

Intelligent Algorithm in Improving Governance Efficiency in Digital Governance Platform

Rui Chen^{1*}, Rongjie Zhang¹

¹ Shandong Youth University of Political Science, Jinan, China

Email Address

lucky20240421@163.com (Rui Chen), matcha1991@126.com (Rongjie Zhang)

*Correspondence: lucky20240421@163.com

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Abstract:

In the current tide of digital transformation, digital governance platform has gradually become an important means to improve the efficiency of government and enterprise management. Intelligent algorithm is the key driving factor, but there are still some problems in algorithm transparency, privacy protection and cross-domain compatibility in its integration and utilization. This paper explores the digital government management platform based on intelligent algorithms and evaluates its role in promoting the efficiency of government management. By integrating different types of management systems with intelligent algorithms, different types of supervision are realized. The research results show that the intelligent algorithm can effectively improve the accuracy and satisfaction of governance decisions, and its accuracy can reach 94.9%. The potential of intelligent algorithms in improving governance efficiency is verified, and the obstacles to be overcome in practical applications are also revealed.

Keywords:

Digital Governance Platform, Governance Effectiveness, Intelligent Algorithm, Data Privacy Protection

1. Introduction

With the advent of the digital age, the rapid development of information technology has brought great changes to the way of social management. With the advent of the digital age, the rapid development of information technology has greatly promoted the innovation of social governance models. In this context, the digital governance platform came into being and has become a key tool to improve governance effectiveness. Based on modern information technologies such as cloud computing, the Internet of Things, big data analysis and artificial intelligence, these platforms effectively solve various social problems and improve the governance level of government departments and enterprises. The information management method based on big data, through the processing and analysis of a large number of data, provides an immediate feedback and forecast model for government decision-making, so as to

realize the optimal allocation of resources and improve the efficiency, pertinency and effectiveness of decision-making. But in practice, there are still some problems such as transparency of algorithm decision, data privacy and security, collaboration and integration between multiple regulatory domains.

Considering the importance of intelligent algorithm to digital governance and the new problems brought by it, it is of great theoretical and practical significance to carry out research on management performance improvement based on intelligent algorithm to promote the improvement of government management level. This paper can study the construction and application of digital management platform to improve the application level of the government in the big data environment. Through the systematic research on the digital governance technology based on intelligent algorithm, the advantages, challenges and countermeasures are analyzed to provide reference and inspiration for the practice and theoretical research of digital management.

2. Related Works

The application of intelligent algorithm in digital governance platform is an important topic in the intersection of public management and information technology. Li Jingwen discussed the risk and governance of algorithm application and emphasized the importance of algorithm transparency and explainability [1]. Fan Bo explains the reasons why digital governance platforms fail in public emergencies through the analytical framework of “technology application - resilience enhancement” [2]. Qiao Tianyu explored the theories and methods of digital governance model research [3]. Deng Nianguo, based on the survey of “Cloud Network Platform” in Guizhou, studies how digital platform drives government governance innovation [4]. Shu Yuhong discussed how digital governance can comprehensively enhance the digital transformation of the government [5]. Yu Lian studied the mechanism and effect of digital governance in improving the implementation mechanism and effect of county government policies [6]. Hao Yue discussed how digital technology can enable the modernization of national governance [7]. Kim S discussed platform government in the era of smart technology [8]. Harrison T M focused on how to foster trusted AI in digital government [9]. Nitzberg M conducted an in-depth analysis of the diverse challenges faced when governing AI [10].

However, most of the existing studies are mainly theoretical exploration and case studies, and there is a lack of intelligent algorithm research for various governance scenarios. In view of the above problems, this paper takes the digital governance as the background, conducts a systematic research on the data governance technology based on intelligent algorithm, and analyzes the problems in depth. The effectiveness of intelligent algorithm in various governance scenarios is evaluated, and relevant governance countermeasures are given.

3. Methods

3.1. Data Collection and Analysis

This paper takes questionnaire survey as the main means to study the effect of digital governance based on artificial intelligence technology. From the five aspects of basic information, intelligent algorithm application cognition, performance evaluation,

challenges and problems, and improvement suggestions, it comprehensively obtains multi-dimensional information of platform managers, algorithm developers, policy makers, and end users. In the selection of indicator data, it should try to be representative and diversified to ensure the wide applicability of research results. Surveyors can send questionnaires to a wider audience through email, social media, professional forums, business seminars, etc. Prior to the issuance, an anticipation test was conducted on the respondents to verify the correctness and understanding of the questions [11,12].

