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Research on the Evolution of AI Copyright Attribution Mechanisms

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ABSTRACT

With the continuous iteration of artificial intelligence technology, the AI-generated content has penetrated into various fields of social production and daily life. The copyright ownership mechanism of artificial intelligence generated content evolves with technological progress, legal change and industrial development. This evolution can be divided into three stages : the embryonic stage, the development stage and the mature stage. The core of the conflict is to coordinate the contradiction between technological innovation and the lag of legal regulation. The primary goal is to balance the rights and public interests of multiple stakeholders. This paper systematically combs the evolution of this attribution mechanism by means of literature research, historical analysis, comparative research and case study. This paper makes an in-depth analysis of the core issues such as the absence of legal personality of artificial intelligence, the inconsistency of originality identification standards, and the imbalance of rights distribution among multiple stakeholders. On this basis, it clearly puts forward targeted solutions such as the legal status of artificial intelligence, the standardization of identification standards, and the establishment of a multi-stakeholder rights allocation system. This study improves the theoretical framework of artificial intelligence copyright protection, and provides practical guidance for legislative revision, judicial adjudication and the development of artificial intelligence industry, thus promoting the benign synergy between technological innovation and rights protection.

1.Introduction

Driven by large-scale language models and deep learning, the rapid development of generative artificial intelligence (AI) has accelerated AI-generated content (AIGC) to become a widely used tool across cultural production, media industry and scientific research. However, the expansion of AIGC has put unprecedented pressure on the traditional copyright framework, which is historically constructed on creative works and entirely derived from the assumption of human authors.

1.1.Literature review and research gap

At present, there are different views on the ownership of artificial intelligence copyright in the academic circles. The literature advocates strict adherence to the principle of "anthropocentrism" and believes that works generated by artificial intelligence should continue to be in the public domain unless it is proved that human beings have put a lot of intelligence and effort. In turn, other scholars and industry practitioners advocate expanding the signature rights of artificial intelligence developers or endorsing a joint signature framework to encourage technology investment. Despite these fierce debates, there is a key gap in the literature : previous studies have mainly analyzed artificial intelligence copyright in a static legal context, or focused on isolated jurisdictional case studies. There is a lack of systematic research on the historical evolution of artificial intelligence technology capabilities and the corresponding legal attribution mechanism trajectory.

1.2.Research questions

In order to solve this gap, this study proposes three core questions: (1) How does the copyright ownership mechanism of artificial intelligence evolve with the change of technical paradigm? (2) What specific legal conflicts have arisen in this evolution process, especially in terms of legal personality, originality standards, and balance of rights? (3) How to dynamically optimize the existing legal framework to balance the rights of human-machine collaborative innovation and multi-stakeholders?

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1.3.Research framework

This paper comprehensively uses research methods such as literature research, historical analysis, comparative research and case analysis. The second section traces the historical evolution of the ownership of artificial intelligence copyright, which is divided into three stages: start-up, development and maturity. The third section identifies the specific legal challenges contained in this evolution, mainly focusing on issues such as ambiguity of subjects, inconsistency of originality standards, and imbalance of rights. The fourth section proposes a targeted and multi-participatory solution path. Finally, the fifth part summarizes the research by summarizing the core findings and outlining the future regulatory trajectory.

2.Historical evolution of AI copyright attribution

The evolution of the copyright ownership mechanism of artificial intelligence stems from the joint efforts of technological progress, legal improvement, social needs and industrial growth. Its development trajectory is closely related to the development of artificial intelligence technology, which is roughly divided into three stages: the embryonic stage (1950s to the beginning of the 21 st century), the development stage (the beginning of the 21 st century-2020), and the mature stage (2020-present). Each stage shows obvious differences in the progress of artificial intelligence technology, social situation, legislative practice, landmark cases, attribution rules and so on, showing a gradual refinement and clarification of the trajectory.

