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Research on the Criminal Regulation of Copyright Infringement Crimes Involving Generative Artificial Intelligence

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Abstract. The era of generative artificial intelligence has brought numerous challenges to the criminal regulation of copyright infringement crimes. To address these core controversies, a "forward-looking yet limited" criminal regulation system should be constructed. At the prepositive law level, it is necessary to limitedly recognize the work attribute of the generated content, the fact of artificial intelligence creation, and clearly deny the legal subject qualification of artificial intelligence, laying the foundation for criminal liability imputation. A "staged and typed imputation model" should be established: in the research and development stage, the principle of technological neutrality should be applied in principle, and only acts of intentionally manufacturing infringing tools should be held accountable as exceptions; in the use stage, the focus should be on regulating users with subjective malicious intent who meet the crime quantity standards. It is emphasized that for criminalization, the act must not only comply with the constitutive elements of criminal law but also cause substantial infringement of legal interests, and strictly adhere to the standards of amount and circumstances, thereby achieving a prudent balance between protecting legal interests and encouraging innovation.

Keywords: Generative Artificial Intelligence, Copyright Infringement Crimes, Criminal Regulation, Typed Imputation

1. Introduction

As generative artificial intelligence enters a new phase of "cognitive intelligence", its ability to independently learn from data and generate new content relying on large models is essentially different from traditional auxiliary tool-type algorithms. This technology faces doubts about the legality of training data at the input end, and controversies over the copyrightability and right ownership of generated content at the output end. Due to its technical characteristics such as fast generation speed, large quantity of works, and wide dissemination scope, the risk of copyright infringement and the scale of damage have expanded sharply, which may break through the boundaries of civil and administrative regulation and meet the social harmfulness standard of criminal crimes. Therefore, researching the criminal regulation of copyright infringement crimes

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involving generative artificial intelligence has become a practical issue that criminal law must respond to.

At present, academic circles have conducted discussions on the legal regulation of generative artificial intelligence, but most existing literatures focus on the prepositive law level such as copyright law and civil law, concentrating on issues such as the granting of legal personality to artificial intelligence, the identification of the work attribute of artificial intelligence-generated content, and the boundary of fair use in the training data stage. When the discussion touches on criminal liability, existing studies are general and unsystematic, almost limited to "how to formally interpret Article 217 when actors infringe the copyright of artificial intelligence-generated content", but fail to answer core questions such as under what circumstances the boundary of infringement will be crossed in the entire process of generative artificial intelligence generating works, and which subject should bear criminal liability. The innovation of this paper lies in filling the above research gaps, directly facing the constitutive elements and liability attribution of copyright infringement crimes involving generative artificial intelligence, systematically analyzing the necessity and limit of criminal law's intervention in such new risks, and striving to construct a hierarchical and highly operable criminal regulation framework, so as to provide support for future judicial practice and legislative improvement.

This paper will adopt a progressive research path of "putting forward problems, analyzing causes, and solving problems" to conduct in-depth discussions on the criminal regulation of copyright infringement crimes involving generative artificial intelligence. The second part of this paper will focus on proposing three core controversial issues, then analyze their causes in the third part, and finally construct specific criminal regulation paths and propose solutions for these three core issues in the fourth part.

2. Core controversies: three focuses of copyright infringement crimes involving generative artificial intelligence

2.1. Controversies over the work attribute of generated content and legal subject qualification

Whether generative artificial intelligence can be involved in copyright infringement crimes logically starts with clarifying two prepositive questions: first, how to determine the nature of its generated content in copyright law; second, whether generative artificial intelligence itself can become a responsible subject in the legal sense. In this regard, there are profound differences in academic circles.

2.1.1. Theoretical differences on the work attribute of artificial intelligence-generated content

The traditional "personalism" holds that works must be the intellectual achievements of humans, and knowledge achievements not created by humans are not works in the sense of copyright law. That is, works must originate from the author's independent and personalized creation. However, artificial intelligence-generated content is essentially the product of algorithms, data, and probability models. Even if the so-called "intellectual labor" is invested, it does not reflect originality, because it excludes the possibility of the "author" exerting their intelligence and talents, and the corresponding results cannot present personalized characteristics. On the contrary, another view holds that the traditional copyright law's identification of both "originality" and "intellectual achievements" [1] is still closely related to whether the subject is a human, ignoring the historical limitations of the provisions of copyright law and the objectivity of "works" involved in the incentive mechanism of

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copyright law. Therefore, the judgment on the originality of artificial intelligence-generated content [2] does not need to explore the ideas and concepts before generation, nor does it need to examine the specific creation process. It only needs to judge whether the generated content itself has undergone significant changes compared with the original works, and from the perspective of readers, judge whether the artificial intelligence-generated content is a work. This theory is called "reader-centeredism" or "objective theory of originality" [3].

