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Problems in the Construction and Implementation of Legal Liability System in the Era of Artificial Intelligence

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Abstract: Artificial intelligence (AI) is a very widely studied science at present. In an era of continuous technological development, there are more and more legal issues arising from AI. How to find out the problems as soon as possible and build a perfect legal liability system is very important at present. The purpose of this paper was to analyze the problems faced in the construction and implementation of the legal liability system in the context of AI and to improve the relevant laws. This paper first proposed the use of random forest algorithms to classify and assess legal risks related to legal issues that might arise from different AI products. This paper found that security, human rights, ethics, copyright and infringement issues in the AI era were among the most important issues. Then this paper selected three areas where legal cases occur more frequently in a city and conducted risk classification and assessment of AI products in these areas. The results showed that before the implementation of the system, the risk ratio of AI products in personal lending was 0.65, the risk ratio of transactions was about 0.8, and the risk ratio of returns was about 0.78; the risk rate of credit card AI products was about 0.5, the self-risk rate and return risk rate of smart medical AI products were about 0.35, and the transaction risk rate was about 0.5. After the implementation of the legal system, the overall legal risk ratio of its personal loan products dropped to about 0.5, the credit card AI products dropped to about 0.45, and the smart medical AI products dropped to 0.3. This showed that the relevant legal liability system constructed in this paper had a certain warning effect and could reduce the relevant legal risks of AI products. And the final expert's score for the legal system constructed in this paper was about 70 points, which showed that the legal system constructed in this paper had certain reliability and feasibility.

1. Introduction

With the advancement of information technology and the continuous development of research, AI is no longer just a tool and means for human labor. AI has independent thinking ability and self-awareness. It has the ability not to lose to human beings in all aspects and should be the main body. As a result, another significant issue in the contemporary judicial study is the responsibility of

AI. Owing to the secret and generally restricted aspect of its research and development. AI, a byproduct of better evolved digital technologies, finds it challenging to successfully retain the important data sources throughout the cycle of creation. Therefore, crucial information may be stored in ahead throughout each step of AI research, training, and output. Therefore, in the event of an infringement event, there are basic data that can be used to provide conditions for the re-division of tort liability. However, there are many problems in the implementation of these methods. For example, the non-cooperation of AI product manufacturers or even deliberately setting security loopholes will have a significant impact on human life. Therefore, this paper studied the legal liability system in the AI era. Issues were discovered during build and implementation. The relevant laws have been improved. This will have important safeguarding significance for the future development of AI and people's social life.

In terms of holding powerful AI responsible at the way of deciding, only by improving the relevant legal responsibility system as soon as possible and clarifying the main body of accountability can a safer society be built. As for the research on the legal liability system in the AI era, many scholars have achieved some results. Among them: Droste W discussed the damage caused by the use of intelligent medical equipment and the distribution of liability for torts for the current AI medical methods [1]. Callier took a socio-legal, interdisciplinary approach to exploring the perspectives of AI-related socio-ethical issues and liability theory. A sociological perspective was used to assess the current legal framework governing human-computer interaction [2]. Machnikowski P discussed the explanation of producer responsibility for AI products in the AI era [3]. Mazurowski M A explored the possibility that AI could replace a large number of radiologists [4]. Sellwood discussed the background of AI and robotics, the technology behind self-driving cars, and the evolution of product liability law [5]. Mareiniss D P discussed the significant legal liabilities that doctors might face when using AI medical products incorrectly [6]. Min K S analyzed representative cases of IAN cuts that occurred during mandibular contouring plastic and cosmetic surgery and assessed the professional surgeon's stance on legal liability [7]. Weng T C used an AI algorithm to investigate the association between supervisory board risk financial protection and the likelihood of an audit restated with in age of instant data processing, showing that reducing managers' legal liability would encourage managers to misreport earnings [8]. Although these studies have a certain role in promoting the construction of a legal liability system, most of them are theoretical discussions in a certain field. There is a lack of a complete responsibility system and practical application, so more comprehensive analysis and application are needed.