Table 1. Evolutionary stages of AI copyright attribution mechanisms

Evolutionary Stage	Timeframe	AI Technological Capability	Source of Originality	Core Attribution Rule
Nascent Stage	1950s–Early 2000s	Weak AI (Rule-based, simple tasks)	Entirely human intellectual labor	Uncontested: Copyright resides solely with the human creator
Developmental Stage	Early 2000s–2020	Transitional AI (Basic autonomous learning)	Human instruction + AI autonomous generation	Ambiguous: Disputed among human creators, developers, and joint attribution
Mature Stage	2020–Present	Early Strong AI (Generative large models)	Collaborative human-AI contribution	Progressive Clarity: Centered on human creative input; distinct rules based on contribution level.

2.1.The emergence phase (1950s–early 21st century)

The concept of artificial intelligence was first proposed in the 1950s. Until the beginning of the 21 st century, artificial intelligence technology remained in the stage of weak artificial intelligence with rule-based algorithm design as the core. It can only accomplish specific, simple tasks. And unable to create independently. In this context, weak artificial intelligence is defined as a system that performs narrow, highly specific tasks based on predefined rules and algorithm design. Lack of general cognitive ability or context understanding. Therefore, it can only perform simple functions, and it is not born with the ability to create independently.

During this period, although there are no clear rules for the copyright ownership of artificial intelligence, the auxiliary nature of artificial intelligence is beyond doubt. This means that copyright is unequivocally inhabiting human creators, so there is no dispute over attribution. At this stage, artificial intelligence technology is mainly used in basic fields such as text editing, data computing, and graphic design. Its core function is to assist human beings to complete basic tasks in the creative process, lacking the ability to independently generate original content[1]. The output generated by artificial intelligence is essentially the direct execution of human instructions, which is completely dependent on human operations and instructions. It has no independent creativity. Its originality is entirely derived from the intellectual labor of human creators, and artificial intelligence only plays an auxiliary role. At the same time, the development of artificial intelligence technology in this stage is slow, and the adoption rate is extremely low, which is limited to the niche field. The volume and influence of the generated content are still minimal. And stay out of the public consciousness, the lack of commercial application. Therefore, the issue of copyright ownership has rarely attracted the attention of the society.

At the societal level, public and academic understanding of AI was limited, generally viewing it as a tool to assist humans in performing simple tasks, without recognising its potential for autonomous creativity. Societal demand for AI centred on enhancing productivity and reducing repetitive labour, with minimal requirement for AIGC. The AI industry had yet to scale up, remaining confined to a handful of specialised fields. The legal community and legislative bodies had not anticipated the copyright challenges posed by AI, with the traditional "anthropocentric" principle of copyright law deeply ingrained[2].

The attribution rule during this phase was remarkably straightforward: copyright for AIGC resides with the human creator. The AI itself holds no copyright and lacks the capacity to be a copyright holder. This rule fully adheres to the traditional "anthropocentric" principle of copyright law, facing no controversy. Both legislative and judicial practices strictly follow this rule. Copyright legislation across nations explicitly defines copyright holders as natural persons, legal persons, or unincorporated organisations, with no special provisions made for the attribution of AIGC[3]. Professor Wang Qian explicitly states in his paper On the Classification of AIGC under Copyright Law: "Traditional copyright law is founded on the principle of "anthropocentrism".The subject of copyright can only be human beings, and copyright can only be obtained through the original intellectual labor engaged by human beings. As a tool, artificial intelligence can neither become the subject of copyright nor generate original works[4]. When amending copyright-related legislation, the legislature

did not consider the copyright ownership of artificial intelligence creations, nor did it adjust the core rules and system design of traditional copyright law specifically for artificial intelligence creations.

The attribution mechanism at this stage was in line with the technical ability, social needs and industrial conditions at that time, effectively safeguarding the legal rights of the creators and maintaining social order. However, it lacks foresight, systematicness and flexibility to foresee the trajectory of artificial intelligence, and thus is insufficient to resolve future ownership disputes.