There is also a more pragmatic stance, which insists that the source of originality must be regarded as human behavior, and the copyrightability of artificial intelligence-generated content can only be attributed to the role of humans. However, considering the fact that artificial intelligence-generated content is objectively indistinguishable from human works, based on the human-machine loop in the machine learning process, it is proposed that artificial intelligence-generated content can be regarded as a creation act representing the will of designers or trainers in copyright law. This view is similar to the "creation tool theory". The content generated by artificial intelligence should be considered as originating from the developers or users of artificial intelligence, and artificial intelligence is only a tool for generation [4]. In addition, there are other theories such as the "fictional subject theory", "incentive investment theory", and "unification of rights and obligations theory". These theories discuss the work attribute of artificial intelligence-generated content from different perspectives, trying to find a reasonable explanation path within the legal framework.

2.1.2. Denial of legal subject qualification: provisions and juridical basis of the current framework

Although there are heated academic discussions on whether the generated content constitutes a work, it should be clarified that under China's current positive law framework, the artificially intelligence developed so far cannot become a subject of copyright or criminal liability, which is recognized by most scholars.

Legal subjects, especially criminal liability subjects, are essentially characterized by having free will and capacity for will. Criminal liability in criminal law is based on the premise that the actor has the ability to recognize and control, that is, the actor can understand the social significance and legal nature of their actions, and freely decide to implement or not implement the actions based on this understanding. However, the existing generative artificial intelligence is still in the stage of "only knowing the word order but not understanding the semantics", without spontaneous thinking ability. For it, whether it is a single word or the overall expression, it is nothing but the difference between "0" and "1" [5]. It cannot understand the connotation and extension of legal concepts such as "reproduction", "distribution", and "infringement", let alone be restricted by the deterrent effect of criminal punishment. After all, its "actions" are only the execution process of codes and programs. Therefore, holding an entity without free will liable for criminal liability is equivalent to practicing "objective imputation", which violates the principle of "unification of subjectivity and objectivity" in modern criminal law. In addition, the purpose of criminal punishment lies in retribution and prevention. Imposing criminal punishment on artificial intelligence can neither achieve moral retribution nor achieve the general prevention and special prevention effects of criminal punishment. If we consider the entire legal system, forcing the attribution of legal subject qualification to artificial intelligence will also trigger a series of absurd questions, such as how the artificial intelligence endowed with subject qualification can sue and defend? Is it necessary to design a set of liability bearing methods specifically for it, such as destruction and data deletion? At this time, it will cause greater legal chaos. Therefore, in the foreseeable stage of technological development,

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denying the legal subject qualification of artificial intelligence is a correct and feasible path in line with jurisprudence and reality.

2.2. Ambiguity of right ownership and differences in identification of responsible subjects

2.2.1. Unclear object of criminal accountability due to disputes over right ownership

On the premise that artificial intelligence itself cannot become a legal subject, the focus of right ownership and liability imputation falls on humans. However, the creation process of generative artificial intelligence can be divided into two links: "research and development" and "use". Developers and users have connections with the works generated by artificial intelligence at different levels, which leads to great theoretical controversies over the ownership of the generated content. If the ownership of rights cannot be determined, according to the principle of "unification of rights and responsibilities", when the process of artificial intelligence generation or the generated content involves copyright infringement crimes, it will face the dilemma of unclear object of criminal accountability.

Developers make a fundamental contribution to the generated content. By designing model architectures, writing core algorithms, and selecting training data, they fundamentally shape the potential creative ability and style tendency of artificial intelligence. From this perspective, any manifestation of "originality" in the generated content seems to be traceable to the framework preset by developers. However, this contribution is indirect and pre-existing, and developers cannot predict and regulate the specific content that the model will output when responding to ever-changing user instructions. On the contrary, users' contribution to the generated content is triggering. By conceiving prompts, setting parameters, guiding multi-round dialogues, and screening, revising, and optimizing the generated results, they ultimately determine the specific expression form of the work. Users are the key role in transforming the potential creative ability of artificial intelligence into practical expression. Therefore, both parties make important contributions to the generated content, and the differences in the identification of the nature of this contribution are an important reason for the disputes over right ownership.

