

Research on the Legal Framework for AI Tort Liability

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Abstract

In recent years, the rapid advancement of technology has continuously expanded the artificial intelligence industry. China has kept pace with global trends by significantly increasing investment in AI research. However, when this technology is applied in human society, it triggers intense collisions with existing legal frameworks, regulations, ethical standards, moral principles, and social norms. The analysis of legal issues arising from AI and its applications reveals complex underlying causes. Establishing specialized market access rules for AI and clarifying its non-subject status are crucial steps. A liability principle centered on producer responsibility, with user liability as the exception, supplemented by equitable liability and strict liability principles, would help alleviate regulatory challenges in AI deployment. Insurance schemes and compensation funds can serve as an underlying safety net when AI-related tort incidents occur.

Keywords

Artificial intelligence; liability for infringement; legal regulation; principle of attribution.

1. Research Purpose and Significance

1.1. Research Objectives

Entering the 21st century, rapid technological advancement has fueled explosive growth in the artificial intelligence industry, impacting virtually every facet of our social lives. As AI technologies become increasingly widespread and integrated, they not only offer numerous conveniences in daily life but also raise a series of issues closely tied to legal and ethical considerations. These include privacy protection, data security, and liability for infringement, posing challenges to social stability and the safeguarding of individual rights. Intense debates have emerged both domestically and internationally regarding the necessity of legislation for artificial intelligence. However, China's legal system currently lacks specialized laws or regulations specifically addressing issues arising from AI applications, creating a legal vacuum that urgently requires filling. This paper aims to stimulate further scholarly exploration in this field by examining the attribution of liability for AI-related infringements within the civil law domain. It seeks to advance the refinement of China's relevant legal framework and, based on this foundation, promote the healthy development of the AI industry to seize the initiative in the international community.

This paper first defines artificial intelligence, then examines its characteristics to explore the challenges and issues it poses to current legal frameworks during practical implementation. Finally, drawing on relevant systems, it explores a path for regulating AI-related torts that suits China's context.

1.2. Research Significance

From a theoretical perspective, amid rapid technological advancement, scholars in the field of AI law and professionals across various industries intersecting with AI are engaging in vigorous discussions about issues arising from AI applications. Approaching the subject from multiple angles—including computer science, big data, sociology, jurisprudence, communication studies, and ethics—they emphasize the critical importance of legal regulation. Nevertheless, there

remains significant scope for further exploration and discussion regarding potential legal challenges. This paper further explores how to assign liability for AI-related infringements through legal channels, striving to establish a balanced relationship between law and technology. It seeks to find an equilibrium point, enabling effective legal responses to the risks and challenges encountered in AI implementation. This approach helps fill gaps in legal theory within AI and other technological innovation fields, promotes the organic integration of legal and technological domains, and advances theoretical progress across various disciplines.

From a practical standpoint, this paper aligns with contemporary trends and keeps pace with the broader trajectory of artificial intelligence development. By focusing on the infringement risks arising from AI applications, it further explores additional possibilities for legal regulation of liability arising from AI. Technologically, it promotes the healthy development of the AI industry and strengthens China's international voice in the field of science and technology. Legally, it accelerates the introduction of relevant laws and regulations to maintain social stability. This not only fulfills people's aspirations for a better life but also enables the self-renewal and improvement of China's existing legal system. While advancing domestic legal development, it also provides Chinese wisdom and sets a positive example for the AI legal systems of other countries.

2. Artificial Intelligence and Its Development and Applications:

2.1. The Definition of Artificial Intelligence

Artificial intelligence continues to advance at a rapid pace even today, and it remains challenging to establish a unified, concrete definition for it within its specialized field. Different industries under this umbrella also emphasize varying aspects when defining AI. The concept of artificial intelligence was first proposed by computer scientist John McKinsey, who, in his research on computation, believed that AI was not about replicating human intelligence but rather about performing more complex computations. [1] In China, some scholars define AI as a scientific discipline encompassing theories, methods, technologies, and application systems aimed at simulating, extending, and augmenting human intelligence. Its primary research domains include machine learning, natural language processing, image processing, and human-computer interaction. [2] As AI technology advances, scholars have also proposed categorizing it based on strength levels. This illustrates how definitions vary across academic disciplines. The author believes that within specific application scenarios, AI can be flexibly interpreted based on its concrete implementation. For instance, when discussing autonomous driving, we refer to AI-powered vehicles developed by humans, where machines take the lead in executing self-driving technology. Similarly, when addressing ChatGPT, we recognize it as generative interactive AI trained through extensive algorithms.