2.2.Developmental stage (early 21st century–2020)

By the beginning of the 21 st century, with the gradual development of technologies such as big data, cloud computing, and deep learning, artificial intelligence has entered a transition stage from weak to strong capabilities. It has acquired preliminary autonomous learning and generation ability, and can generate logical coherence, integrity and originality content based on simple human instructions. During this period, the volume of AIGC has grown steadily, the scope of application has gradually expanded, and it has entered areas closely related to copyright such as cultural creation and media communication, resulting in huge economic and social value[5]. The positioning of artificial intelligence only as an auxiliary tool has begun to change. The originality of its generated content has gradually emerged, and the rights demands of relevant stakeholders have become increasingly diverse. Disputes about the ownership of artificial intelligence copyright have begun to emerge[6]. Countries have made preliminary explorations on attribution rules, but have not yet formed a clear and unified institutional framework.

Artificial intelligence technology at this stage goes beyond rule-based algorithm design. It can learn from a large amount of data, independently summarize patterns and adjustment algorithms, and generate original content based on basic human instructions. A number of preliminary autonomous artificial intelligence tools came into being, which were applied to text creation, music generation, software development and other fields[7]. The content generated by artificial intelligence at this stage is no longer just the output of human instructions, but has a certain degree of independent creativity. This originality stems from the combination of human teaching and artificial intelligence autonomous learning and generation. However, the autonomous creativity of artificial intelligence is still limited, unable to reach the level of human creation, and still needs human intervention and adjustment.

In terms of social background : the public and academic community’s awareness of artificial intelligence has steadily increased, and the recognition of its autonomous generation ability has continued to increase ; the social demand for AI is diversified, and the economic value and social value of AIGC are gradually emerging. The scale of the artificial intelligence industry has expanded, the application field has continued to expand, and the demands for the rights of relevant stakeholders have diversified, resulting in conflicts of interest. The legal community has begun to address the copyright challenges posed by artificial intelligence. In this way, the discussion was carried out, and the discussion revolved around the issue of attribution, resulting in a variety of controversial views. The legislature has also begun to pay attention to this issue and gradually explore legislative adjustments.

The attribution mechanism of artificial intelligence copyright in this stage presents the characteristics of ambiguity and controversy, which is embodied in four core attribution perspectives: first, the attribution rules of human creators who advocate that copyright should belong to human creators still occupy a dominant position; secondly, the AI developer ownership rule advocates that the copyright belongs to the AI developer and is supported by the AI development enterprise; third, the common ownership rule, which advocates that copyright should be jointly held by human creators and developers, balancing the interests of both parties; fourth, the rules of attribution of the public domain, which advocates placing AIGC in the public domain. Generally speaking, a unified attribution system has not been established at this stage, and the judicial practice also shows the phenomenon of inconsistent referee standards[8].

At the legislative level, countries show the characteristics of " passive response, fragmented exploration, and vague rules, and have not surpassed the core framework of human beings as the sole copyright owner." The U.S. Copyright Office has gradually clarified the copyright protection boundary of artificial intelligence creations through copyright registration guidelines and case responses, and tends to attribute copyright to human creators engaged in a large amount of intellectual labor.The EU and its member states focus their legislative exploration on the core requirement of "human creative input," without directly stipulating the rules of attribution. With the goal of promoting the development of the artificial intelligence industry, Japan has launched an amendment to the "Copyright Law", proposing to attribute the copyright of artificial intelligence-generated content without specific human creators to developers. However, the draft has not yet been formally adopted. China’s legislation continues to focus on human creation, and does not specifically stipulate the attribution of content generated by artificial intelligence. In spite of this, the legislature and the executive branch have begun to address relevant issues, accumulating practical experience through academic seminars and policy guidance.

2.3.Maturity phase (2020–present)

Since 2020, the breakthrough of deep learning technology has promoted the rise of generative artificial intelligence, marking that artificial intelligence technology has officially entered the new stage of strong artificial intelligence. For the purposes of this study, Strong Artificial Intelligence (Strong AI) refers to systems that have broad cognitive capabilities, are capable of autonomous learning, complex reasoning, and produce outputs comparable to human intelligence in different fields. They can perform complex creative tasks, achieve commercial and scalable deployments across text generation, visual design, and media production, and do not require excessive human intervention.