With the development of AI, traditional methods of analyzing legal issues can no longer meet the current environment. The innovation of this paper is that the random forest method in the AI algorithm is used, and the issues with the design and execution of the set of core accountability are classified and evaluated. The legal dangers during the service's installation of AI products are evaluated from various fields and perspectives of criminal law, administrative law and civil law. The results are more contrastive and the effect is more pronounced.

2. Legal Liability System in the AI Era

2.1 Legal Issues Faced in the AI Era

AI is a computer with a human brain-like thinking ability, and it is also a technical science. At the beginning, people believed that if a computer would satisfy the Board exam, it might speak and possess same level of awareness and cognition as a person. However, this is just simple AI awareness. Machines cannot simply be considered without "minds". In many cases, the decision-making methods of machines and humans are the same [9-10]. The concept of AI is shown in Figure 1.

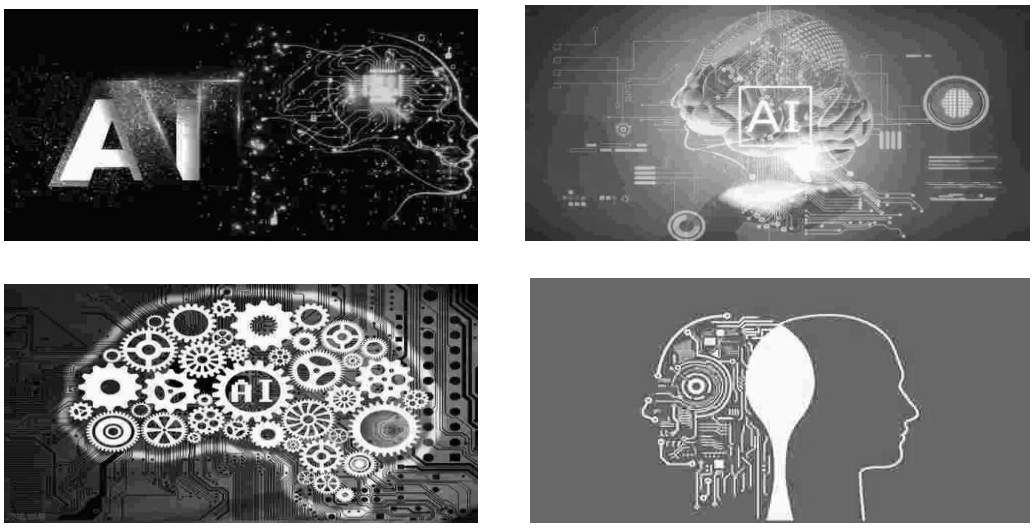


Figure 1: AI schematic diagram

Super AI can not only think like a human being and become a completely independent individual, but even have many functions beyond human [11]. In intellectual world, there is no consensus about which mega AI is feasible. In fact, as a technical means, the purpose of AI's generation and development is to serve human beings. Providing convenience for human life is the primary purpose of AI development. The process of human survival and development is the process of making and using tools. For more than 10,000 years, human society has gone through the era of tools in the most traditional sense represented by stone tools and iron tools; human society has experienced the era of industrial revolution tools represented by steam engines; in the era of information and data tools represented by the Internet, the emergence of AI in this era has made up for the shortcomings of human beings as creatures [12-13]. "Subject-object dichotomy" is mainly "man-nature dichotomy" from a legal point of view, that is, the dichotomy of the relationship between humans and the relationship between humans and nature [14-15]. The current life that is associated to the term and existing within this framework of the user's actions, which is the aim and also is a piece of such person's mind and deed [16-17].

In addition, different views on the scope of legal objects are determined by different economic development and social progress. The continuous progress of social economy also makes the scope of legal objects change constantly. Therefore, weak AI still belongs to a type of item that is an element of social abilities and is represented by the characteristics: When weak AI fulfills the same goal, it is only a purely stiff and unthinking physical activity. Weak AI lacks the human capacity for emotional choice in the face of reality, nor does it have the subjective world composed of values and emotions. Weak AI is only the product of simple input and output of data and cannot autonomously ask questions or solve problems creatively. If there is a situation where the program is not preset, it is difficult for weak AI to respond appropriately and even the operation of the program may be interrupted [18].