2.2.2. Theoretical differences on responsible subjects: users, developers, and public domain

At present, most scholars who recognize the generated content as works and endow artificial intelligence with the status of "author" generally agree with the theory of "separation of creation subject and right subject". They believe that the copyright property rights of the generated content can be transferred to humans, while the copyright personal rights cannot be transferred, and artificial intelligence does not have the qualification for rights, so it is not within the scope of discussion. However, scholars have different views on who should enjoy the transferred copyright property rights.

The current mainstream "user theory" holds that the copyright property rights of the generated content should be transferred to users. Users are the "initiators and guides" of artificial intelligence-generated content, who promote the content to the public, affect the creation order, and are the "formal authors". They optimize the content expression through instructions, determine the final presentation through later debugging and screening, and make the greatest contribution to the generated content [6]. The "developer theory" emphasizes the fundamental role of developers in creation. The algorithms written by developers are the basis of artificial intelligence creation, and the original expression of the generated content is inseparable from the prepositive algorithms [7].

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Another theory holds that developers and users have an indirect impact on the generated content without "final creative control", so it is inappropriate to identify both as right holders. A special institution should be established to build a database and become the subject of copyright property rights to approve others' use [8]. There is also a view that artificial intelligence-generated content should not be granted rights in copyright law, but should enter the "public domain of knowledge" [9] for free use by the public to promote industrial development [10].

The separation of the above theories reveals the uncertainty of the ownership of artificial intelligence-generated content. To construct a clear criminal regulation path, it is necessary to first sort out the ownership relationship at the prepositive law level, or develop an imputation logic independent of the confirmation dispute based on the illegality of the act and subjective fault in criminal justice.

2.3. Disputes over the necessity and scale of criminal law's intervention

When responding to the criminal risks involved in generative artificial intelligence, how should criminal law position its functions and roles? Should it adhere to its modest nature and not easily intervene in the new social relations brought about by technological development, or should it take an active attitude to respond to the serious consequences that may be caused by the abuse of technology? Regarding this core issue, academic circles have formed two positions.

First, scholars who hold the view of the modesty of criminal law believe that in the field of emerging technologies, there are already other legal adjustment methods such as civil and administrative laws, and criminal law should maintain maximum restraint. Premature intervention will hinder technological development. If developers have to bear potential criminal risks when acquiring and using data for training, artificial intelligence may not be able to obtain sufficient diverse and high-quality information, and scientific research companies have to shift funds and human resources from technological research and development to legal compliance. When the technical risks of artificial intelligence have not been fully manifested and the premises are unclear, blindly adding charges or expanding interpretation may do more harm than good, which not only lacks legitimacy but also impacts the existing legal system. To promote social progress, we should tolerate the reasonable risks brought by technological development and should not easily initiate criminal law. On the contrary, scholars who hold the positive criminal law view advocate that criminal law should not be passive and lagging behind, but should actively adapt to the development and changes of technological society [11]. They believe that when a new type of act, such as large-scale infringement using generative artificial intelligence, can reach the social harmfulness equivalent to that of traditional related crimes, criminal law should intervene in a timely manner. As Professor Zhang Mingkai said, "The narrower the scope of criminal punishment, the better" is not the content of the principle of modesty in criminal law, but it should be as reasonable as possible [12]. Criminal punishment should match the importance of the legal interests protected and the degree of threat they suffer.

Based on the above disputes, a more reasonable position can be drawn: it must be admitted that criminal law needs to play a role of early intervention and prevention when facing the potential major legal interest infringement risks brought by generative artificial intelligence. However, this intervention is not unlimited expansion, but should be strictly limited to legal circumstances, so as to ensure that the application of criminal law can effectively prevent risks without inhibiting technological development and innovation freedom. Therefore, the key lies in establishing a forward-looking but limited intervention rule, so that criminal law can not only play a warning and regulatory role in the field of copyright infringement crimes involving generative artificial

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intelligence but also avoid improperly hindering scientific and technological progress and the improvement of social benefits.

