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Research on the Legal Regulation Path and Responsibility Structure Reconstruction of Algorithm Decision Making under the Background of Digital Governance

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Abstract: With the rapid development of digital technology, algorithm decision-making is widely infiltrated in various fields, which not only improves efficiency, but also gives rise to a series of complex legal problems. This article focuses on exploring the legal regulation path of algorithm decision-making and the reconstruction strategy of responsibility structure under the background of digital governance. Traditional legal norms and responsibility structure are difficult to adapt to the complexity and uniqueness of algorithmic decision-making. Based on this, this article puts forward a multi-dimensional response plan. On one hand, it is essential to improve the legal and regulatory framework by clearly defining the rights and obligations of key stakeholders, including algorithm developers, data providers, and algorithm users, in areas such as algorithm design, data supply, and application. On the other hand, oversight mechanisms should be strengthened by establishing specialized regulatory bodies, implementing dynamic supervision, and encouraging public participation in monitoring. At the same time, the structure of accountability must be redefined, with responsibilities scientifically allocated based on different scenarios, thereby fostering a fair and reasonable mechanism for the distribution of accountability. With the help of these measures, it is expected to effectively deal with the legal dilemma of algorithmic decision-making and create a standardized and orderly legal environment for algorithmic decision-making.

1. Introduction

With the rapid development of information technology, digital governance has become an important mode of social governance [1]. In this context, algorithmic decision-making is widely used in all fields of social life because of its high efficiency and accuracy [2]. Algorithm decision-making not only brings convenience, but also causes a series of complex legal problems. Due to the opacity of the algorithm, it is difficult for the public to know how the algorithm makes decisions. This may lead to the unpredictability of decision-making results, and also make it difficult to identify the responsibility [3]. The algorithm may also unfairly treat specific groups based on data bias and infringe on the equal rights of individuals. These problems harm individual interests, but also pose a challenge to social fairness and justice and the rule of law order [4].

In this case, it is particularly urgent to regulate algorithmic decision-making by law and reconstruct the responsibility structure [5]. Effective legal regulation path can standardize the operation of algorithmic decision-making, protect the legitimate rights and interests of the public and safeguard social fairness and justice [6]. Reasonable reconstruction of the responsibility structure will help to clarify the responsibilities of each subject in the decision-making process of the algorithm and enhance the accountability of the algorithm. The purpose of this study is to explore the legal regulation path and responsibility structure reconstruction of algorithmic decision-making under the background of digital governance, in order to provide theoretical support for solving related legal dilemmas.

2. Overview of algorithm decision-making

Algorithm decision-making refers to the process of automatically making decisions by analyzing and processing data through computer algorithms. Its core lies in using mathematical model and program code to generate decision-making results according to input data information [7]. It is highly dependent on data, and the quality and scale of data directly affect the accuracy of decision-making. Algorithm decision-making has the ability of automatic execution, and can quickly draw conclusions without too much manual intervention.

In today's society, algorithmic decision-making is widely used in many fields. In the commercial field, e-commerce platforms use algorithmic decision-making to provide personalized recommendations for users to improve sales efficiency and user experience. In the financial industry, algorithmic decision-making is used for risk assessment and credit approval to assist financial institutions to make reasonable decisions [8]. In the aspect of government services, algorithmic decision-making can optimize resource allocation and improve the accuracy of public services. The wide application of algorithmic decision-making has greatly improved the operational efficiency of various fields, but at the same time it has brought many potential problems due to its characteristics, which need to be studied and regulated urgently.

3. Legal problems faced by algorithm decision-making

In the environment of digital governance, although algorithm decision-making has brought efficiency improvement, it has also caused many thorny legal problems and challenges. The black box problem of the algorithm makes the decision-making process of the algorithm difficult to be understood and supervised by the outside world [9]. Algorithms are usually based on complex mathematical models and a large number of data, and their internal logic and reasoning process are obscure to ordinary users and even professionals. In some recruitment algorithms based on artificial intelligence, enterprises screen resumes according to the algorithm, but job seekers have no way of knowing why they were eliminated, and it is difficult for recruiters to clearly explain the specific basis of algorithm decision. This opacity affects the public's trust in the decision-making results of the algorithm, and also brings great obstacles to legal supervision. The problem of algorithmic discrimination has been repeatedly banned. The algorithm may be unfair to specific groups based on data deviation or improper programming. Figure 1 shows the possible types and manifestations of discrimination in algorithmic decision-making in different industries.

