Research on Public Resource Management Technology Based on Improved Differential Algorithm

Xue Wenhua
Fujian Polytechnic of Information Technology, 350003, China

Keywords: Evolutionary Computational Theory, Improved Differential Algorithm, Management Technology Research, Universities, Public Resources.

Abstract: Management technology research plays an important role in the public resources of intelligent universities, but there is a problem of inaccurate management scope. The traditional genetic algorithm cannot solve the resource management problem in the public resources of intelligent universities, and the management effect is not ideal. Therefore, this paper proposes research on public resource management technology in colleges and universities based on improved differential algorithm, and analyzes the research on public resource management technology in universities. In the era of knowledge economy, the optimal allocation of higher education resources and the promotion of management efficiency have become the key factors to promote the sustainable development of colleges and universities. With the continuous expansion of the scale of education and the increasing shortage of educational resources, how to scientifically and rationally manage and use the public resources of colleges and universities has become an important issue for managers.

1 INTRODUCTION

At present, there are many problems in the management of public resources in many colleges and universities, such as uneven allocation of resources, low utilization rate and high maintenance cost (Hu Yuting, 2016). These problems not only affect the teaching quality and scientific research level, but also restrict the long-term development of the school (Xie Ziyuan and Qiu Jifang, 2022).

2 RELATED CONCEPTS

2.1 Improved Mathematical Description of the Difference Algorithm

Difference algorithm is a method to predict future trends by calculating the differences between continuous variables (Wang and Xiao, et al. 2022). In the management of public resources in colleges and universities, the difference algorithm can accurately predict and dynamically adjust the resource demand (Liu, 2023), and realize the optimal allocation of resources shown in Equation (1).

$$\lim_{x\to\infty}(y_i \cdot t_{ij}) = \lim_{x\to\infty} y_{ij} \geq \max(t_{ij} \div 2) \quad (1)$$

Introducing intelligent management system: building an intelligent management platform based on big data analysis to realize real-time monitoring and automatic allocation of resources is shown in Equation (2).

$$\max(t_{ij}) = \partial(t_{ij}^{\ 2} + 2 \cdot t_{ij}) \succ mean(\sum t_{ij} + 4)\mathrm{M} \quad (2)$$

Formulate flexible resource allocation policies: dynamically adjust the allocation ratio of various public resources according to the prediction results of differential algorithm to meet the needs of different users in different periods.as shown in Equation (3).

$$F(d_i) = \square \prod \sum t_i \bigcap \xi \cdot \sqrt{2} \to \oint y_i \cdot 7 \quad (3)$$

2.2 Selection of management technology research programs

Strengthen the maintenance and update mechanism: establish a regular inspection and maintenance

Wenhua, X.
Research on Public Resource Management Technology Based on Improved Differential Algorithm.
DOI: 10.5220/0013537900004664

In *Proceedings of the 3rd International Conference on Futuristic Technology (INCOFT 2025) - Volume 1*, pages 177-181
ISBN: 978-989-758-763-4

system to ensure that resources are in the best use state (Wang and Liu, et al. 2022); At the same time, update the old equipment in time to improve the overall resource performance. as shown in Equation (4).

$$g(t_i)=\ddot{x}\cdot z_i\prod F(d_i)\frac{dy}{dx}-w_i \tag{4}$$

Strengthen user training and awareness guidance: Improve users' awareness of correct use and saving of resources through training, and reduce waste and loss is shown in Equation (5).

$$\lim_{x\to\infty} g(t_i)+F(d_i)\le\sqrt{2}\max(t_{ij}) \tag{5}$$

In order to improve the effectiveness of management technology research, it is necessary to standardize all data, and the results is shown in Equation (6).

$$\lim_{x\to\infty} g(t_i)+F(d_i)\leftrightarrow mean(\sum t_{ij}+4) \tag{6}$$

2.3 Analysis of Management Technology Research Programs

Although the above strategies are feasible, they may face some problems in practice, such as insufficient funds, imperfect technical support, uneven quality of personnel and so on (Ma and Wu, et al. 2022). Therefore, it is necessary to increase investment, improve technical force and strengthen personnel training to ensure the effective implementation of the strategy, and the results is shown in Equation (7).