3. Causes of controversies over copyright infringement crimes involving generative artificial intelligence

3.1. Disconnection between legal provisions and emerging technologies

The deep-seated reasons for the relevant controversies over whether the generated content of generative artificial intelligence can be classified as "works" in copyright law and whether generative artificial intelligence itself has legal subject qualification lie in the disconnection between the current legal normative system and disruptive emerging technologies. This disconnection is specifically manifested in:

3.1.1. Insufficiency of human rationality presupposition and legal forward-looking

China's current Copyright Law and Criminal Law systems are designed with "human rationality" as the presupposition premise. When formulating the Copyright Law, legislators failed to predict the rapid development of artificial intelligence technology (for example, generative artificial intelligence did not enter public view until 2022). Therefore, even when judging whether the generated content constitutes a work, the discussion on the subject is reasonably excluded, but it is ignored that both the originality standard and the definition of intellectual achievements are centered on "humans" with free will and ethical judgment ability. When trying to "cut" the facts generated by artificial intelligence with the legal framework of "human authors", controversies inevitably arise. Adhering to the position of "human authors" and failing to fully consider the drastic changes in social reality have led to a dilemma for the law between protection and non-protection when facing a large number of generated content.

3.1.2. Challenges to legal norms from the similarity of generation processes

The operation process of generative artificial intelligence has a confusing similarity with human creative behavior in appearance, which directly challenges traditional legal norms. However, what is more complex is that humans still cannot explore the specific decision-making process of artificial intelligence models during internal generation, which is called the "black box" of technology; while the human brain's creative processes such as the emergence of inspiration and intuitive thinking are also a "biological black box" at the neuroscientific level. Some scholars have proposed that since humans cannot explain how the "intelligence" derived from the "creative thinking process of the human brain" specifically acts on the process of creating works, there is no reason to identify "intelligence" as unique to humans and an essential element of works. However, it should be emphasized that human "black box" creation is driven by consciousness and intention [13]. Even if the process is opaque, the subject of the act is clearly accountable; while the "black box" of artificial intelligence is the result of mathematical calculations and statistical probabilities, which does not have creative intention and free will at all. When facing this technical reality of "similar in form but different in essence", the inherent conceptual system and judgment standards of the law have encountered severe challenges, thus triggering fundamental controversies over subject qualification and work identification.

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3.2. Conflict between traditional single imputation doctrine and multiple imputation subjects

The dilemma of unclear responsible subjects for copyright infringement involving generative artificial intelligence stems from its complex and multi-link generation process, which has a fierce conflict with the relatively clear single-line imputation logic in traditional law.

3.2.1. Single and clear traditional tort liability subjects

In the traditional model of copyright infringement and even crimes, the chain of conduct is relatively simple and direct, and the infringer is the person responsible for liability. In this model, the subject of the act is clear, the causal relationship between the infringing act and the harmful result is clear, and the law can relatively easily identify and impute liability to one or several specific responsible persons with unified acts and purposes. This single-line logic of "who infringes, who is responsible" is the foundation for the effective operation of the traditional copyright system.

3.2.2. Difficulty in imputation due to participation of multiple subjects

The operation of generative artificial intelligence has completely broken this imputation model, dispersing potential infringing acts into a long creation chain involving multiple subjects. The generation process of generative artificial intelligence requires the joint action of multiple subjects such as developers, users, and data source providers. When developers, owners, and users are the same subject, there will naturally be no problem of unclear imputation. However, often the roles of developers, owners, and users are separated, which will trigger the problem of "liability distribution among multiple subjects of infringing acts" [14]. Specifically, when an act of infringing copyright is involved in a certain link of the generation process of weak artificial intelligence, which one or several parties should bear the corresponding liability? In this case, the traditional single-line imputation model can no longer be applied.

3.2.3. Algorithm black box obstructs the identification of intent and causality

The "black box" characteristic of the internal decision-making process of generative artificial intelligence further exacerbates the difficulty of imputation. When infringement occurs, judicial practice can hardly penetrate the technical barrier to prove whether it is the developer's data selection or the user's specific instructions that directly lead to the infringement result. This break in the causal relationship makes it extremely difficult to distribute objective liability between developers and users. In the identification of subjective intent, the technical black box leads to cognitive estrangement. For example, developers usually claim that they cannot predict the specific content that users will generate using artificial intelligence. At this time, it may only be possible to infer the developer's subjective cognition through the analysis of the composition of training data based on the possibility of foresight [15]. The inexplicability of algorithms provides space for actors to claim that they "lack subjective intent", which greatly increases the difficulty of criminal investigation and trial, and invisibly raises the threshold for criminal law's intervention.

3.3. Cognitive deviations in the functional orientation of criminal law

The disputes over the necessity and scale of criminal law's intervention caused by copyright infringement crimes involving generative artificial intelligence are deeply rooted in the cognitive deviations of academic circles on the function of criminal law itself. Some views adhere to the

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traditional role of criminal law, while others advocate that criminal law should adjust itself in a risk society.