Artificial intelligence systems now have powerful self-generating capabilities, based on complex instruction generation to match human creative standards. AIGC has grown exponentially, and commercial applications have been deeply integrated into various fields of social production and daily life, resulting in huge economic and social value. In this context, the dispute over the ownership of artificial intelligence copyright has intensified. Countries have accelerated legislative amendments, and the judiciary has established the principle of adjudication through landmark cases, shifting the imputation mechanism from "ambiguity" towards "clarity".

Generative AI in this phase, underpinned by Transformer architectures and large-scale pre-trained models, possesses core advantages including robust autonomous generation capabilities, rapid learning and iteration speeds, and strong interactivity. It can execute complex creative tasks, with applications spanning text generation, visual design, music production, film and television creation, and other domains, achieving commercial and scalable deployment.It must be clarified that AI at this stage remains in the nascent phase of strong artificial intelligence, lacking independent will or autonomous consciousness. The originality of its generated content still relies on human creative input and the algorithmic design, model training, and data feeding by AI developers, exhibiting characteristics of "collaborative contribution between humans and AI"[9].

At the societal level, the AI industry has established a comprehensive industrial chain with increasingly diverse stakeholders, whose rights and interests exhibit significant differences and conflicts. The legal community and legislative bodies have developed a maturing understanding of AI copyright attribution, forming a consensus centred on "human creative input while balancing the rights of multiple stakeholders," with research focusing on core disputes.Public acceptance of AIGC continues to rise, with users increasingly concerned about their rights as consumers and the fairness of attribution rules, making the refinement of attribution regulations an urgent necessity.

Mature AI copyright attribution frameworks have established a core system centred on human creative input, explicitly excluding AI as a legal subject, balancing the rights of multiple stakeholders, and differentiating attribution based on specific scenarios[10]. While minor variations exist between nations, overall consensus is strengthening. Firstly, it is clarified that AI lacks legal subject status and cannot be the holder of copyright; copyright is solely attributed to the relevant human entity making a substantial contribution. Secondly, centred on "human creative input," three attribution scenarios are distinguished: where humans provide substantial creative input, copyright belongs to the user; where no substantial human creative input exists, copyright belongs to the developer; where multiple parties jointly provide substantial creative input, copyright is either jointly owned by all parties or allocated proportionally based on contribution. Thirdly, a multi-stakeholder rights allocation system is established to balance all parties interests. Fourthly, criteria for determining originality are clarified to unify adjudication standards.

Regarding typical cases and legislative practice, numerous landmark AI copyright attribution cases have emerged globally, prompting accelerated legislative revisions and judicial interpretations. The US AI painting copyright case A Recent Entrance to Paradise (2023) established the rule that "content generated entirely autonomously by AI is not protected by copyright"[11]; China's inaugural AI text-to-image copyright dispute established the principle that "where humans make substantial creative contributions, AIGC qualifies for copyright protection and ownership vests in the user"[12].

In legislative practice: The United States issued the "Guidelines for Copyright Registration of AIGC" in 2023, clarifying copyright protection and attribution rules for AIGC; The European Union introduced the AI Act in 2024, incorporating provisions on copyright attribution for AIGC to establish a comprehensive legislative framework; Japan has explored legislative responses through amendments to its copyright framework; China is progressively refining its legislation and judicial interpretations, forming a coordinated system of "legislative guidance + judicial practice + policy regulation," while advancing the fourth revision of its Copyright Act with proposed dedicated provisions.

In the mature stage, the attribution mechanism has the characteristics of clear rules, balancing multiple rights, and driving industrial progress. However, the defects still exist: first, the conflicting rules dominate the cross-border AIGC; second, the rights protection of data providers is insufficient; third, the adaptability of strong artificial intelligence to future development is insufficient; fourth, adhere to nuances in the evaluation criteria of originality. In general, this stage marks the transformation of attribution mechanism from "ambiguity" towards "clarity", which effectively resolves the current core attribution controversy. Nevertheless, in order to be consistent with technological progress and social needs, continuous improvement is still needed.