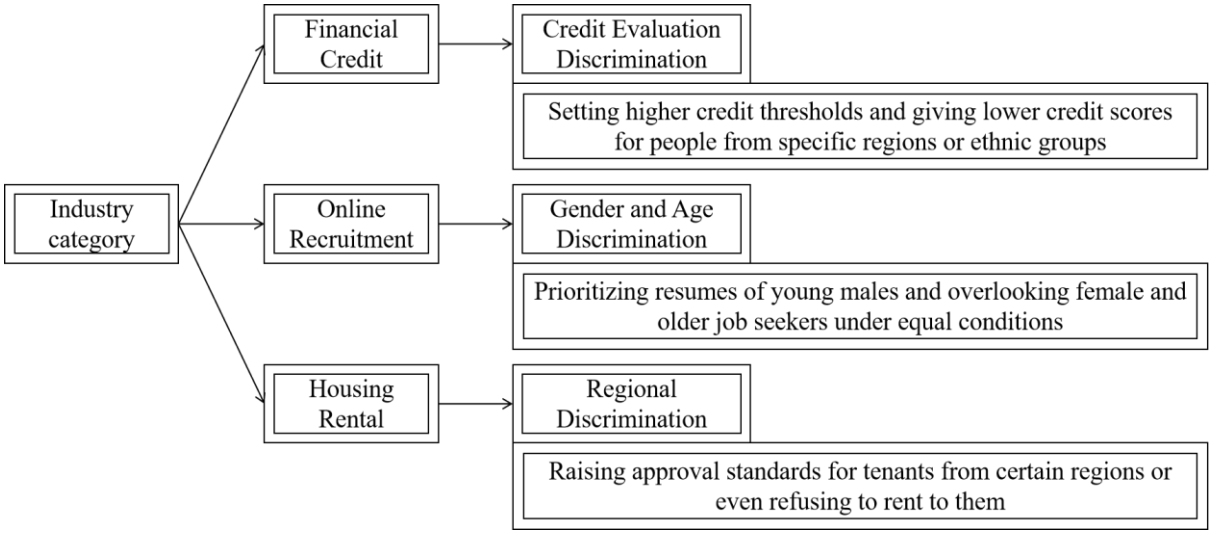

Figure 1 Discrimination of Algorithms in Different Industries

Algorithm discrimination involves many key fields, which seriously violates the equal rights of individuals and violates the principle of fairness and justice of the law. Fuzzy responsibility identification is also an important challenge for algorithm decision-making. Because algorithm decision involves many subjects, including algorithm developers, data providers, algorithm users and so on. For example, in traffic accidents caused by autonomous driving algorithms, the responsibilities among automobile manufacturers, algorithm developers and data providers are complicated, and all parties often shirk their responsibilities, making it difficult for victims to obtain reasonable compensation. These legal problems and challenges urgently need effective solutions to ensure fairness, justice and the rule of law in the digital age.

4. Algorithm decision-making legal regulation path

4.1. Improve the system of legal norms

Table 1: Suggestions on Legal Norms Related to Algorithmic Decision-Making

Subject	Legal Norm Requirements
Algorithm Developers	1. Ensure the interpretability of algorithms by providing explanations of the basic principles and logic of the algorithms in product descriptions or related documents.
	2. Be responsible for the legality of algorithm data sources and refrain from using illegally obtained data.
	3. Regularly conduct fairness tests on algorithms to prevent algorithmic discrimination.
Data Providers	1. Guarantee the authenticity, completeness, and accuracy of the provided data.
	2. Comply with data protection laws and regulations by strictly encrypting data involving personal privacy.
Algorithm Users	1. When using algorithmic decision-making results, inform users that the decision-making basis is an algorithm and provide reasonable explanations for user inquiries.
	2. Bear corresponding compensation liability for user losses caused by algorithmic decision-making errors.

Legal norm system is the basis of regulatory algorithm decision. At present, the special laws for

algorithmic decision-making are not perfect, so it is necessary to fill the legal gaps and clarify the rights and obligations of the relevant subjects of algorithmic decision-making [10]. For example, laws should be enacted to make it clear that algorithm developers need to ensure the transparency of the algorithm and disclose the basic principles, data sources and processing methods of the algorithm to the public within a reasonable range. Aiming at the problem of algorithm discrimination, the law should strictly prohibit the design and application of discriminatory algorithms based on specific sensitive factors. Table 1 lists the legal norms that different subjects should follow in the algorithm decision-making process.

Clarifying the legal and regulatory requirements for each stakeholder helps establish a comprehensive and detailed legal framework for algorithmic decision-making, providing a solid legal foundation for its lawful and compliant operation.

4.2. Strengthen the supervision mechanism

Establishing a robust regulatory mechanism is key to ensuring that algorithmic decision-making is lawful and compliant. On one hand, a specialized regulatory body for algorithms should be established. This institution, staffed with professional technicians and legal experts, would be responsible for the regular oversight of algorithmic decision-making. The regulatory body could conduct periodic reviews of various algorithms to assess their security, fairness, and transparency. On the other hand, a dynamic regulatory model needs to be constructed. As algorithms are continuously updated and iterated, regulation cannot remain static. Regulatory authorities should track the operation of algorithms in real-time and intervene promptly for investigation when an algorithm is found to be abnormal or potentially involve violations. Public participation in supervision should be encouraged by establishing a reward mechanism for reporting violations, thereby broadening regulatory channels and fostering an oversight environment involving the entire society.