3.3.1. Cognitive deviation of adhering to the "post-fact punishment" function of criminal law

This is a manifestation of overemphasizing the formal correspondence of the principle of legality in criminal law provisions while ignoring the substantive harmfulness of the act. When judging whether an act should be subject to criminal punishment, adhering to the post-fact punishment of criminal law is too rigidly bound by the literal expression of Article 217 of the current Criminal Law, while ignoring that in the digital age, large-scale and automated infringement acts carried out using generative artificial intelligence may cause substantive harm to the social copyright management order and the property rights of right holders equivalent to or even more serious than traditional copyright crimes. This way of thinking is essentially a misunderstanding of the principle of modesty in criminal law, equating "modesty" with "passivity" and "absence".

3.3.2. Reasonable position of advocating the "forward-looking and limited intervention" function of criminal law

Advocating that criminal law should "intervene forward-looking but limitedly" in generative artificial intelligence reflects a more modern and comprehensive understanding of the function of criminal law, that is, criminal law should play an active preventive function in a risk society. Both the generation process and the generation results of generative artificial intelligence contain potential criminal risks. More importantly, due to its technical characteristics of a large number of works, fast dissemination speed, and difficulty in identification, once an infringement act occurs, it can easily reach a scale beyond the reach of traditional infringement in a short time, which may be seriously harmful to society. Facing this new type of risk, criminal law cannot and should not wait for the occurrence of harmful results, but should intervene moderately in advance to protect major legal interests. However, this forward-looking intervention is limited, and it is necessary to accurately and prudently regulate on the premise of abiding by the principle of legality and the modesty of criminal law. On the one hand, the act of criminalization needs to be reasonably explained so that it can be covered by the constitutive elements of Article 217 of the current Criminal Law; on the other hand, it must substantially meet the crime quantity standards, abide by the "principle of necessity" [16], distinguish between civil infringement and criminal crimes according to the provisions of "amount" and "circumstances", and prevent the abuse of criminal punishment.

4. Regulation path: constructing a forward-looking yet limited criminal imputation system

4.1. Limited recognition of the status of creation subject to lay the foundation for imputation

The criminal regulation of copyright infringement crimes involving generative artificial intelligence first needs to solve the problems of the legal attribute of its generated content and the legal status of artificial intelligence itself. The premise of constructing a forward-looking but limited criminal imputation system lies in providing a clear foundation for the identification of criminal liability at the prepositive law level. Therefore, this paper advocates the limited recognition of the status of generative artificial intelligence as a creation subject: that is, when specific conditions are met, its generated content is recognized as protected by copyright law, but its legal personality is clearly

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denied, only the fact of creation is acknowledged, and the liability ultimately falls on human subjects.

4.1.1. Clarifying the work attribute of generated content in prepositive law

In the criminal field, the identification of the crime of copyright infringement is based on the premise that the act infringes the valid copyright of others. Therefore, it is recommended to revise the Copyright Law or issue judicial interpretations to clarify that the generated content is a work when it meets "originality" and contains human intellectual contributions, laying the foundation for criminal imputation at the prepositive law level.

(1) The "Originality" Standard of Generated Content in the Era of Artificial Intelligence

The author believes that artificial intelligence works are large in quantity, fast in dissemination, and difficult to distinguish from human works in appearance. Protecting their copyright is a legal task that must be completed. The construction and development of the copyright system should shift from the doctrinal analysis method to the functionalist analysis method [17], focusing on objectivity. The key link of judging the originality standard of works should be positioned on readers, that is, if the artificial intelligence work has no significant similarity with other works and is recognized by the "general public", it can be regarded as a copyright work. In addition, the algorithm independently learns rules based on massive data, the generation process is not restricted by a single template, and the result is different from the single source of training data. The fact that artificial intelligence independently acquires and integrates information to generate content beyond the established program algorithm reflects "originality", which provides technical and theoretical support for the identification of generated content as works.

