Research on Accountability Mechanism of Big Data Algorithm Decision

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Abstract: Algorithmic accountability is one of the core issues in big data application. Therefore, it is necessary to strengthen the research on accountability in big data algorithmic decision-making to ensure that algorithmic decision-making can be objective, scientific and transparent, and constantly promote the harmonious development of human-computer society and the scientific use of big data technology.

Many government departments and enterprises use big data technology and methods to make intelligent decisions in public policy making and market operation, such as: credit rating, trend analysis, content promotion and quantitative evaluation in education, medical treatment, justice, insurance and financial fields. Therefore, with the aggregation of big data, more and more government departments and enterprises use algorithms as a tool to transform data into knowledge and make decisions, which provides infinite growth possibilities for algorithm to dominate decision-making, and the impact of this growth is far-reaching. On the one hand, with the development of artificial intelligence, machine learning and deep learning, many decisions can be made automatically based on certain algorithms, instead of traditional artificial decision-making, which improves the efficiency of decision-making; on the other hand, when algorithms become more and more decision-making tools for organizations, algorithms will not only reshape personal life, And it will play an important role in the large-scale social, economic and political process, that is, algorithm is no longer just regarded as the operation of code, but represents the organization's important directional role in resource allocation, public opinion guidance, social equity and other aspects in various fields. Although computers are often regarded as objective and rational machines, algorithms are designed by human beings, which may be biased and wrong. Therefore, the accountability of big data algorithm decision-making becomes a difficult problem for the government and enterprises in the future, and also an important topic for scholars to study.

1. Literature review

As for the research on accountability of big data algorithm, relevant organizations and scholars abroad have carried out research on its necessity, transparency and accountability of algorithm decision-making, accountability and law of algorithm decision-making, allocation of responsibility of algorithm decision-making, etc.

1) The necessity of accountability in big data algorithm decision-making.

According to the World Wide Web foundation, the reason why algorithmic decision-making is questioned is because of its black box problem, which often puts citizens and consumers at a high risk. In order to reduce the harm and discrimination caused by algorithmic decision-making, it is necessary to strengthen the accountability of big data algorithmic decision-making and solve the gap in technology, ethics, knowledge and policy.

2) Big data algorithm decision transparency and accountability.

Scholar Paul bdelaat pointed out that the complete transparency of the algorithm does not help its accountability, because transparency may infringe on the privacy of individuals, and at the same time, it may make enterprises lose competitiveness. As a result, he believes that the algorithm can be made public to oversight bodies, but transparency to the public is not desirable.

3) Big data algorithm decision-making accountability legal issues.

Anton Vedder et al. Think that because of the algorithm in big data environment, only when the algorithm is not only regarded as the activity of data processing, the accountability of the algorithm can be paid attention to. At present, the impact of the algorithm has far exceeded the scope of data protection law. In the preamble of the general data protection law of the European Union, it is pointed out that the obligations of controllers and processors need to be adjusted in consideration of the possible risks caused by the algorithm in dealing with the rights and freedoms of natural persons. There is no detailed description of "obligation regulation", which affects the implementation of algorithm accountability.

4) Big data algorithm decision responsibility.

The distribution problem of Ren. According to Maja brkan, the bad consequences of big data algorithm decision-making should be assigned by the designer of the algorithm, that is, the developer and the data provider of the algorithm, that is, the adopter of the algorithm.

At present, the research of Chinese scholars on big data algorithm decision-making is more from the perspective of industry ethics regulation, mainly including: 1) the ethical issues generated by the application of algorithms in the field of journalism. Wang Yani, a scholar, thinks that the coming of algorithm era greatly improves the efficiency of information distribution, and the recommendation algorithm reduces the burden of information selection to a certain extent, but different algorithms have their ethical risks, which will bring problems such as information cocoon room, transfer of information choice right and lack of mainstream value orientation. 2) The ethical problems in the application of the algorithm in the field of unmanned driving. In order to prevent the ethical risk of "prisoner's dilemma", Wang Po, a scholar, believes that utilitarianism should not be enforced in the emergency algorithm of driverless accidentsAlgorithm. 3) The ethical problems in the application of algorithms in the field of artificial intelligence. Scholars Wei Qiang and Lu Ping believe that the new generation of artificial intelligence has a high degree of adaptability, which brings benefits to human beings, but also brings ethical risks such as privacy, security and transparency. On the whole, foreign scholars have made a more in-depth study on accountability of big data algorithm. Although the ethics of big data algorithm will involve the issue of responsibility, Chinese scholars still elaborate and analyze it from the moral level, and the research on its special "accountability" is still in the initial stage.