With the rapid rise and wide application of big data and cloud computing, a new wave of AI development is coming like lightning. AI has played a role that cannot be underestimated in all fields of human society. Although AI is developing very rapidly, at present, AI is dominated and controlled by humans due to its lack of autonomous consciousness, inability to judge and think independently, and the limitations of algorithm data. As a product of human creation and invention, the original intention of AI's generation and development is to serve human beings, so AI is of great value to human beings [19]. Although the "intelligence" shown by the current AI is only a specific response to specific external stimuli, it cannot change by itself and lacks initiative. AI is also not a

threat to humans.

Some people say that man is a delicate machine, but as the most basic concept in legal research, this concept is the result that the law abstracts the real people according to a certain standard, which is also the embodiment of the law to treat the real people with a unified standard. In order for individuals with various guises in actuality at becoming persons with coherent professional rules in the system of law, one of textual rule's most fundamental and crucial goals is to change all sort of people in truth into such "system people" in the legal sense through the unified provisions of the law [20]. The limited legal subject status of AI has become a psychological condition for legal subjects. However, the fact that corporations such as legal persons and unincorporated organizations do not have the ability to perceive happiness or pain but enjoy legal personality is ignored, which belongs to the case of legal subjects. Therefore, from the basic connotation of the legal subject, the ability to perceive happiness or pain, such as emotion, does not belong to the standard of judging whether it has a personality. This is not a criterion for judging whether it has legal subject qualification. So it can be said that AI can even be a legal subject.

2.2 Construction and Implementation of Legal Responsibility System

The current status of the construction of the relevant legal system: In terms of AI law, the EU has made corresponding measures for the legal status of AI. A dedicated group to study AI-related issues was established. Reports on the legal status of AI have been published one after another. Legislative motions on AI were first started. Most countries other than China regard highly complex AI that meet certain conditions as "cyborgs". The legal status of AI in China is currently more inclined to treat it as a "thing". Regarding the research status of the AI legal system in the world, this paper searches a well-known thesis database in China. The summary results are shown in Table 1 and Table 2.

Table 1: Number of related literature in China

index word	Number of journals	Thesis
AI	124286	25931
AI and the law	6085	2332
AI and the legal liability system	137	23

Table 2: Relevant literature from other countries

index word	AI	AI and the law
2010	2625	11
2015	3204	26
2020	17542	107

As can be seen from Table 1, there are currently more than 120,000 AI-related journals published in China, and about 26,000 related master theses. There are also more than 6,000 journals related to AI and law, and 2,332 related master theses. But there are few journals and papers on AI and the construction of legal systems. There are even fewer relevant papers on AI and AI law in other countries. However, the number of papers from 2010 to 2020 has increased significantly, which also shows that other countries are paying more and more attention to research in AI and law.

It is feasible for AI to attain the character of a citizen of a country as it can exhibit free and independent conduct in fact as well as logical capacity in intellect. The public officer, which is an assumption reasoning, is really the justice system's conceptual interpretation of the true people. This normal sane individual disregards elements like style, empathy, choice, etc, which is more

suited to powerful AI in shape. Even the rationality that includes moral requirements in the ability to recognize and perceive the world does not contradict strong AI. And the ability of super AI to recognize and perceive the world is basically undisputed. There are many scholars who disagree about whether super AI is bound by morality. For this legal subject, a liability system can be constructed using the existing laws. Taking AI as a legal subject, this paper combines the system with various basic laws in China.

In addition, in the process of strictly implementing legal responsibility, the relevant system can also be improved in a targeted manner. It is better to consider implementing an AI registration system to register strong AI that satisfies the necessary requirements. The primary tenet on which AI identity is based is the distinction amongst numerical measurements. Even if the data is damaged during the application process, the AI's identity information can be provided through the number. This provides a guarantee and basis for determining the rights and obligations of all parties and clarifying legal responsibilities [21]. With increased production, economic and social life is continuing to advance. The legislation, meanwhile, can always be amended at whim due to its strength, which raises the likelihood that it would not react toward the pace for which community is developing. It is hard to address every scenario in human society due to such a gap in the legislation. It will be challenging for new developments like deep learning (AI) to properly conform to current rules given how quickly the field of cognition is expanding [22].