3.Specific issues in AI copyright attribution evolution

The evolution of the copyright ownership mechanism of artificial intelligence fundamentally reflects the process of technological progress in line with the legal framework, social needs and industrial development. From the embryonic stage of non-controversial rules, to the development stage of vague disputes, and then to the mature stage of gradual clarity, the attribution mechanism has undergone a process of continuous refinement. However, due to the fast speed of technology iteration, the diverse demands of stakeholders, and the lag of legal refinement, a series of specific problems have arisen. These can be summarized into four core areas.

3.1.Absence of AI legal personality & unclear attribution subjects

The lack of legal subject status of artificial intelligence is the core issue throughout the whole evolution process of artificial intelligence copyright ownership mechanism, and it is also the root cause of other ownership disputes. From the embryonic stage, the "anthropocentrism" principle of

traditional copyright law implicitly regards artificial intelligence as only an auxiliary tool, making it unnecessary to discuss its dominant position. However, with the iteration of artificial intelligence technology and the continuous enhancement of autonomous generation ability, the disadvantages of this rule are gradually revealed, which leads to the increasingly prominent problem of vague definition of the subject of attribution[13,14].

Specifically, this problem is manifested in two aspects: first, the legal subject status of artificial intelligence itself is difficult to determine. Countries have unanimously recognized that artificial intelligence lacks the legal attributes of civil subjects, so that it cannot become a copyright owner. However, as generative artificial intelligence increasingly produces highly original content autonomously, the debate over whether artificial intelligence can constitute a fictional legal person has intensified. If this problem is not solved, when artificial intelligence generates content completely independently without human input, the ownership of rights faces a dilemma that cannot be attributed to people. Secondly, the boundary of rights among multiple subjects is blurred. Relevant parties have expanded from a single human creator to include AI developers, users, data providers and others. Each rule has different degrees of contribution to the originality of AIGC. However, the existing rules fail to clearly define the threshold of contribution or the scope of rights, resulting in frequent disputes over attribution[15]. For example, training data provided by data providers is an important source of AIGC originality. However, the existing provisions fail to clarify whether these providers enjoy copyright or remuneration claims, resulting in insufficient protection of their rights[16].

3.2.Inconsistent standards for originality assessment and ambiguous judgement criteria

Originality constitutes the core requirement of copyright protection and is the premise for AIGC to obtain copyright protection and determine ownership. However, throughout the evolution of the copyright ownership mechanism of artificial intelligence, the criteria for judging originality have always been inconsistent, which has become an important bottleneck hindering the refinement of the ownership framework.

Observing this evolution process, it can be found that there is obvious ambiguity in each stage: in the new stage, the originality assessment reflects the works created by human beings, without taking into account the progress of artificial intelligence technology; in the development stage, originality appears as a dual-source phenomenon, involving the contributions of humans and artificial intelligence. However, the failure of countries to clarify the weight between these elements has led to inconsistent judicial decisions on issues such as "what level of human input constitutes a substantial contribution" due to the lack of uniform standards. In the mature stage, although countries gradually make it clear that originality depends on "independent creation + minimum innovation", subtle differences still exist: the United States emphasizes "premise of human creative input", the European Union does not distinguish between human contribution and artificial intelligence contribution, and China emphasizes "substantial human design of core elements". These different standards have not only caused conflicts in the assessment of cross-border AIGC ingenuity, but also led to controversial rulings between different cases within the same jurisdiction.

Furthermore, the "ambiguity" in the evaluation of originality is manifested as the lack of specific standards. For example, "the degree of human creative input", "the minimum threshold of innovation", "the threshold of similarity between AIGC and existing works" lack clear and operable rules. In practice, this dependence on judicial discretion aggravates the uncertainty of adjudication.

3.3.Imbalance in multi-stakeholder rights allocation and irreconcilable conflicts

With the evolution of artificial intelligence copyright ownership mechanism, stakeholders have changed from single subject to multiple subjects. However, the refinement of rights allocation rules lags behind this diversification, resulting in an increasingly prominent imbalance in the allocation of rights among multiple stakeholders. The conflicting claims of all parties are difficult to reconcile, which seriously damages the innovation vitality of the artificial intelligence industry and the fairness of the copyright protection system.