3.2. Intelligent Algorithm in Improving Governance Efficiency

The applications of intelligent algorithms in digital governance platforms are multifaceted, processing and analyzing large amounts of data to support key governance activities such as decision making, resource allocation and risk assessment. The specific application process is shown in Figure 1:

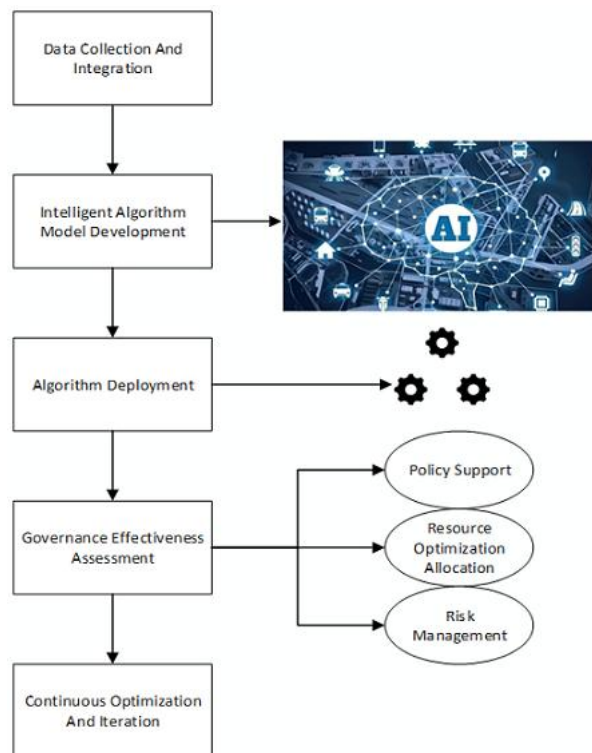


Figure 1. Application of intelligent algorithm in improving governance efficiency.

In the decision-making process, the law of current social problems and public needs is identified through the statistics and statistics of two kinds of large samples of history and reality. Based on data such as public opinions, social media comments and historical influences, machine learning and other methods are used to predict the social reactions and possible impacts of various decision-making schemes [13,14]. This paper uses logistic regression to estimate the probability of a particular policy passing:

$$P(Y | X) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \dots + \beta_n x_n)}} \quad (1)$$

$P(Y|X)$ is the probability of the policy passing, $x_1, \dots, x_n$ are the feature sets that affects the policy passing, and $\beta_0, \dots, \beta_n$ are the model parameters. In the allocation of

resources, an optimal scheduling method based on genetic algorithm is adopted to improve the operating efficiency and benefit of the system. Using this method, decision makers can make optimal decisions on the needs and expected benefits of each project under certain capital conditions. Resources are allocated to maximize the overall social benefit by:

$$C_{\max} = \sum_{i=1}^n c_i x_i \quad (2)$$

And it is subject to:

$$\begin{aligned} \sum_{i=1}^n a_{ij} y_i &\leq b_j, j = 1, \dots, m \\ y_i &\geq 0, i = 1, \dots, n \end{aligned} \quad (3)$$

c_i is the expected benefit of project i , a_{ij}, b_j are the consumption and total resource limit of resource j on Project i respectively, and y_i is the amount of resources allocated to Project i . In the field of risk assessment, intelligent algorithms use historical event data and real-time monitoring data to predict and identify potential risk patterns through classification and clustering algorithms.

3.3 Performance Improvement

Through the comprehensive use of historical and actual data, intelligent algorithms can help decision makers identify important trends and regularities. This method can analyze the traffic flow, population distribution and economic development, so as to lay a solid theoretical and technical foundation for future development and related public service projects. By analyzing various possible decision results and adopting machine learning method, decision makers can predict various possible decision results and make decision making more scientific and rational. Such as decision tree, random forest and other methods, can effectively solve a variety of complex, non-linear correlation, in the decision-making has a good explanation, help to improve the transparency and credibility of the decision. In resource allocation, the multi-objective optimization method based on genetic algorithm is adopted, so that the decision-makers can get the maximum benefit under the condition of limited resources. The method synthesizes various constraints and optimization indexes, and can achieve optimal resource allocation to a certain extent. Intelligent algorithms can also improve performance by automating processes and personalizing services. Through the use of natural language processing and intelligent dialogue robots, rapid response to public queries and requests can be achieved, reducing waiting time and improving user satisfaction. This paper applies a data-driven personalized service recommendation method. In view of the enterprise risk, the model-based method is adopted to realize the rapid identification and response of various internal risks through real-time monitoring and forecasting of the system. In terms of security management, intelligent video monitoring technology based on machine learning can achieve timely detection and rapid response to abnormal situations. In addition, the system can also assist government departments to evaluate the effectiveness of policy implementation and summarize and analyze the opinions of the public, so as to provide references for making relevant decisions [15].

