuals draw inspiration and materials to create new works through unique labor. In this context, inventors and authors are entitled to reap the fruits of intellectual property. Human operators dominate the input of front-end prompts, engage in iterative interaction with AI during content generation, and refine back-end outputs. They initiate, select, and control the AI, ultimately determining the final form of expression. Since operators directly shape AI-generated content, rights are generally attributed to them in the absence of prior agreements [9].

Second, designers prioritize AI adoption and market penetration over controlling rights to generated content. Having already profited from developing AI tools, granting designers ownership of outputs could constitute windfall gains. Service providers aim to facilitate widespread use of their technology rather than accumulate ownership of generated digital products. Broad adoption generates data feedback that improves AI performance, creating a virtuous cycle. Consequently, designers are generally inclined to empower operators, supporting user engagement and incentivizing broader AI use. This is reflected in current user agreements of popular generative AI platforms, which typically do not stipulate copyright ownership for designers.

Third, designers and operators hold divergent positions regarding ownership allocation. Designers generally avoid asserting ownership over outputs due to the unpredictable nature of AI and the associated liability risks. Conversely, operators view their contributions during content generation as entitling them to ownership of the resulting works. Designers shape AI's capabilities at an abstract level, while operators bear direct responsibility for outputs during concrete application. Given that operators invest significant intellectual labor, imbuing the work with creative essence, granting them copyright protection provides appropriate incentives.

From a copyright jurisprudential perspective, recognizing operators' rights aligns with the legislative intent of copyright law. Creator-centric principles emphasize protection of original expressions externalized through human subjective thought. The originality of AI-generated works is intrinsically linked to human intellectual input. Operators stand closest to the creative process, and AI-generated content, as the manifestation of their ideas, should be subject to their rights, consistent with the personality and labor theories that underpin copyright legitimacy [10].

4. Construction: Developing a New Form of Copyright

Given that attribution to the operator is inevitable, it is essential to establish rules that ensure both technical rationality and legal legitimacy.

4.1. Establishing Attribution Rules

Within the human-machine co-creation paradigm, the attribution of copyright for AI-generated content represents an intermediate state: neither wholly machine-generated nor solely human-created, but rather the product of collaborative interaction. Clear and reasonable attribution rules require distinguishing different levels of human-machine collaboration, particularly by defining criteria for recognizing the intermediate scenario of co-creation. Specifically, this model differs from machine-dominant creation based on whether the operator contributed a minimum level of creative labor, and from human-dominant creation based on whether the AI introduced non-human-derived original expressions. Establishing attribution rules grounded in a minimum threshold of creative contribution identifies genuinely co-created works while providing an objective, operational normative basis for subsequent rights allocation.

The minimal creative contribution standard serves as a theoretical tool to reconcile the tension between traditional copyright assumptions and practical realities. Its application requires that expressive elements of the work fundamentally derive from

human input; otherwise, the normative purpose of originality is compromised. Originality must be evident in the interaction between operator and AI, encompassing distinctiveness, specificity, aesthetic choices, and individuality in prompting, with outcomes showing objectively discernible differences [8].

The minimum creativity doctrine aligns with both ontological interests and cognitive economics. Provided a user's contribution renders AI-generated content sufficiently distinct from existing works and public domain materials, the user may assert copyright. Ontologically, copyright law demands human intellectual contribution, emphasizing participation and personalized expression. Although machine intelligence reduces traditional human input, copyright should encourage use of new tools in creative production. From a cognitive economics perspective, distinguishing high and low originality in AI-generated content can be costly and inefficient. Adopting a minimum threshold focuses solely on human contribution, sidestepping proportionality issues between human and non-human factors and achieving efficient protection at low cost.

This threshold manifests as objectively discernible differences in content, without requiring users to exercise absolute control over expressive details. A prudent approach involves maintaining rational ignorance regarding the subject matter of rights, assuming most AI-generated content meets the minimum creativity standard. Courts can adjust the burden of proof dynamically during infringement litigation based on claimed scope. Additional methods, such as automated screening tools and evaluating prompt precision, may assist in assessing user contribution.

In establishing empowerment rules, the key is to reasonably restrict the scope of rights enjoyed by operators. Operators should retain fundamental rights over AI-generated content-including reproduction, distribution, online dissemination, broadcasting, performance, and exhibition-while excluding adaptation rights.

The right of adaptation controls acts that create new works based on the original while preserving its essential expression. In human-machine co-creation scenarios, operators contribute creative labor, but their control over expressive form is limited. A substantial portion of content derives from algorithms and training data. Granting full derivative rights could lead to improper appropriation of public domain resources and contradict the purpose of adaptation rights, which is to encourage new expressions while preserving the core of the original work.