Specifically, this imbalance is manifested in three key areas: First, the gap between AI users and developers is still a core argument. Although the existing rules distinguish the attribution based on the scene, they do not define a balanced boundary between their respective rights. Some jurisdictions tend to protect one party without protecting the other, thus stifling the innovation incentives of the other party. Secondly, the rights of data providers are ignored. The originality of AIGC relies heavily on a large number of training data sets. Data providers have invested a lot of resources in collecting, organizing and providing these data, but the existing attribution rules have failed to clarify their rights claims, resulting in insufficient recognition of their contributions[17]. Thirdly, there is an imbalance between public interests and private rights. Some attribution rules narrowly define the scope of AIGC's fair use and overprotect private interests, thus limiting the dissemination and sharing of knowledge. On the contrary, some advocates of incorporating AIGC into the public domain ignore the innovation investment of private entities.

Furthermore, the imbalance in the allocation of rights is also manifested in the lack of "common attribution rules". When multi-party collectives make substantial creative contributions, the existing rules cannot clarify the proportion of contributions or the way in which rights are exercised. It leads to the difficulty of effective implementation of common rights, which in turn aggravates conflicts of interest.

3.4.Technological-attribution misalignment & regulatory lag

The evolution of the copyright ownership mechanism of artificial intelligence has always lagged behind technological progress, which is a problem that runs through its development. With the rapid iteration of artificial intelligence technology, this regulatory lag has become increasingly prominent. Therefore, the attribution mechanism is difficult to

adapt to the new challenges brought by technological progress in time, which damages its scientific effectiveness and practical feasibility.

Specifically, this lag is manifested in two dimensions: first, the lack of adaptation to new technology scenarios. The speed of iteration of artificial intelligence technology is far faster than the speed of refinement of legal rules. Each stage of technological development will introduce new attribution disputes. However, refining the attribution rules often requires a long process, which makes the attribution problem in the new scene unsolved. Second, the rules lack flexibility. The existing attribution rules are mainly rigid, which cannot cope with the timely optimization of artificial intelligence iteration. They also did not reserve space to define human contributions in future AI-mediated interaction models. In addition, the design of some attribution rules does not fully consider the core characteristics of artificial intelligence, and continues to apply traditional copyright rules to protect artificially created works. This has caused a disconnect between regulation and technical practice.

4.Pathways to resolve AI copyright attribution evolution issues

In view of the specific problems in the evolution of the above-mentioned artificial intelligence copyright ownership mechanism, and drawing on domestic and foreign legislative practices, judicial precedents and theoretical research, the following core principles should be adhered to: based on the current technological reality, balancing multiple interests, adapting to future development, and strengthening international coordination. Solutions should be put forward in a targeted manner to promote the continuous refinement of the imputation mechanism and cultivate a virtuous circle between technological innovation and rights protection.

4.1.AI legal status clarification & stakeholder interest boundary definition

To solve the problem of "artificial intelligence lacks the status of legal subject and the ambiguity of legal liability", it depends on clarifying the legal status of artificial intelligence and accurately delineating the boundary of rights and interests between different subjects, so as to eliminate the root cause of imputation disputes.

First of all, the legal status of artificial intelligence should be clarified by adhering to the principle of "illegal person", while reserving space for technological progress. National legislation should uniformly stipulate artificial intelligence as a technical tool, which lacks the legal attributes of natural persons, legal persons or unincorporated organizations and cannot become the subject of copyright. The copyright of AIGC can only be attributed to human entities that make substantial creative contributions. At the same time, considering the future development potential of strong artificial intelligence, legislation can reserve the space to adjust "virtual entities" to prevent the fundamental disconnection of rules.