2.2. Characteristics of Artificial Intelligence

This paper primarily analyzes the characteristics of artificial intelligence that impact the legal field.

First, artificial intelligence possesses the characteristic of high autonomy. Autonomy refers to the ability of AI products to think independently—that is, to process, analyze, and output information autonomously without human intervention, ultimately achieving the initially set objectives or outcomes. Autonomy forms the foundation of intelligence, and it manifests during the extensive computational processes where AI engages in “learning.” This also represents the most significant distinction between AI products and ordinary products.

Secondly, artificial intelligence possesses unpredictable characteristics. Although designed, coded, and fed information by humans and connected to cloud data networks, once designed, AI rapidly adapts and reorganizes information based on varying circumstances to reach more

accurate conclusions—a process that remains unpredictable. Other everyday products are comparatively simple and ordinary, allowing people to predict their behavior. Thus, the technological risks posed by AI can only be gradually mitigated through technological advancement, never entirely eliminated.

Finally, artificial intelligence exhibits complex integrative characteristics. Internally, it represents the deep integration of multiple cutting-edge technologies. Externally, it undergoes profound convergence with diverse industries. This comprehensive integration necessitates a more systematic and holistic legal mindset for understanding, regulating, and assigning responsibility regarding AI. Accelerating the legal regulation of AI liability today aligns with the broader landscape of AI-related industries, fostering the comprehensive advancement of artificial intelligence across all fields.

2.3. Current Status of Artificial Intelligence Development

The development of artificial intelligence has evolved from early problem-solving programs to research on artificial neural networks and artificial life. Concurrently, it has undergone shifts from symbolic computation to the adoption of neural and evolutionary computation, alongside transitions in working paradigms from symbolism to connectionism and then to behaviorism. [3] As mentioned earlier, artificial intelligence possesses complex integrative characteristics, resulting in varying development statuses across different fields. In the industrial sector, AI applications are primarily manifested through the widespread deployment of industrial robots. These robots have become the preferred solution following human labor, significantly reducing industrial costs and enhancing efficiency. In daily life, AI is increasingly integrated into urban systems, transportation, healthcare, and education. The nation is vigorously promoting the development of smart cities, enhancing the intelligence of road networks and infrastructure. AI also maintains close ties with the financial sector, where it leverages big data and cloud computing to build data models, process and analyze financial information, or design personalized services tailored to individual users' circumstances. This approach not only mitigates risks for users but also generates greater returns.

Internationally, countries worldwide have recognized the opportunities presented by artificial intelligence development and are rolling out policies to secure strategic advantages. For instance, the European Union has introduced the world's first AI Act, which will provide robust legal support for AI governance. Overall, AI development continues to advance at a rapid pace and will undergo deeper integration with other fields. The era of artificial intelligence has arrived, transforming not only the human world but also profoundly reshaping legal systems.

3. The Risk of Infringement and Liability Dilemma in Artificial Intelligence

3.1. Typical infringement risks associated with artificial intelligence, exemplified by autonomous driving and AI-generated art

Self-driving cars are artificial intelligence products that have emerged in recent years through the integration of AI technology with traditional automobiles. They represent a decision-making AI system that achieves autonomous driving based on artificial intelligence. As technology continues to advance, the advent of self-driving vehicles has enhanced the convenience of daily life. However, in 2018, an Uber self-driving car undergoing testing in Tempe, Arizona, struck and killed a pedestrian crossing the street. The vehicle failed to detect her crossing a major thoroughfare. This incident prompted Uber to suspend all autonomous vehicle testing. The case became the world's first fatal accident involving a self-driving car. Ultimately, the court ruled that the safety operator's error constituted negligent homicide, convicting the individual while acquitting Uber and its AI algorithm. This demonstrates that

autonomous vehicle accidents infringe upon personal rights and property rights, with complex liability and causal relationships that current laws struggle to define. The emergence of autonomous vehicles renders existing laws ineffective in regulating the issues they generate. Yet this represents merely one facet of the legal challenges posed by artificial intelligence development.