(2) Human Intellectual Contributions in Work Identification

The Opinions of the Guangdong Provincial Higher People's Court on Promoting the Innovation and Industrial Development of Artificial Intelligence Science and Technology with High-Quality Intellectual Property Trial Work stipulates that "great consideration should be given to the creative contributions of humans to the output content of generative artificial intelligence" [18]. A comment in People's Post and Telecommunication News points out that the Guangdong Court takes "human contributions" as the core of right confirmation, and its in-depth value lies in recognizing that "without the spark of human thought, AI is just an advanced repeater" [19]. This indicates that the core of the legal protection of artificial intelligence-generated content is human wisdom. This paper holds that we should not ignore the "personalism" element of the expression of work ideas, but should acknowledge the factual contribution of artificial intelligence in creation and not deny the status of humans in creation. The generated work can be regarded as a collaborative work of the "machine author" as the factual contributor and the "human author" as the legal author [20]. Because in the stages of data screening and input during machine learning, aesthetic revision during human-machine interaction, and definition of generation goals during use, artificial intelligence works all contain "human intellectual contributions", and the generated content implies human will and personality, which is an extension of human intelligence.

4.1.2. Denying legal personality but recognizing the fact of creation

As discussed earlier in this paper, the existing artificial intelligence does not have free will and capacity for will. Even with the development of technology, artificial intelligence may generate self-awareness of behavior and be able to spontaneously identify and describe its own behavior, but there is still a considerable distance from the ability to recognize and control driven by independent will

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required by qualified criminal liability subjects. Denying the legal personality of artificial intelligence and investigating the responsible subjects behind it when infringement occurs is a more realistic and effective path of criminal regulation. However, on the basis of denying its legal personality, we can endow artificial intelligence with the identity of "creation subject" and acknowledge its actual contribution in creation. In the process of generating content, artificial intelligence has actually participated in "creation", directly determining certain expressive elements of the work and making a factual contribution to the work. Regarding artificial intelligence as a "creation subject" not only respects the reality of technological development but also reserves space for the further development of technology and law in the future.

4.2. Constructing a staged and typed imputation model to clarify liability division

Facing the dilemma of multiple responsible subjects of generative artificial intelligence, it is obviously useless to discuss imputation in general. This paper advocates abandoning the one-size-fits-all imputation idea and adopting a "staged and typed imputation model" instead, which decomposes the continuous process of artificial intelligence from research and development to use, and sets different criminal review focuses and imputation standards at different stages, so as to achieve accurate and prudent intervention of criminal law.

4.2.1. Liability in the research and development stage: principle of technological neutrality and exceptional accountability

In the research and development stage, the position of criminal law should generally be modest and restrained. The object of regulation mainly points to developers, and the core lies in distinguishing between legitimate technological research and development and illegal manufacturing of infringing tools.

(1) No Accountability in Principle: Principle of Technological Neutrality and Transformative Use Theory

The principle of technological neutrality originated in the field of patent law, specifically the "ordinary commodity doctrine" in American patent law. In 1984, the U.S. Supreme Court borrowed this principle in the "Sony case" and held that Sony's video recorder did not constitute contributory infringement because it had "substantial non-infringing uses" [21]. This case established the protection boundary for technological innovation, that is, as long as the technology has substantial non-infringing uses, the developer can be exempted from liability, which is the "principle of technological neutrality". This principle constitutes the juridical basis of the "safe harbor principle" [22] in the internet environment. China's Regulations on the Protection of the Right to Network Dissemination of Information formulated in 2006 absorbed the "safe harbor principle". Network service providers do not need to review each piece of information uploaded by netizens one by one, but only need to quickly delete articles, videos, or disconnect links when someone finds infringing materials. Therefore, similarly, this paper holds that the principle of technological neutrality can also be applied in the field of artificial intelligence. Generative artificial intelligence is a basic technology with a wide range of substantial non-infringing uses such as auxiliary creation, education and scientific research, and information summarization. Therefore, even if users use it to commit infringement acts, developers are generally not liable for contributory infringement unless there is evidence that they have the intent to induce infringement. This principle is conducive to encouraging technological innovation and development.

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In addition, when developers train generative artificial intelligence, they can learn from the American "transformative use theory" as a way of fair use. Different from the mechanical dogmatism in the application of the traditional "four-factor" standard, this theory highlights the "purpose of use" as the primary factor [23]. The purpose of developers inputting training data is to allow artificial intelligence to "learn" grammar, style, and factual rules, and generate new rules and expressions, which is highly transformative. In this context, "commercial use" is no longer a decisive factor in judging fair use, and the core should shift to examining the degree of "transformation" of the new work from the original work. That is, as long as the act of data mining and training does not "substantially replace the market of the original work", the purpose of use is legitimate. Research and development activities based on this theory do not constitute copyright infringement, let alone exclude criminal risks.