2. The meaning of accountability in big data algorithm decision making

With the application of the algorithm in various fields, the transparency of the algorithm has been widely concerned, which leads to the problem of algorithm accountability. Because the algorithm system has strong autonomy, it can form a set of its own system by continuous evolution and learning based on the acquired data. This structure is unexpected for developers, including the existence of "black box". It is difficult to trace back to the root of mistakes, which may bring challenges to the current ethics and order on the issue of accountability: is it the fault of algorithm or the wrong judgment of staff? In the near future, it may be very difficult to define responsibility and judge behavior supervision, which leads to the problem of responsibility gap. Therefore, many scholars have discussed what is algorithmic decision-making accountability. According to researcher Neyland D, accountability means that algorithmic decision-making should not only prove its rationality, but also undertake the obligation to mitigate any negative social impact and potential harm caused by it. According to Robyn Caplan, algorithmic decision-making accountability not only refers to the allocation of responsibility for the impact of the algorithm on society, but also includes the corresponding treatment mechanism if it causes harm. Although the above two scholars emphasize the content of accountability, the subject of accountability has not been clarified. The Public Policy Council of the United States has made clear provisions for the

accountability subject of algorithm decision-making, pointing out that the institutions applying the algorithm should be responsible for the decision-making made by the algorithm even if they can not make a reasonable explanation for the results of the algorithm. In this paper, the accountability of algorithmic decision-making refers to the responsibility of the institutions adopting and applying algorithmic decision-making for the adverse impact of society and individuals in the process of applying algorithmic decision-making and the process of taking corresponding relief measures.

3. The importance of accountability in big data algorithm decision making

The essence of artificial intelligence is a kind of algorithm model. With the support of powerful computing ability, computers can continuously analyze and learn from big data with the help of algorithms, and learn from experience through repeated trial and error correction, so as to realize the continuous improvement of their own intelligent level, so as to help people make corresponding decisions. In order to promote the harmonious development of human-computer society in the future, the research and establishment of algorithmic accountability is of great significance.

1) It is conducive to promoting the transparency of big data algorithm decision-making process.

In order to avoid the "black box" of intelligent decision-making and promote the data source, quality, design of algorithm model and transparency of operation process of big data algorithm decision-making, it is of great significance to ensure the legitimacy, fairness and justice of algorithm decision-making and provide important guarantee for big data decision-making.

2) It is helpful to promote the scientificity of algorithm decision model.

The design of big data algorithm decision-making model is the best embodiment of decision-maker's thoughts and ideas. By establishing accountability mechanism for algorithmic decision-making, the design of big data decision-making model must conform to objective laws, be objective, systematic and logical, and reduce the risk of prejudice, error and discriminatory harm in algorithmic model design, such as logic model, procedure model, and so on The design and application of data processing model and user-defined model conform to the principles of fairness and justice.

3) It is helpful to strengthen the responsibility of decision results.

Accountability for decision-making errors is not circumvented by intelligent decision-making. No matter the government or the enterprise, they are also responsible for the harm or discriminatory consequences caused by intelligent decision-making. The construction of algorithm accountability mechanism is helpful to greatly improve the responsibility of big data algorithm decision-making, trace and correct the mistakes or bad consequences of decision-making, and improve the value guidance of openness, fairness and justice of big data algorithm decision-making.

4. Countermeasures to improve accountability of big data algorithm decision

It is very difficult to trace the damage caused by big data algorithm decisions as ordinary victims. Because according to the way of civil litigation to the court, according to the Convention, the principle of who sues and who adduces the evidence, it is difficult for the victim to make mistakes in the automatic decision-making of adducing evidence by himself. As Goodman and others think, it's extremely difficult to sue employers for automated recruitment, because job seekers may never know whether the enterprise has adopted the technology. At present, the harm of algorithm decision-making that has been exposed is usually done by experts, scholars and engineers who know technology through the detection and evaluation of complex technology. Therefore, the problem of accountability in algorithmic decision-making is more difficult than that in common decision-making. With the coming of human-computer society, the construction of accountability system for big data algorithm decision-making has become an important problem to be solved by the government and enterprises in the future. The data of algorithm and driving algorithm are designed, created and collected by people. Even if the algorithm makes wrong decisions or unexpected results, including the way of machine learning, then the decisions made by the algorithm should be ultimately in the charge of people, rather than taking the algorithm decision as

an excuse and not taking corresponding responsibilities.