Compared to decision-making AI, AI painting represents a rapidly evolving form of generative AI that has emerged in recent years. By training AI models with vast amounts of visual data provided by designers, these systems process and generate artwork. Such AI-generated paintings are readily accessible online, though opinions about them vary widely. Some appreciate AI art for its convenience in producing beloved works, while others contend that creations generated by this technology not only feature bizarre imagery that defies common sense but also infringe upon others' copyrights, portrait rights, and other legal protections. In reality, the development and refinement of AI technology rely heavily on extensive data training, and the data used for training often includes content protected by intellectual property rights. Neither the creative principles nor the workflow can directly adopt strategies designed for non-AI creative tools, thereby introducing new legal challenges. [4] User instructions given to AI painting tools may also lead to copyright infringement. During the output phase, generative AI learns from original works and combines user requirements to produce corresponding content. While it does not directly output the original work, it synthesizes multiple works for re-creation: this may involve extracting fragments from original works or modifying and reworking multiple works based on user specifications. In such cases, the copyright holder's rights to modification, compilation, and adaptation may be infringed. [5] An AI painting technology carries multiple risks of infringement.

3.2. The Liability Dilemma of Artificial Intelligence

First, from the perspective of artificial intelligence technology itself, although designed by humans, the complexity of its operational programs makes the ultimate outcomes unpredictable. Second, the principles of liability for torts under China's civil law are broadly categorized into general fault-based principles and specific strict liability principles. Ordinary product liability primarily follows the strict liability principle, where manufacturers and sellers bear quasi-joint liability. Considering that in actual legal practice, AI product torts differ significantly from general product torts, Therefore, the strict liability principle cannot be applied indiscriminately. Simultaneously, establishing the facts of AI infringement poses challenges. For instance, while defects in AI products may exist, determining the legal standard for such defects proves difficult. The inherent complexity and diversity of AI products preclude a unified standard, making defect identification challenging and complicating liability attribution. Finally, the burden of proof for victims seeking redress against AI infringement is significantly heavier than in conventional tort cases. The specialized nature, technological complexity, and unique characteristics of AI present insurmountable hurdles for those attempting to prove liability.

4. Approaches to Regulating AI-Related Infringements in China

4.1. Establish market access rules for artificial intelligence products

Establishing rules for market access of artificial intelligence products fundamentally involves clarifying the methods, conditions, and procedures for AI market entry. First, China possesses specific market access regulations in certain industries such as food, pharmaceuticals, and finance. Therefore, developing specialized market access rules for artificial intelligence is feasible. Second, we must define the methods of market access. The author believes a combination of approval-based registration and standard-based regulation can be adopted. AI

enterprises and their products cannot undergo market access registration without prior approval from relevant authorities. Conversely, upon obtaining approval from relevant authorities, registration becomes possible, permitting market entry. This balanced approach encourages AI market participation while ensuring effective oversight. Market access conditions can be divided into two categories: enterprise access and AI product access. Enterprises gain market access upon approval and registration by relevant authorities. Product access, however, is more complex—this stage is designed to minimize product defects. It requires enterprises to conduct self-inspections of their AI products and submit quality reports, supplemented by random inspections by technical supervision departments. Only products meeting AI quality standards may enter the market. This multi-party inspection process alleviates the burden of single-party testing. Regarding market access procedures, products meeting registration or approval requirements may enter the market. If subsequent reviews reveal non-compliance, regulatory authorities will enforce market withdrawal. Additionally, AI manufacturers meeting legal dissolution criteria may apply to the registration authority for liquidation and deregistration to exit the market.