5. Reconstruction of decision responsibility structure of algorithm

With the wide application of algorithmic decision-making, it is difficult for the traditional responsibility structure to cope with the challenges brought by its complexity, and reconstructing the responsibility structure has become a key measure to solve the legal dilemma of algorithmic decision-making.

Under the traditional responsibility structure, the responsibility subject and the responsibility distribution are clear, but the algorithm decision-making involves multiple participants, and the interaction between the subjects is complex, which leads to the ambiguity of responsibility identification [11]. In order to solve this problem effectively, it is necessary to redefine the subject of responsibility and build a scientific and reasonable responsibility distribution mechanism. As the creator of the algorithm, the algorithm developer is mainly responsible for the design and initial state of the algorithm. They need to ensure that the logic of the algorithm is reasonable and avoid bad consequences caused by algorithm defects. The data provider should be responsible for the quality and legality of the data provided, and should bear the corresponding responsibilities if the algorithm decision-making mistakes are caused by data problems. In the process of applying the algorithm, the user of the algorithm should use and monitor the algorithm reasonably and be responsible for the damage caused by improper use or ineffective monitoring. Table 2 shows the distribution of responsibilities among the responsible subjects in different situations.

Table 2: Reference for Responsibility Allocation in Algorithmic Decision-Making

Scenario	Algorithm Developer Responsibility	Data Provider Responsibility	Algorithm User Responsibility
Discriminatory decisions due to algorithm design flaws	Primary responsibility; rectify the algorithm and bear primary compensation liability	Bear a corresponding proportion of responsibility if the data influences discrimination	Bear partial joint liability for failing to detect discrimination
Decision-making errors due to data errors	Bear a small amount of responsibility for flaws in algorithm fault-tolerance design	Primary responsibility; bear primary compensation liability for data errors	Bear partial joint liability for failing to effectively review the data
Losses caused by improper application by users	No responsibility if the algorithm conforms to design	No responsibility if the data is legal and compliant	Primary responsibility; bear full compensation liability for improper application
Losses caused by new risks emerging from algorithm updates	Update the algorithm and bear responsibility; define responsibility if third-party code is involved	Bear responsibility if the risk is related to the data; no responsibility if unrelated	Bear responsibility for failing to promptly report risks and for exacerbating losses due to non-reporting
Losses caused by external malicious attacks	Cooperate with investigations and bear responsibility if there are algorithm vulnerabilities	Cooperate with investigations; no responsibility if data is not leaked	Cooperate with investigations; no responsibility if not due to improper use

Under different circumstances, each responsible subject bears corresponding responsibilities according to its role and fault degree in the algorithm decision-making process. This responsibility allocation mechanism not only takes into account the influence degree of each subject on the algorithm decision-making results, but also takes into account the principle of fault responsibility, which is helpful to clearly define the responsibility in the complex algorithm decision-making environment. By reconstructing the responsibility structure, the responsibility of each subject in algorithm decision-making is clarified, which urges all parties to perform their duties more cautiously, thus promoting the operation of algorithm decision-making on a legal, fair and just track.

6. Conclusions

In the era of digital governance, algorithm decision-making is deeply integrated into all fields of society, which brings profound changes to people's lives and social operation. A series of legal problems caused by algorithm decision-making can not be ignored, so it is urgent to regulate it legally and reconstruct its responsibility structure. By analyzing the legal problems and challenges faced by algorithm decision-making, this article finds that the black box of algorithm hinders public supervision and trust. In view of these problems, the research puts forward the ways to improve the legal norm system, strengthen the supervision mechanism and reconstruct the responsibility structure.

To improve the system of legal norms, the rights and obligations of various parties involved in

the algorithmic decision-making process, such as algorithm developers, data providers, and algorithm users, have been clarified, establishing legal boundaries for algorithmic decisions. Regulatory mechanisms have been strengthened by setting up specialized regulatory bodies and implementing dynamic supervision, combined with public oversight, to ensure the lawful and compliant operation of algorithmic decisions. The liability framework has been restructured by redefining the responsibilities of different entities and constructing a reasonable mechanism for allocating responsibilities based on different scenarios, thereby enhancing the accountability of algorithmic decisions.

These legal regulation paths and responsibility structure reconstruction measures cooperate with each other to form an organic whole, which is expected to effectively solve the legal dilemma brought by algorithm decision-making. In the future, with the continuous progress of technology, the legal regulation and responsibility structure of algorithmic decision-making still need to be continuously studied and improved to adapt to the dynamic changes in the digital age.

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