Furthermore, derivative rights restrict re-creation. Granting operators full derivative rights would unduly limit others' reuse of AI-generated content, impeding knowledge dissemination and cultural development. Therefore, it is recommended that operators not receive derivative rights, allowing human-machine co-created content to remain available for secondary creation.

4.2. Establishing Disclosure Obligations

While empowerment rules affirm and protect operators' legitimate rights, it is equally essential to establish disclosure obligations to prevent market confusion or trust crises arising from AI-generated content. Rights holders should disclose that content is AI-generated and clearly label its attributes upon public release, addressing both copyright attribution and source origin. The copyright system functions effectively only when the statutory author status and the author's stance toward that status are clearly established.

Firstly, this obligation has a sound legal foundation. Copyright attribution serves both as a declaration of rights holder identity and as a disclosure rule for work information, combining rights attributes with public notice functions. Copyright protection must safeguard creators' rights while upholding the public's reasonable reliance on information authenticity. Principles of good faith and duties of product information disclosure provide legal grounds for labeling AI-generated content. If AI

outputs circulate under the guise of human works, legal evaluation standards may be blurred, and "bad content" could crowd out legitimate creations [1].

Secondly, disclosure obligations uphold the value objectives of copyright law. Attribution of authorship carries statutory presumptive effect regarding the identity and rights of creators. AI-generated quasi-works are susceptible to false attribution for illicit gain, creating legal risks. Operators could misrepresent outputs as human creations, and other industry participants might collude to secure improper benefits, ultimately eroding foundational trust in the creative ecosystem.

Thirdly, this obligation serves long-term interests. Truthful identification in sustained transactions benefits both operators and the broader market. Short-term gains from concealing AI use come at the expense of public trust. Disclosure requirements ensure efficient operation of the creative market, foster trust, and promote a virtuous cycle within the AI industry. Therefore, regulating the attribution obligation and establishing operators as duty-bearers is necessary. Requiring truthful attribution is a form of non-damage liability and does not impose unreasonable economic burdens on operators.

4.3. Establishing an Authentication Mechanism

To implement operators' rights and the duty of truthful disclosure, technical mechanisms are needed to ensure cost-effective and efficient enforcement.

Registration and Filing System. Registration should not be a prerequisite for acquiring rights but should serve as evidence of the creative process, fulfil the disclosure obligation, and provide preliminary confirmation of rights attribution. For AI-assisted content, registration authorities should assess whether human creative contributions exist based on the operator's statement. Applicants must explicitly state the extent of AI usage and the operator's contribution. Registration is permissible only when the operator's intervention imparts originality and distinctiveness. Relevant laws should explicitly stipulate disclosure obligations and labelling requirements, with registration rights limited to work components demonstrating genuine human contribution [3].

Promoting Blockchain Technology. Three main challenges exist in rights protection: lack of trust mechanisms, difficulty ensuring reliable evidence, and high costs relative to effectiveness. Blockchain's immutable characteristics can enhance digital copyright registration, clarify rights transfer processes, and verify infringement evidence, alleviating protection burdens. Platforms adopting blockchain can record the human-machine collaboration chain, demonstrating the causal link between operator input and final expression, thereby substantiating the minimum threshold of creativity [1].

Platform-Provided Credentials. Laws may require AI platforms to provide generation records containing fundamental information sufficient to prove the content's origin. Public verification of AI-generated content enables traceability to the source, curbing misrepresentation as human-generated works. This supports operators' rights claims and safeguards the public's right to know at minimal societal cost.

5. Conclusion

With generative AI increasingly permeating content creation, the "human-machine co-creation" model in text-to-image and text-to-video scenarios has become an undeniable reality, presenting systemic challenges to traditional copyright law's rules on rights attribution. This study reviewed prevailing perspectives-including the AI tool theory, commissioned work theory, and collaborative work theory-and identified their theoretical limitations in addressing the realities of human-machine co-creation.

Accordingly, this study proposes a novel copyright attribution framework centred on the "operator as rights holder" through legislative measures. Provided that AI-generated content qualifies as a work, rights should vest in the operator who exercises actual control over the generation process and makes a minimum creative contribution. This framework establishes "minimum creative contribution" as the threshold for

entitlement and imposes restrictions on derivative rights to prevent misuse of the public domain.

To safeguard public information rights and uphold creative ethics, the framework also recommends establishing disclosure mechanisms alongside rights entitlement. Incorporating technological solutions such as blockchain and registration systems can enhance transparency, traceability, and efficiency in rights attribution.

While this study provides a preliminary exploration of these issues, complex questions-such as the specific implementation mechanisms for disclosure obligations-remain and require further refinement and in-depth investigation in future research.

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