Secondly, clearly define the boundary of rights between different subjects, clarify the scope of contributions of all parties and the way to claim rights. First of all, distinguish the rights boundary between artificial intelligence users and developers, further refine the criteria for defining "human creative input", and clarify the specific examples of "substantive creative contribution". If this input is provided by a human user, the copyright should belong to the user, and the artificial intelligence developer retains the neighboring right and can obtain compensation through the contract. In the absence of substantial human contribution, the copyright belongs to the developer, and the user only retains the right of fair use. Secondly, clarify the rights of data providers and incorporate them into a multi-stakeholder rights allocation framework. If its training data has a substantial contribution to the originality of AIGC, it should be given a claim for compensation and establish a collaborative protection mechanism for data rights and copyrights.

4.2.Unify standards for originality assessment and refine evaluation criteria

The key to solve the problem of "non-uniform originality identification standards and unclear evaluation standards" is to promote the unity of originality evaluation standards, refine specific judgment rules, enhance operability, and standardize judicial judgment standards.

First of all, promote the unification of the evaluation criteria of originality, and clarify that the core criteria for identifying originality in AIGC is "independent creation + minimum innovation + human creative input correlation". Specifically, "human creative engagement connection" requires that the content generated by artificial intelligence can be considered original if it reflects a large amount of human creative engagement; the content that is completely generated by artificial intelligence and does not require manual input lacks originality. At the same time, the specific evaluation rules of the standard should be refined, and the "degree of human creative input", "minimum threshold for innovation", "content similarity judgment method" and other aspects should be clarified to enhance the practicability of the standard[18].

Secondly, we should promote the coordination of international standards for originality identification and reduce cross-border regulatory conflicts. Promote global consultation and cooperation on copyright protection of artificial intelligence, and cultivate the core consensus of major countries and regions in originality assessment. Coordinate the nuances of national standards and establish a coordination mechanism of "core standards are unified and specific rules are adapted to regional differences." At the same time, international organizations are encouraged to publish AIGC originality assessment guidelines to provide a unified reference point for countries

4.3.Establishing a multi-stakeholder rights allocation system to balance interests

The key to solve the imbalance and irreconcilable contradiction of rights allocation among multiple stakeholders

is to build a multi-dimensional rights allocation system of "copyright ownership + neighboring rights protection + fair use + benefit distribution". This system must balance private interests and public welfare in order to achieve a balance between the demands of all parties.

First, optimize the copyright ownership rules to accommodate the rights of multi-stakeholders. Refine the attribution rules in different scenarios, and clarify the applicability of "single subject attribution" and "multiple subjects sharing". Establish a negotiation mechanism for the distribution of rights, allowing stakeholders to agree on a distribution plan in a contractual manner to minimize conflicts.

Secondly, strengthen the protection framework of neighboring rights and safeguard the interests of artificial intelligence developers and data providers. Grant artificial intelligence developers neighboring rights to technical achievements, allowing them to obtain benefits through licensing or transfer; give data providers the right to data adjacency, clarify their legal rights to training data, and standardize the collection, use and sharing of data.

Third, optimize the fair use rules and balance private interests and public welfare. It defines the scope of fair use for AIGC and allows the public to use it freely for personal learning, scientific research, public welfare promotion and so on. At the same time, standardize the boundary of fair use and prevent abuse of rights.

Finally, establish a diversified dispute resolution mechanism to resolve conflicts in a timely manner. Construct a multi-level system combining negotiation, mediation, arbitration and litigation, and encourage relevant parties to resolve disputes through negotiation and mediation. Through the establishment of a special adjudication mechanism for artificial intelligence copyright disputes, the litigation procedure is simplified to ensure the consistency of judicial standards.

4.4.Cross-border attribution rule coordination & enhanced protection

The key to solving the conflict and inadequate protection of AIGC cross-border attribution rules is to promote international coordination. This includes refining cross-border attribution rules and dispute settlement mechanisms to enhance the global protection of artificial intelligence copyrights, thereby promoting the coordinated development of the artificial intelligence industry worldwide.

First of all, promote the coordination of cross-border artificial intelligence copyright ownership rules and reduce conflicts. Countries should actively participate in international cooperation on global artificial intelligence copyright legislation, and clarify the principles for determining the ownership of cross-border artificial intelligence copyright. We believe that the attribution of such content is mainly based on the "source of human creative input". At the same time, international organizations should be encouraged to establish unified rules for cross-border artificial intelligence copyright protection, and form a regulatory framework combining "territorial adaptation and global coordination."