4.2. Clarify the obligations of each responsible party

Currently, the development of artificial intelligence technology has made significant strides in mimicking human problem-solving capabilities. However, artificial intelligence fundamentally differs from genuine human intelligence, as it lacks autonomous consciousness. [6] Therefore, artificial intelligence cannot be treated as a legal subject; it remains within the scope of objects. When defining the obligations of various responsible parties, the unique characteristics of AI products must be fully considered. The strict liability principle for product liability outlined in the Tort Liability section of the Civil Code cannot be applied indiscriminately. First, designers, manufacturers, and sellers themselves must bear the duty to provide instructions and explanations for the use of AI products, and must produce AI products in accordance with national standards. Second, if the infringement is caused not by defects in the product but by the user's failure to fulfill their duty of care, the relevant provisions of the fault-based liability principle may be directly applied. At the same time, proving liability for AI products is more difficult compared to other ordinary goods. The author believes that reference can be made to the EU's approach to reduce the burden of proof on the party seeking to prove infringement involving AI products. [7] Third, for non-defective damages caused by inherent uncertainties in AI products, the producer, seller, and user shall share liability. While ordinary product liability imposes strict liability on producers and sellers, AI products possess unpredictable attributes. Users must therefore consider whether they can effectively control the AI product and whether they are prepared to bear the corresponding risks before purchase. By fostering greater caution in AI product usage, this approach can conversely drive further refinement of AI technology.

4.3. Improving the Principles of Liability Rules for Artificial Intelligence Infringement

The allocation of liability for infringement follows a multi-faceted model centered on producers bearing product liability, with users bearing liability as an exception, supplemented by the principles of strict liability and equitable liability. First, AI-related torts may employ a conditional no-fault liability principle: when a product defect exists, designers, producers, and sellers bear direct responsibility. This elevates standards for designers and producers. When AI designers or producers exert significant control over the AI system, directly influencing its subsequent overall operation, strict liability should apply to compel relevant parties to fulfill reasonable analysis and prudent review obligations. Finally, we must further refine the equitable liability principle. In AI operations, if infringement arises from inherent risks of the AI itself rather than defects—where neither fault-based nor strict liability applies—we can invoke equitable liability. Producers, sellers, and users would bear joint responsibility. Some

scholars have also proposed expanding the scope of product liability subjects to broadly include producers, sellers, and developers to provide compensation to victims. [8]

4.4. Explore artificial intelligence liability insurance and compensation systems

Although the author has already elaborated in detail on the need to refine legal principles for attributing liability in AI infringement cases, to prevent responsible parties from passing the buck after liability arises, we must also explore a system of safeguard measures as a last resort. This path of exploration is not entirely untrodden. As early as 2017, the UK government published the Automated and Electric Vehicles Bill, which was passed on July 19, 2018, becoming the world's first formal legislation to incorporate autonomous vehicles into mandatory vehicle insurance. [9] Based on the risk level of artificial intelligence, a mandatory insurance system should be established for high-risk AI systems, while a relevant commercial insurance system should be developed for systems posing ordinary risks. Some scholars also propose that, in addition to establishing corresponding insurance systems, a dedicated compensation fund should be created. This fund would be jointly financed by relevant parties such as AI system developers, sellers, and users to cover personal injuries and psychological damages caused by high-risk AI systems. [10] In cases of particularly challenging AI infringement, compensation will first be provided through state-funded indemnity funds, with subsequent accountability pursued against relevant parties. This dual safeguard mechanism collectively promotes the healthy development of the AI industry.

5. Conclusion

The artificial intelligence industry is developing rapidly and spans a wide range of fields. To seize the initiative, the international community is intensifying research on AI-related legal issues. China should also keep pace with the times by accelerating research on legal regulations for AI infringement issues, striving to complete the introduction of relevant laws and regulations at an early date. Although this paper explores legal regulation of AI, the author's limited research capabilities and need for enhanced legal expertise mean the analysis remains superficial. Significant operational space exists for implementing legal regulations, and numerous methods remain unexplored. Nevertheless, the author believes that in the near future, China will witness the emergence of diverse new perspectives on AI legal regulation, driving the formulation and implementation of relevant legal policies.

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