$$No(t_i)=\frac{g(t_i)+F(d_i)}{mean(\sum t_{ij}+4)} \tag{7}$$

In the era when knowledge and talents keep pace with each other, higher education institutions play an important role (Geng and Wu, et al. 2023). As a solid masonry in the educational building, the management and utilization of public resources directly affect the core elements such as teaching quality, scientific research results and student satisfaction. is shown in Equation (8).

$$accur(t_i)=\frac{\min[\sum g(t_i)+F(d_i)]}{\sum g(t_i)+F(d_i)}\times 100\% \tag{8}$$

The first step is to build an all-round resource management system (Zhang and Wang, 2022). The system should cover all relevant areas of human resources, financial resources, academic resources and infrastructure resources can be expressed as Equation (9).

$$accur(t_i)=\frac{\min[\sum g(t_i)+F(d_i)]}{\sqrt{b^2-4ac}\sum g(t_i)+F(d_i)}+randon(t_i) \tag{9}$$

Taking human resources as an example, colleges and universities need to establish a multi-dimensional framework including teachers' professional development, student teaching assistant programs and administrative support personnel to ensure that all kinds of talents are rationally allocated and fully trained (Chen and Zhao, et al. 2022). At the same time, by establishing a digital platform and integrating resource information, the transparency and efficiency of resource allocation are improved.

3 OPTIMIZATION STRATEGIES FOR PUBLIC RESOURCE MANAGEMENT TECHNIQUES

Through data analysis tools, we can identify the hot spots and pain points in resource utilization, and find out the root causes of inefficiency and waste. This includes specific data on classroom usage, library borrowing and occupancy of laboratory equipment (Bai, 2022). On this basis, colleges and universities can formulate targeted optimization schemes, such as adjusting curriculum arrangement, optimizing book procurement process, or updating old equipment.

3.1 Introduction to Management Technology Research

Modern information technologies such as cloud computing, big data analysis and artificial intelligence can greatly improve the efficiency and accuracy of resource management.

Table 1: Technical research requirements for public resource management

Scope of application	Grade	Accuracy	Management technology research
Teaching equipment management	I	85.00	78.86
	II	81.97	78.45
Laboratory resource management	I	83.81	81.31
	II	83.34	78.19
Classroom scheduling and allocation	I	79.56	81.99
	II	79.10	80.11

using big data analysis can accurately predict the use trend of teaching resources, so as to prepare in advance; using cloud services can realize remote access and sharing of resources and expand the audience range of resources.

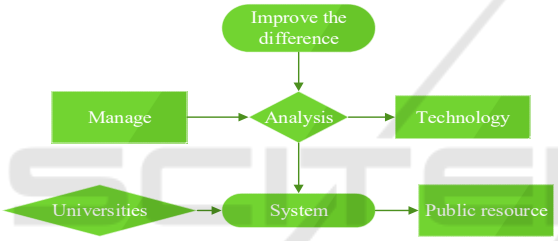

Figure 1: The analytical process of public resource management techniques

Innovative management mechanism is also indispensable. Colleges and universities can encourage teachers and students to use resources more efficiently by establishing incentive mechanisms, such as rewarding individuals or teams who save energy and materials. At the same time, regular training seminars are held to enhance teachers and students' awareness of the importance of resources and enhance their ability to manage and use resources.

3.2 Technical Situation of Public Resource Management

Continuous supervision and feedback are the guarantee to maintain management efficiency. Establish a dynamic monitoring system, real-time tracking of resource use status, timely adjustment of management strategy. At the same time, open feedback channels, encourage all parties in the school to actively put forward suggestions and problems, form a benign interaction, and promote the continuous improvement of management measures.

Table 2: Manage the overall picture of the technical research programme

Category	Random data	Reliability	Analysis rate
Teaching equipment management	85.32	85.90	83.95
Laboratory resource management	86.36	82.51	84.29
Classroom scheduling and allocation	84.16	84.92	83.68
Mean	86.84	84.85	84.40
X6	83.04	86.03	84.32
		P=1.249	

3.3 Management Technology Research and Stability

Effective management of public resources in colleges and universities requires a series of carefully planned and carefully implemented steps. From building a comprehensive resource management system to introducing advanced technology, and then constantly innovating and perfecting the management mechanism.