4. Results and Discussion

4.1 Challenges and Countermeasures

In view of the problems existing in the current information construction, this paper studies a new government management mode based on artificial intelligence. This paper focuses on the transparency and interpretability of algorithms, privacy and security, algorithmic bias and fairness, technical compatibility and integration difficulties, governance and accountability. Through the comprehensive use of questionnaires, expert interviews, case studies and data statistics and other research methods, this paper discusses the impact of corporate culture construction on the development of enterprises. This paper classifies and evaluates all kinds of problems by means of importance-influence matrix, Chi-square test and correlation analysis. The importance-influence matrix divides challenges into four quadrants according to their importance and influence. Challenges with high priority need to be focused on and solved, and the importance-influence matrix is shown in Table 1. In this paper, a scale of 1-10 is used to represent the degree.

Table 1. Importance-influence matrix.

Challenge	Importance	Influence	Priority
Algorithmic Transparency	9.8	9.3	9.55
Data Privacy	9.1	8.2	8.65
Algorithmic Bias	9.6	9.3	9.45
Technical Compatibility	6.2	5.6	5.9
Governance Responsibilities	7.1	6.7	6.9

In the data in Table 1, the importance and influence of algorithmic transparency reach 9.8 and 9.3, and the comprehensive priority score is 9.55, which is the highest score, reflecting that it is the most concerned issue. Transparency in the decision-making process is essential to earn the trust of stakeholders. The importance score of algorithmic bias is 9.6, the impact score is 9.3, and the overall priority score is 9.45. Therefore, it is important to avoid bias during algorithm design and implementation to ensure the fairness and fairness of the algorithm. The importance and impact scores for data privacy are 9.1 and 8.2, respectively, and the overall priority score is 8.65. Protecting the privacy of individuals and sensitive information during the implementation of intelligent algorithms is another high priority issue that needs to be addressed with strong data protection measures. According to the importance and influence scores, algorithm transparency, data privacy and algorithm bias are the three core issues facing the realization of algorithm intelligence.

This paper uses Chi-square test to examine the perceived differences among public safety analysts, local law enforcement agencies, and community organization representatives on three evaluation criteria: algorithmic transparency, privacy protection, and algorithmic preference. Chi-square test data are shown in Table 2:

Table 2. Chi-square test.

Evaluation Indicators	Algorithmic Transparency	Data Privacy	Algorithmic Bias
Public Safety Analyst	9.52	8.41	9.66
Local Law Enforcement Agency	8.6	9.56	7.48
Community Organization Representatives	9.79	7.33	10.23
Chi-Square Value	15.44	12.29	18.27
Degrees Of Freedom	4.73	4.85	4.77
Significance	0.004	0.02	0.001

As can be seen from Table 2, for algorithmic transparency, public safety analysts gave a score of 9.52, local law enforcement agencies 8.60, and community organization representatives 9.79. The Chi-square value is 15.44, the degree of freedom is 4.73, and the significance level is 0.004, which shows that different groups have significantly different views on the transparency of the algorithm. And the significance of different groups in data privacy and algorithm bias is 0.02 and 0.001, and the significance value is less than 0.05, which is significant.

4.2 Technical Solutions

To solve the problem of data privacy and security, this paper uses a method of data security storage based on ciphertext, which encrypts and saves sensitive data. Data access is restricted by role access control, data anonymity can be used to protect user privacy, and differential privacy can be introduced to protect user data security. In order to enhance the transparency and interpretation of the algorithm, an interpretation board can be built to describe the algorithm decision, and each algorithm is explained in detail, and through the graphical visualization method to assist people to analyze it. In order to ensure the fairness and non-bias of the algorithm, a variety of data collection methods can be used to eliminate sample bias. The design can periodically identify possible biases and construct a feedback loop that allows users to report their subjective preferences in a timely manner. Through the establishment of a clear performance evaluation system, the continuous monitoring and evaluation of the objective function, the dynamic tracking and evaluation of the objective function are realized, and the algorithm is constantly optimized on this basis.