4.1 Clearly divide responsibilities according to different subjects

Although the main body of big data algorithm decision-making is very complex, there are human factors, as well as "machine" factors, it is necessary to clearly divide the responsibilities of decision-making main body, in order to help the effective implementation of algorithm decision-making and determine the attribution of responsibilities. Human beings express their opinions and choices to problems in language and words, while the essence of big data algorithm is to express and make decisions in computer code and mathematical way. The results of decision-making embed the subjective choice of designers, developers and users. In addition to the reasons of the algorithm itself, the comprehensiveness, accuracy, integrity and other factors of the decision-making raw material data are also important aspects affecting the algorithm. Therefore, according to the purpose, standard, function, application scope and effect of algorithm decision-making, different responsibility subjects are divided, and the harm caused by algorithm to the parties is evaluated and accountable. ① Designer or developer of algorithm Business. In terms of artificial intelligence products, its essence is a kind of commodity. Then the designer and developer of the algorithm are the important persons responsible for the algorithm decision-making. The algorithm designer includes both the algorithm engineer and the adoption.The mechanism of the algorithm. ② Manager of algorithm decision. Many enterprises or governments in order to improve the efficiency of the unit, to buy the products of big data algorithm decision-making, in the work of the harm caused to users, the managers of algorithm decision-making also need to bear the corresponding responsibility. The traditional decision-making accountability follows the principle of "who decides who is responsible" and "who is in charge of who is responsible". As a big data algorithm decision-making, although it is a decision made by a machine, the resulting harm and negative impact also need to be responsible by the corresponding responsible person. Therefore, the principle of "who designs who is responsible" and "who is in charge who is responsible" should also be followed.

4.2 Build a scientific and reasonable accountability mechanism

The "non transparency" and "non explainability" of big data algorithm decision-making have always been criticized. In order to promote its transparency and explainability, building a scientific and reasonable accountability mechanism helps to prevent the occurrence of its risks.

1) Establish a special accountability Committee for big data algorithm decision-making. Its main responsibility is not only to evaluate the risk of big data algorithm decision-making and make relevant rules and systems, but also to accept the complaints of the parties who are hurt by algorithm decision-making. It is very difficult for the parties concerned to prove the damage caused by traditional products. Therefore, in view of the high complexity of big data algorithm decision-making and the harm caused by big data algorithm decision-making products, it is necessary to establish a big data algorithm decision-making accountability committee composed of experts, scholars and technicians, to evaluate and certify the harm caused by the parties, and to provide the parties with relevant evidence and reports. Establish clear responsibility standards. As an organization that develops and adopts automatic decision-making, if it causes discriminatory and wrong decision-making, it needs to take corresponding responsibility according to the influence and severity of decision-making. At present, due to different standards and cognitive levels of error or discrimination, it is difficult to define the responsibility for the negative impact of automated decision-making. For example, compas is a crime risk assessment system applied by the judicial department of the United States that discriminates against black people. The algorithm of the system often labels black people as high-risk criminals. If black people commit crimes, they will face more severe penalties. However, due to the lack of a unified definition of algorithm deviation and the establishment of a corresponding accountability mechanism, many courts still use the system without any responsibility for the problems. Therefore, for the damage caused by the algorithm, it is necessary to clarify the responsibility of designers, developers and application

providers, and also to divide the damage caused by subjective intention or the damage caused by the natural acquisition of the algorithm system. According to the different problems, different responsibility standards should be formulated to better prevent the adverse consequences caused by the algorithm.

2) Strengthen the audit of algorithm. Strengthening audit is an important aspect of algorithmic accountability. In the general data protection law of the European Union, algorithmic audit is clearly proposed as an important means of assessing responsibility. The audit of algorithm includes both manual audit and AI audit, that is, the coding of audit content and process. Due to the complexity of the algorithm, in the audit process of the algorithm, for the deviation and bias of the algorithm and data, it is very limited to rely on the manual audit of experts and technicians. If we pass the professional AI audit system, we can scientifically check the learning model of the algorithm, and test the bias in the training data and model, it will greatly improve the efficiency and scientificity of audit.

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