3. Actual Effect Test of the Legal Liability System

3.1 Experiment-related AI Algorithms

One of the AI algorithms used in this paper is the random forest algorithm, which can classify, evaluate and predict the possible legal risks of AI products based on decision trees. The algorithm concept for random forest can be shown in Figure 2. The specific calculation process is as follows:

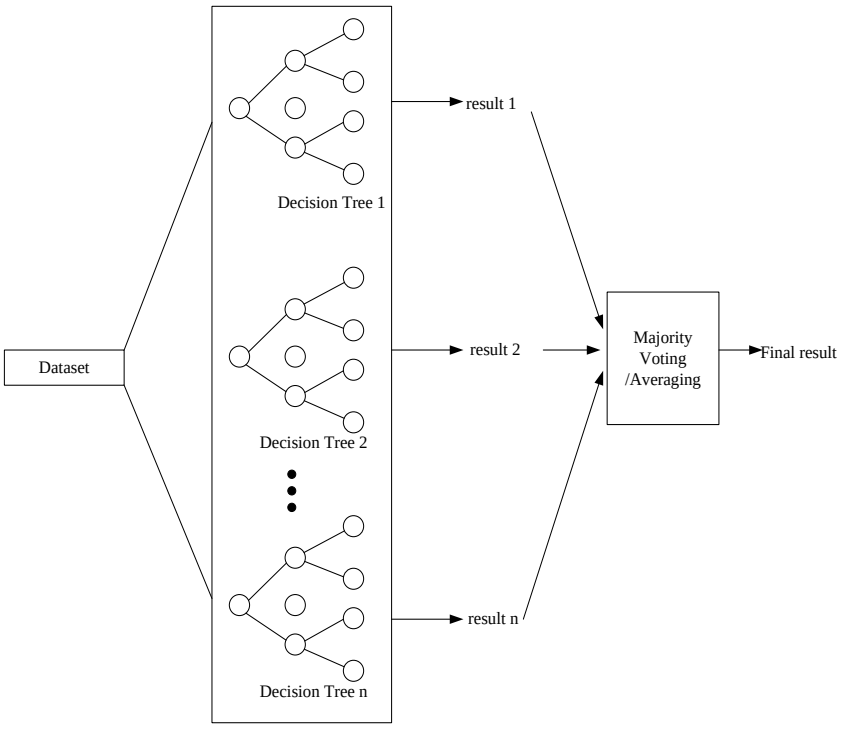


Figure 2: Schematic diagram of random forest algorithm

The legal risk of an AI product is assumed to be assessed by variance, and the formula is:

$$E(r_i) = \frac{\sum_{i=1}^{m} r_i}{m} \tag{1}$$

The way of normalization is:

$$\bar{x}^* = \frac{x^* - u}{\sigma} \tag{2}$$

In the final evaluation index for the legal risk of AI products, the legal risk rate of the classified calculation product itself is:

$$TR = \frac{(R - f)}{\beta} \tag{3}$$

3.2 Experimental Process and Results

This paper firstly uses the AI algorithm to classify and summarize the main relevant legal complaint cases in a city in China, as shown in Table 3. This paper find that most of the cases occur in credit card, medical and personal lending. The relevant legal liabilities of the city in the past 10 years are summarized and classified, as shown in Table 4. Among them, criminal law cases account for the largest number, exceeding 6.42 million, followed by civil law cases. There are fewer administrative law cases.

Table 3: Major legal complaints in China

Code	Type of legal dispute	Type of legal dispute
L1	private loan	35172
L2	bank credit card	19178
L3	medical treatment	18123