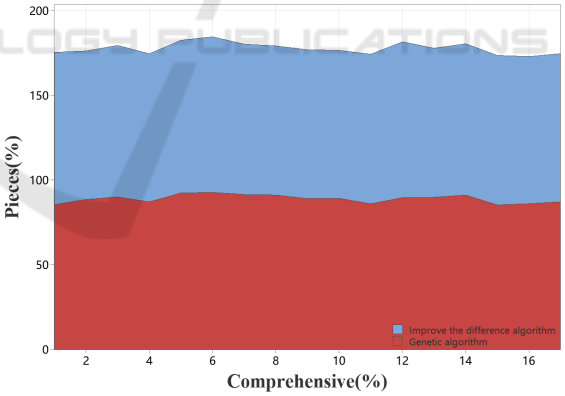

Figure 2: Research on management technology of different algorithms

Efficient resource allocation is the premise of improving resource utilization. Colleges and universities should establish and improve the resource sharing mechanism, break down the barriers between departments, and encourage cross-disciplinary and interdisciplinary exchanges and cooperation.

Table 3: Comparison of the accuracy of management techniques of different methods

Algorithm	Survey data	Management technology research	Magnitude of change	Error
Improved differential algorithm	85.33	85.15	82.88	84.95
Genetic algorithm	85.20	83.41	86.01	85.75
P	87.17	87.62	84.48	86.97

The electronation of books and materials can enable teachers and students to access the required materials anytime and anywhere; The implementation of laboratory opening system can make full use of laboratory equipment and avoid redundant construction and waste.

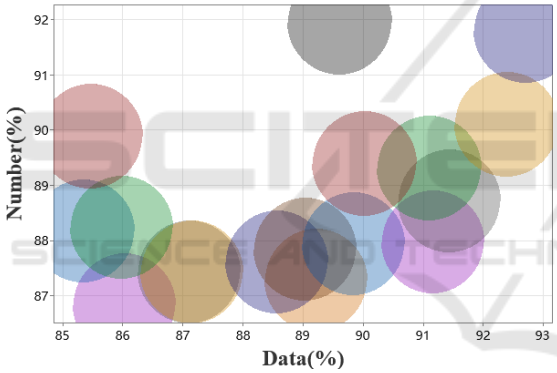

Figure 3: Research on management technology to improve differential algorithm

Good management system is the guarantee to ensure the effective use of resources. Colleges and universities need to maintain and upgrade public resources regularly to meet the needs of teaching and scientific research.

3.4 Rationality of Management Technology Research

For high-frequency facilities such as library reading rooms and sports fields, the reservation system can be adopted to reasonably allocate the use time and reduce the loss of waiting time in line.

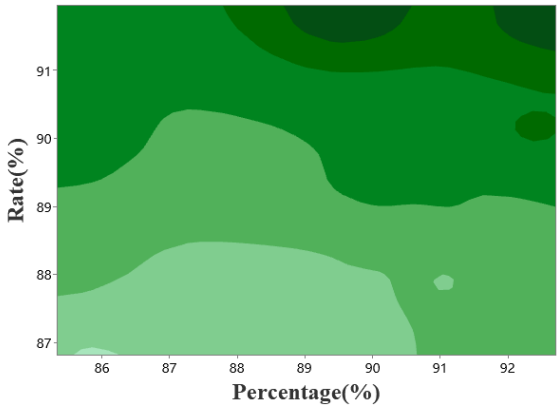

Figure 4: Research on management technology of different algorithms

Besides traditional teaching and research resources, colleges and universities can also explore new ways of resource development. For example, cooperate with enterprises to establish practice bases and provide internship opportunities for students; Carry out online open courses to attract more people to participate in lifelong learning; Some research results are even transformed into commercial products, creating economic value and feeding back the development of schools.

3.5 Manage the Effectiveness of Technical Research

Public resources are the precious wealth of colleges and universities, and their efficient use is directly related to the educational quality and scientific research level of colleges and universities.

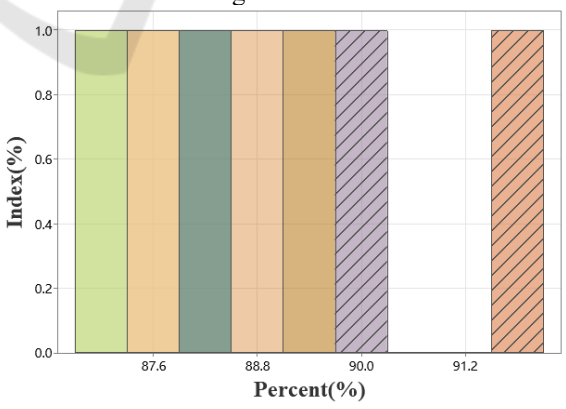

Figure 5: Research on management techniques of different algorithms

By optimizing allocation, strengthening management, cultivating saving consciousness, and innovating resource development, we can maximize

the potential value of resources and make greater contributions to the sustainable development of colleges and universities and social progress.