4.3 Risk Assessment

In order to compare the risk assessment effects of different technical solutions when applied in digital governance platforms, this paper selects the Encrypted Data Security Framework (EDSF), the Role-Based Access Control Platform (RBACP), and the Anonymous Data Processing System (Anonymous Data Processing System-ADPS) as comparative technical solutions. Various technical solutions can be implemented on selected digital governance platforms, and data can be collected using tools such as risk assessment software, data analysis tools, and user feedback questionnaires. The obtained risk assessment accuracy data is shown in Figure 2:

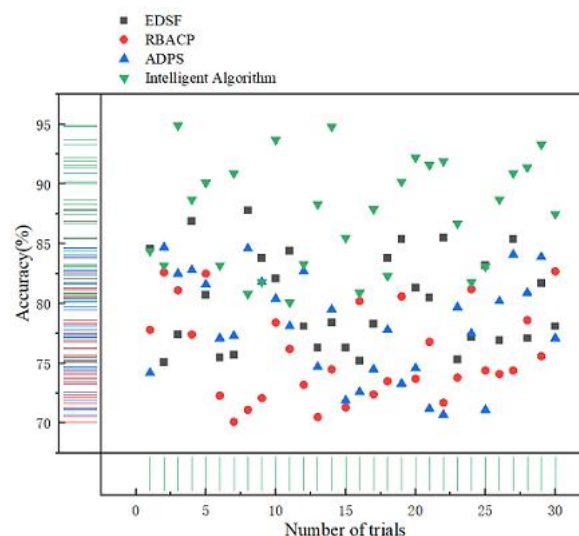


Figure 2. Accuracy of risk assessment.

Judging from the accuracy data of risk assessment, the accuracy of intelligent algorithm is generally higher, its highest accuracy can reach 94.9%, and the average accuracy is 87.47%. In contrast, the highest risk assessment accuracy of the technology was 87.8% of the EDSF, far lower than the intelligent algorithm. Intelligent algorithms have obvious advantages in processing complex data and identifying potential risks. The obtained satisfaction data of risk assessment are shown in Figure 3:

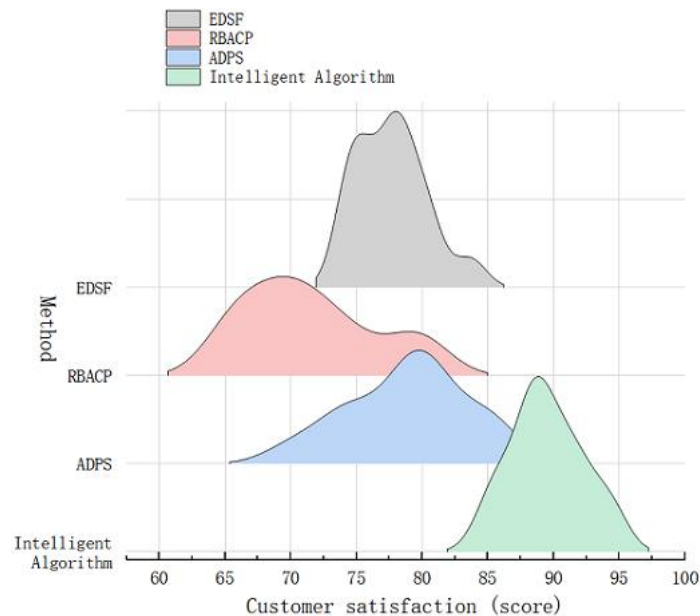


Figure 3. Satisfaction with risk assessment.

As can be seen from the data in Figure 3, the satisfaction of intelligent algorithm is higher in risk assessment satisfaction, and its satisfaction distribution ranges from 82 to 97 points. It can be found that the satisfaction of EDSF is generally higher than that of RBACP and ADPS, and the satisfaction of EDSF is distributed between 70 and 87 points, which is far lower than that of intelligent algorithms.

4.4 Results and Discussion

The study found that intelligent algorithms have significant advantages in analyzing complex data sets and predicting potential risks. The intelligent algorithm's excellent performance in risk assessment accuracy can be attributed to its advanced data processing capabilities and machine learning models. These algorithms are able to learn and recognize patterns from large amounts of data, automatically adjusting to improve the accuracy of predictions. High user satisfaction with intelligent algorithms may stem from the reliability and timeliness of the risk assessment results they provide. Decision makers and technology developers should make a reasonable choice of technology from the aspects of technical performance, user needs and management purposes. Although intelligent algorithm is an excellent method in risk assessment, it needs to be organically integrated with other methods in order to achieve the best effect of the entire digital management system.

5. Conclusions

In this paper, the application of intelligent algorithms in digital governance platform is comprehensively analyzed. In particular, it focuses on key challenges such as

algorithmic transparency, data privacy, and algorithmic bias, and proposes a range of technical solutions to address these issues. It is found that intelligent algorithms have significant advantages in the accuracy of risk assessment, and users have higher satisfaction with intelligent algorithms in risk assessment. However, the research mainly focuses on the technical aspects of intelligent algorithms, and the social, ethical and legal issues of intelligent algorithms are not deeply discussed. Future research could further expand the sample size, employ more diverse data collection methods, and delve into the long-term impact and social acceptance of intelligent algorithms.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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