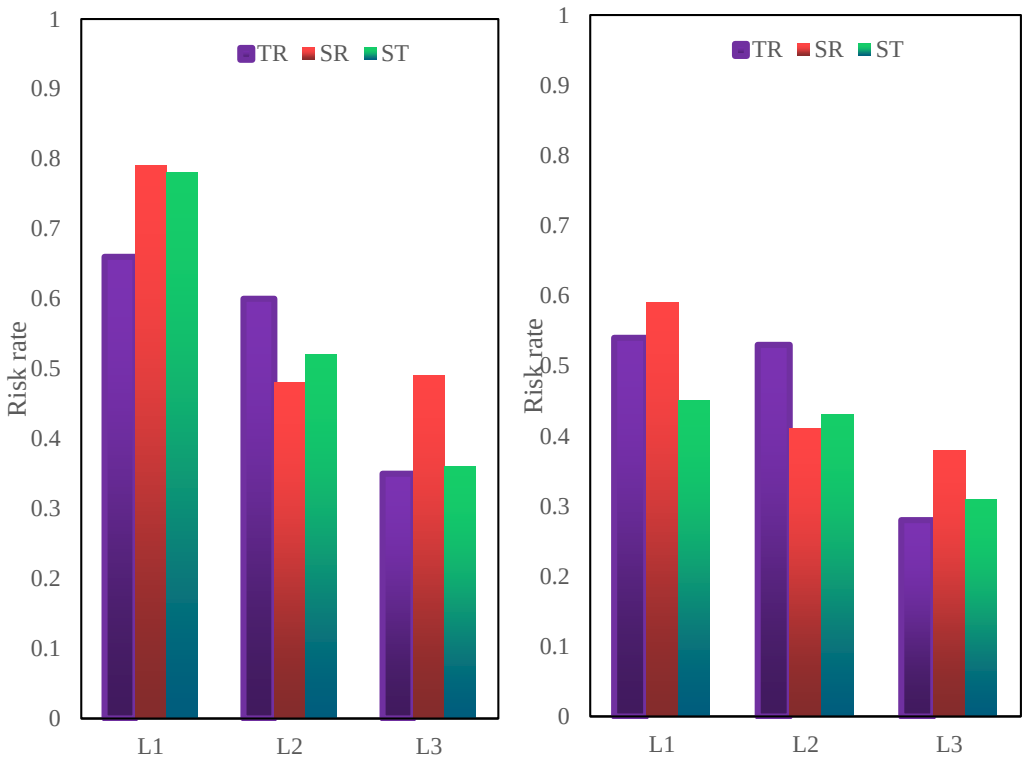
Table 4: Classification of relevant legal liabilities

code	type of law	Number
R1	criminal law	6.42million
R2	civil law	4.10million
R3	administrative law	0.21million

Then, this paper conducts legal risk classification and assessment of related AI products in the credit card, medical and personal lending fields of the city. Then, the legal liability system constructed in this paper is implemented, and the legal risks before and after the two are compared. The risk results are shown in Figure 3.

As can be seen from Figure 3 (a), before the implementation of the system, for AI products in the fields of personal lending (L1), credit card (L2) and intelligent medical care (L3), the product risk rate (TR) of L1 existing products is 0.65, The transaction risk ratio (SR) is about 0.8, and the return risk ratio (ST) is about 0.78. Compared with other products, the wind efficiency is higher, which may also be one of the reasons for the large number of such legal cases [23]. The risk rate of L2 products is about 0.5, the risk rate of R1 and R3 of L3 products is about 0.35, and the risk rate of R2 is about 0.5. After the implementation of the legal system, it can be seen from Figure 3 (b) that the three legal risks of the three products have decreased. The overall legal risk ratio of L1 products dropped to about 0.5, L2 products dropped to about 0.45, and L3 products dropped to 0.3. This shows that the relevant legal liability system constructed in this paper has a certain warning effect,

which can reduce the relevant legal risks of AI products.



(a) Before the implementation of the system (b) After the system is implemented

Figure 3: Legal risk assessment of AI products

Finally, this paper makes an overall evaluation of the legal liability system constructed. The evaluation indicators include the perfection, complexity and implementation validity of the system. The results obtained by the expert scoring method are shown in Figure 4. The legal system has a score of 77 for criminal law (R1), 78 for implementation validity, and 73 for complexity. For the civil law (R2), the completeness is 76, the implementation validity is 73, and the complexity is 63. The overall score is lower than that of the criminal law. And the perfection, implementation validity and distribution of administrative law (R3) are 85 points, 82 points, which is relatively the highest. The complexity is 60 points, which is relatively low. This may be due to the fact that the administrative law has less content compared to the criminal law and the civil law. And the case is more prominent, the implementation is more efficient. This shows that the legal liability system for AI constructed in this paper has certain reliability and feasibility, which has also been recognized by most experts.