(2) Exceptional Accountability: Intentionally Manufacturing Infringing Tools

The deterrent power of criminal law should be reserved for malicious acts under the guise of technology. If the developer intentionally designs artificial intelligence as an "infringing tool", it may constitute inducement of infringement and need to bear criminal liability. For example, a developer specially develops an artificial intelligence model designed to "accurately imitate the style and plot of a certain best-selling author". At this time, in terms of the act of inputting data during training, the purpose of use is no longer "transformative" learning, but to illegally use the original expression of others. Therefore, the act of inputting specific work data during training itself constitutes infringing use, and this infringing use is bound to affect the normal use and market value of the original work. In this case, the developer's subjective intent to induce infringement is obvious, and their act has crossed the protection boundary provided by the principle of technological neutrality. Correspondingly, the developer should bear legal liability for the large-scale infringement acts that may be caused by users using this tool.

4.2.2. Liability in the use stage: identification of knowing infringement and profit-making purpose

In the use stage, the focus of criminal law should shift to users. The user must know that their instructions will generate infringing content, or know that the generated content is infringing but still use it, implement acts of mass reproduction and dissemination of infringing generated content, and their purpose is to make profits or conduct other illegal dissemination, ultimately meeting the criminal quantity standard of "a relatively large amount of illegal gains" or "other serious circumstances". At this time, the user's act meets the constitutive elements of the crime of copyright infringement in Article 217, and the user should be held criminally liable as a direct principal offender, and generative artificial intelligence is only a tool to assist their crime. In addition, based on the principle of "unification of rights and responsibilities", this paper advocates transferring the copyright property rights of artificial intelligence-generated content to users. This arrangement considers that the intellectual investment and liability risks borne by developers have been rewarded through business models such as technical licensing fees and subscription service fees of artificial intelligence models. Allocating the initial rights of the generated content to the end users who directly control and use it externally best reflects the legal spirit of "who acts, who is responsible", and provides a clear and reasonable prepositive juridical basis for investigating their liability in criminal law.

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4.3. Adhering to the constitution of crime combining formal conformity and substantive infringement

4.3.1. Formal conformity: must conform to the provisions of Article 217 of the Criminal Law on subjective, objective, and criminal object elements

When judging whether an act involving generative artificial intelligence constitutes the crime of copyright infringement, a formal review must first be conducted to see if it fully complies with the constitutive elements stipulated in Article 217 of the Criminal Law.

The crime of copyright infringement is an intentional crime with the purpose of profit-making, and "for the purpose of profit-making" is the core element for identifying subjective intent. Both in the research and development stage and the use stage, it is necessary to examine whether the actor has this purpose. Emphasizing this element can effectively distinguish criminal acts with serious social harmfulness carried out on a commercial scale from ordinary fair use acts such as personal study and research, reflecting the modesty of criminal law. It should be particularly noted that for the identification of the developer's subjective intent in the research and development stage, it is necessary to have the subjective intent of infringement for the purpose of profit-making, while transformative use also for the purpose of profit-making is still considered as fair use.

The "learning" and "generation" behaviors of generative artificial intelligence need to be reasonably interpreted into the harmful act norms of Article 217. In the data training stage, if the content protected by copyright law is obtained by actively destroying technical protection measures through means such as web crawlers without the permission of the copyright owner, this act may be regarded as illegal reproduction [24]; in the content generation stage, if the user provides the public with infringing content generated by artificial intelligence that constitutes substantial similarity with others' works, enabling it to be obtained by the public at a time and place chosen by them, it conforms to the behavioral characteristics of distribution; in judicial practice, the acts of reproduction and distribution are usually handled as absorbed offenses and convicted and punished as the crime of copyright infringement in Article 217, which is also applicable to the scenario of artificial intelligence infringement.

Artificial intelligence-generated content is the object of the crime of copyright infringement, which is homogeneous with the existing criminal objects. It can be concluded that it is possible to include it in protection through the legal provision of "other works specified by laws and administrative regulations". The various types of works listed in Article 217 of the Criminal Law are protected mainly because they have "original expression", not the way of their generation. When artificial intelligence-generated content has objectively participated in market circulation and can generate economic value, the act of reproducing and distributing it without permission, like the infringement of traditional works, will cause harm to the potential market interests of the right holder and the national copyright management order. When it comes to specific protection approaches, this paper holds that artificial intelligence-generated content that meets the requirement of "originality" should be regarded as the types of works such as written, artistic, and audio-visual works listed in Article 217 through expansive interpretation. There is no rush to create new types of works. This is a choice that combines judicial efficiency and legal stability, which can not only respond to the judicial needs brought by technological development in a timely manner but also accumulate practical experience for future legislation.