Secondly, improve the dispute resolution mechanism of cross-border artificial intelligence copyright disputes and improve the efficiency of law enforcement. Clarify the jurisdiction of such disputes, establish cross-border judicial assistance mechanisms, and encourage international arbitration institutions to participate in the resolution of cross-border artificial intelligence copyright disputes, so as to provide parties with efficient and accessible dispute resolution channels.

Third, strengthen the cross-border law enforcement cooperation of artificial intelligence copyright and crack down on infringement. Promote cooperation among intellectual property law enforcement agencies worldwide, establish an early warning mechanism for cross-border infringement, strengthen supervision of cross-border platforms, and create a cross-border infringement punishment framework. Increase penalties for malicious infringement and strengthen cross-border copyright protection.

4.5.Dynamic attribution mechanism for tech progress & regulatory lag mitigation

The key to solving the problem of "mismatch between technological progress and attribution mechanism, coupled with the significant aging of rules" is to establish a dynamic adjustment mechanism. This will ensure that the attribution rules can adapt to the development of artificial intelligence technology in time, and ensure the scientific validity and practical feasibility of the attribution rules.

Firstly, a dynamic correction mechanism of attribution rules is established to keep pace with technological progress. The legislature should regularly evaluate the development of artificial intelligence technology and its compatibility with attribution rules, and timely discover the gap between rules and technical practice. These gaps should be filled through legislative amendments and judicial interpretations, and the attribution rules should be refined. At the same time, a flexible rule adjustment channel is established to allow the administrative department to issue targeted administrative guidance to alleviate the problems caused by the aging of the rules.

Secondly, strengthen the connection between legislation and technical practice and enhance the adaptability of rules. Establish a collaborative communication mechanism involving the legislature, the judiciary, artificial intelligence companies, and research institutions. Encourage artificial intelligence enterprises and research institutions to participate in the formulation and revision of attribution rules. Promote interdisciplinary research in the field of law and computer science, and ensure that rule design meets the core characteristics of artificial intelligence and industrial development needs.

Finally, flexibility is retained within the rules to adapt to future technological advances. It adopts the legislative model of "principle + specific rules + miscellaneous provisions", clarifies the core principles of artificial intelligence copyright ownership, refines the rules of existing technology scenarios, and incorporates miscellaneous provisions to ensure that the ownership mechanism can adapt to the future development of artificial intelligence.

5.Conclusion

This study systematically traces the evolution of the copyright ownership mechanism of artificial intelligence, and demonstrates that the development of these legal frameworks is fundamentally driven by the continuous push and pull between technological breakthroughs, legal modifications and industrial needs. The core findings reveal a shift from a static, human-centered attribution model in the primary stage to a highly competitive attribution paradigm in the development stage, and finally to a gradual, scenario-based attribution framework in the mature stage.

The essence of the continuing dispute over imputation lies in the serious dislocation between the rapid iteration of artificial intelligence and the lag of legal regulation. This is mainly manifested in the lack of legal subject status of artificial intelligence, the inconsistency of evaluation criteria for collaborative originality between human and artificial intelligence, and the serious imbalance in the allocation of rights among developers, users and data providers. In order to resolve these conflicts, the basic logic of the future legal framework must shift from the binary ownership debate to the cooperative right distribution model. This includes strictly defining artificial intelligence as a non-legal entity and standardizing global originality standards based on "substantial human creative input". Establish a robust multi-stakeholder rights allocation system that protects private intellectual investment while maintaining the availability of the public domain.

Despite these findings, this study still has some limitations. Comparative analysis mainly focuses on major jurisdictions (such as the United States, the European Union, China, etc.), and may not fully summarize the regulatory nuances of emerging digital economies. In addition, with the rapid approach of generative artificial intelligence to advanced powerful artificial intelligence capabilities, the human-centered originality hypothesis may face unprecedented empirical challenges. Future research should explore standardized compensation models for training data providers to ensure that the copyright system remains resilient in the face of continued technological interference.

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