Table 4: Comparison of the effectiveness of management techniques of different methods

Algorithm	Survey data	Management technology research	Magnitude of change	Error
Improved differential algorithm	82.21	85.92	84.59	82.85
Genetic algorithm	83.73	84.23	84.41	83.55
P	84.20	87.39	84.76	83.90

Colleges and universities should actively promote the concept of resource sharing. For example, an inter-departmental sharing platform is established to allow teachers and students from different disciplines to share experimental equipment or books and materials.

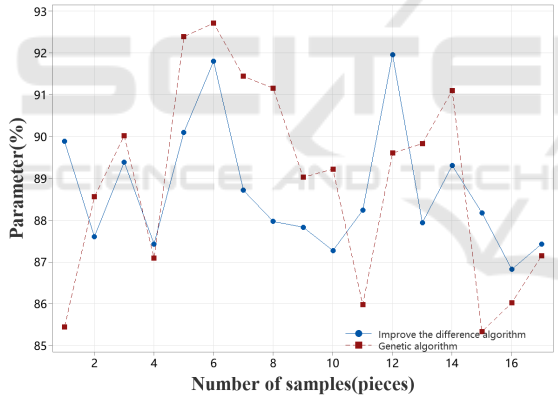

Figure 6: Research on improved differential algorithm management technology

Continuous performance maintenance of resources is as important as timely updating. Vulnerable experimental equipment and outdated academic materials should be repaired or updated in time to avoid losing money because of small things, which will affect the normal progress of teaching and scientific research activities.

4 CONCLUSIONS

Implementing regular resource efficiency evaluation is an effective means to ensure the efficient use of public resources. Through questionnaires and interviews, teachers and students' experience and suggestions are collected, resource utilization and satisfaction are analyzed, and resource allocation strategies are adjusted in time. Establish a feedback mechanism to encourage teachers and students to supervise the use of resources and form a benign interaction.

REFERENCES

Hu Yuting. (2016). Research on Test Sequence Optimization Technology based on Improved Differential Evolution Algorithm. (Doctoral dissertation, Jiangxi University of Science and Technology).

Xie Ziyuan, & Qiu Jifang. (2022). Research on Acceleration Technology of Frequency-Domain Finite Difference Algorithm based on Inverse Design.

Wang Qingfeng, Xiao Yuqing, & Qin Yi. (2022). Research on Adaptive Drilling Technology of Drilling Robot based on Expert Database and Differential Evolution Algorithm. Coal Mine Machinery(002), 043.

Liu Xiaochan. (2023). Chemical Parameter Estimation Based on Improved Differential Evolution Algorithm. Information Recording Materials, 24(4), 14-16.

Wang Zhendong, Liu Fantao, Hu Zhongdong, Li Dahai, & Wen Wei. (2022). Optimization Deployment Method for Sensor Network Nodes based on Improved Differential Evolution Algorithm. CN201910318330.8.

Ma Yue, Wu Lin, & Guo Shengming. (2022). Mission Target Allocation based on Improved Differential Evolution Algorithm. Command Control and Simulation, 44(4), 11.

Geng Rong, Wu Yaqian, Xiao Qianqian, Xu Sai. (2023). Research on Prediction of Space-based Information Network Resources based on Improved GRU Algorithm. Journal of Northeastern University (Natural Science Edition), 44(3), 305-314.

Zhang Rong, Wang Bin. (2022). Research on Unmanned Aerial Vehicle Mission Planning based on Improved Differential Evolution Algorithm. Electronics Production, 30(19), 49-54.

Chen Danfeng, Zhao Cai, Zhang Zhifei, & Zhou Yan. (2022). Research on Microgrid Dispatch based on Improved Differential Evolution Algorithm. Journal of Guangxi University: Natural Science Edition (004), 047.

Bai Yun. (2022). Research on Improved Methods of Differential Evolution Algorithm based on Reinforcement Learning. Scientific and Technological Innovation(028), 000.