Although the research in this paper has achieved some results, as people rely more and more on AI, the advantages and disadvantages of AI are gradually revealed. The unpredictable and uncertain nature of AI development raises a series of problems. In order to meet the arrival of the AI era, it is necessary to conduct relevant institutional discussions on AI. However, China currently lacks a relatively complete normative system for AI laws. In addition, super AI should also enjoy the right not to be arbitrarily terminated. This right similar to the human right to life is an important basis for the existence and development of super AI. At the same time, it is also necessary to limit the freedom of super AI in the form of legal reservations. The freedom of AI is limited within the boundaries of benefiting human beings to ensure that its purpose of serving human beings can be better achieved; political rights such as the right to vote and the right to be elected should be

restricted to avoid the possibility of AI ruling humans in the future.

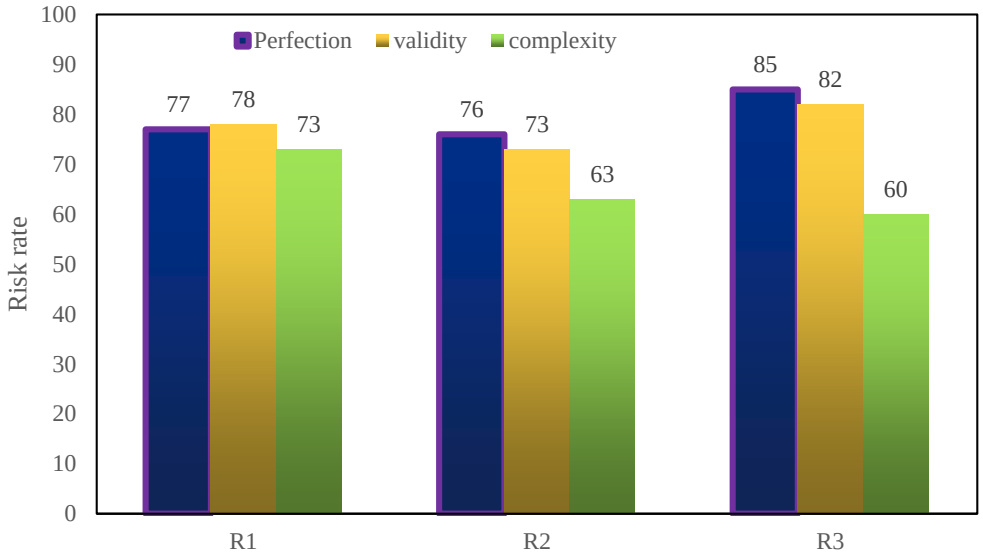


Figure 4: Evaluation of legal liability system

4. Conclusions

AI has relatively high autonomy and learning ability. At the same time, there is a lack of provisions for strong AI-related rights in the current legal system. This makes it difficult to clarify the rights of strong AI and the limits of rights. Therefore, it is necessary to improve the relevant legal responsibility system as soon as possible. Based on this, this paper firstly analyzed the legal issues faced in the AI era and gave a more detailed explanation from the basic concepts of AI to application fields. This paper analyzed AI from legal objects and subjects. With the continuous development of science and technology, security issues, human rights issues, ethical issues and copyright infringement were important legal issues in the AI era. Super AI could act as a legal subject and enjoy the power of normal people. Then combined with the basic laws of China, the legal responsibility system and implementing agencies of this paper were constructed. Secondly, in the experimental analysis part, the legal risk assessment of AI products in different fields in a city was carried out by using the random forest method in the AI algorithm. The results showed that the legal risk rates of AI products in the fields of personal lending, credit cards and smart medical care were about 0.75, 0.5 and 0.4, respectively. After implementing the legal system constructed in this paper, the legal risk rate in various fields dropped significantly. Finally, according to the evaluation of the legal system of this paper by experts, it was concluded that the legal responsibility system constructed in this paper had more than 70 points in the perfection and implementation validity of criminal law, civil law and administrative law. The complexity did not exceed 75 points. This showed that the system constructed in this paper had certain feasibility. However, this paper also has some shortcomings. In this paper, the research on the random forest algorithm is not deep enough, and the design of the experimental part is relatively simple. Therefore, this paper has some room for improvement.

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