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4.3.2. Substantive infringement of legal interests: the act must cause serious harm to dual legal interests

After the formal review, the core link of criminal law's intervention lies in the substantive judgment, that is, examining whether the act has caused serious harm to the legal interests protected by the crime of copyright infringement. The legal interests protected by the crime of copyright infringement have a dual structure: one is personal legal interests, that is, "the copyright of others and the rights related to copyright"; the other is super-personal legal interests, that is, "the national copyright management order". Only when the infringement act of generative artificial intelligence causes actual and serious harm to both dual legal interests can it have the substantive legitimacy of invoking criminal law.

Copyright personal rights aim to protect the author's personality and are inseparable from the author. Since artificial intelligence is endowed with the status of "author", protecting the copyright personal rights of artificial intelligence has no legal significance. Therefore, the personal legal interests protected by copyright infringement crimes involving artificial intelligence focus on copyright property rights, and the key lies in judging whether the infringement act has caused substantial market substitution and infringement to the property interests of the copyright owner.

In addition, the crime of copyright infringement is regarded as an economic crime, and the super-personal legal interest it infringes is the national copyright management order, that is, a fair and healthy cultural market competition environment. Criminal regulation should focus on industrialized, large-scale, and malicious infringement acts. When actors use artificial intelligence to carry out piracy and counterfeiting, the speed, scope, and low cost of infringement are far beyond traditional infringement. Such acts have openly damaged and challenged the fair competition order of the market. Therefore, it is necessary to impose criminal law sanctions on such large-scale and industrialized artificial intelligence infringement acts to effectively maintain the national copyright management order as a super-personal legal interest.

4.3.3. Standard of amount and circumstances: must reach the standard of a relatively large amount of illegal gains or serious circumstances

After the formal and substantive review, the amount and circumstances are the last threshold determining the existence and severity of criminal liability. Only when the infringement act reaches "a relatively large amount of illegal gains" or "other serious circumstances" can the criminal procedure be initiated, which is an inevitable requirement of the principle of legality in criminal law.

According to the relevant judicial interpretations of the Supreme People's Court and the Supreme People's Procuratorate, the threshold for convicting the crime of copyright infringement mainly includes: "a relatively large amount of illegal gains of more than 30,000 yuan", "an illegal business volume of more than 50,000 yuan", or although it does not meet the above amount standards, "other serious circumstances" due to illegal publication, reproduction, or distribution of works infringing copyright. In the context of generative artificial intelligence infringement, due to the large number of works and fast dissemination speed, the infringement act can easily accumulate and exceed these amount standards in a short time. In addition, the identification of "other serious circumstances" should also adhere to a prudent and advancing-with-the-times attitude. For large-scale and industrialized infringement carried out using artificial intelligence, the judgment of "serious circumstances" should pay more attention to the breadth and depth of the act's damage to the copyright market order.

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5. Conclusion

Following the path of "problems, causes, and solutions", this paper systematically analyzes the criminal regulation of copyright infringement crimes involving generative artificial intelligence. First, this paper advocates that criminal law should shift from traditional post-fact punishment to a forward-looking but limited intervention stance to seek a balance between protecting legal interests and encouraging innovation. Second, on the basis of affirming that artificial intelligence-generated content has the attribute of works in the sense of copyright law, it proposes to attribute the copyright property rights to users and constructs a "staged and typed imputation model", that is, in the research and development stage, developers are generally not held liable, and only acts of intentionally manufacturing infringing tools or inducing infringement are punished as exceptions; in the use stage, the focus is on regulating users with subjective malicious intent who meet the crime quantity standards. Finally, at the judicial application level, it emphasizes the combination of formal conformity and substantive infringement of legal interests, requiring that the act not only complies with the constitutive elements of Article 217 of the Criminal Law but also causes serious harm to the property interests of the copyright owner and the national copyright management order, and strictly adheres to the criminalization standards of amount and circumstances to ensure the legality and rationality of the initiation of criminal punishment. The imputation model proposed in this study provides a clear and operable reference standard for judicial practice and theoretical support for future legislation, breaking through the limitations of previous discussions mainly focusing on prepositive law, and effectively responding to the core controversies and practical dilemmas faced by generative artificial intelligence in the criminal regulation of copyright from the perspective of the substantive requirements of criminal imputation.

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