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Optimization of Ideological and Political Education Path and Evaluation of Teaching Effect in Universities Based on Intelligent Computing Model

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ABSTRACT

Over the past two decades, with the support of the Party and the state, universities have established educational principles integrating curriculum reform, teaching beliefs, and political theories. Despite significant progress in ideological and political theory research, challenges remain that hinder sustainable development. This paper leverages a computerized algorithmic model of complex information networks to explore the intersection of scientific and humanistic approaches in education. By combining these methods, the study provides an optimized knowledge and political model for university education and analyzes its credibility. Empirical results indicate that the proposed model achieves a 91% accuracy rate. The improved model enhances the intellectual and political vitality of university theoretical courses, strengthens educational principles, and ensures the quality of university education.

Keywords: Universities, Ideological and political education, Path optimization, Intelligent computing model optimization

1. Introduction

Despite significant progress, several issues in the current teaching policies of universities cannot be ignored. Some "avant-garde" teachers misunderstand the requirements of curriculum reform, blindly pursuing innovation in teaching forms. They often equate ideological and political activity curricula with students engaging solely in self-study and discussions, without ensuring these activities

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are internalized into students' overall quality. As a result, "the educational goal of students' all-round development does not seem to have been truly achieved." Conversely, some teachers cling to traditional teaching methods and ideas. In ideological and political teaching, practices such as "lecturing from a book with a piece of chalk" and students "passively memorizing and reciting before exams" remain prevalent [10, 7, 12, 3]. Exploring teaching strategies that align with core literacy training requirements has become an urgent necessity in the context of curriculum reform [9].

Ideology and politics, though seemingly simple, reveal fundamental world laws that are universal in nature and contain an inherent simplicity and beauty. Ideological and political education aims to uphold the knowledge and political standards of university education, fostering morality, training successors for socialist society, and promoting all-round moral, intellectual, and physical development. This includes cultivating core competencies such as political identification, scientific spirit, legal awareness, and public participation [1, 11]. On one hand, intelligent computing provides advanced statistical analysis tools for complex information networks, ensuring a deeper understanding of such networks. On the other hand, traditional studies on complex information networks offer theoretical foundations for developing intelligent computing models and algorithms.

However, much of the current research on complex information networks focuses either on their physical characteristics or on their specific applications in certain fields, with limited studies addressing their broader impacts [13, 8]. Without the technical support of intelligent computing models and algorithms, research on complex information networks cannot fully realize its potential for intelligent computing and services. The growing demand for intelligent computing models and algorithms highlights the need for an integrated approach that combines these technologies with educational and political theory.

This study formulates an evaluation index system based on the requirements of political and ideological reform and the unique characteristics of universities. By doing so, it aims to enrich educational and political theory, enhance the research outcomes of theoretical education, and offer practical tools to improve scientific, ideological, and political education [4, 5, 6]. This system can help educators accurately understand the direction of education, diagnose gaps between current practices and reform goals, and develop effective strategies to improve educational outcomes. Additionally, education directors play a critical role in supervising the implementation of teaching reforms to ensure their success.

In summary, evaluating the intellectual and political methods most suitable for university education and their integration with intelligent computing models can provide valuable insights for educators and administrators. These insights can guide decision-making, training, and the improvement of educational practices, helping teachers understand the current educational landscape, students' learning needs, and the gaps that need to be addressed to achieve reform objectives.

2. Optimization of Intelligent Computing Model

This section summarizes the characteristics of complex networks in the field of intelligent computing, focusing on multivariate parameter optimization and advanced computational methods. The local process of multivariate parameter optimization is expressed in Eq. (1) and Eq. (2):

$$h_{lm} = \frac{\partial S\left(\theta^{i}\right)}{\partial \theta^{l} \partial \theta^{m}} \quad (i \leq l, m \leq d). \tag{1}$$

$$\theta^{i+1} = \theta^i - H^{-1}\left(\theta^i\right) g\left(\theta^i\right). \tag{2}$$

To enhance efficiency, the reverse transmission training algorithm is combined with the Newton iteration method to derive the steepest descent minimization, as shown in Eq. (3):

$$\begin{cases} w_{ij}^{(k+1)} = w_{ij}^{(k)} - \lambda^{(k)} \left(\dfrac{\partial E}{\partial w_{ij}}\right)^{(k)}, \\ \vartheta_i^{(k+1)} = \vartheta_i^{(k)} - \lambda^{(k)} \left(\dfrac{\partial E}{\partial \vartheta_i}\right)^{(k)}. \end{cases} \tag{3}$$

In high-dimensional problems, the minimization effect is optimal, as defined in Eq. (4):

$$\lambda^{(k)} = \min\left\{\lambda_{w_{ij}}^{(k)}, \lambda_{\vartheta_i}^{(k)}\right\}. \tag{4}$$

Pairing with Eq. (5):

$$w_{ij}^{(k+1)} = w_{ij}^{(k)} - \lambda_{w_{ij}}^{(k)} \left(\frac{\partial E}{\partial w_{ij}}\right)^{(k)}. \tag{5}$$

This leads to Eq. (6) through Eq. (8):

$$\Delta w_{ij}^{(k)} = w_{ij}^{(k)} - w_{ij}^{(k-1)}, \tag{6}$$

$$\Delta \hat{g}\left(w_{ij}^{(k)}\right) = \left(\frac{\partial E}{\partial w_{ij}}\right)^{(k)} - \left(\frac{\partial E}{\partial w_{ij}}\right)^{(k-1)}, \tag{7}$$

$$\lambda_{w_{ij}}^{(k)} = \frac{\Delta \hat{g}\left(w_{ij}^{(k)}\right)^T \Delta w_{ij}^{(k)}}{\Delta \hat{g}\left(w_{ij}^{(k)}\right)^T \Delta \hat{g}\left(w_{ij}^{(k)}\right)}. \tag{8}$$

The training method, based on weighted Naive Bayesian theory, is expressed in Eq. (9):

$$c(x_i) = \underset{c_i \in Y}{arg\,max}\, P_w(c_i) \prod_{j=1}^{n} P_w\left(x_{ij} \mid c_k\right). \tag{9}$$

Spherical harmonic analysis is calculated using Eq. (10) through Eq. (12):

$$a_{n,m} = \int_0^{2\pi} \int_0^{\pi} \sin(\theta) f(\theta,\varphi) \overline{Y}_n^m \, d\theta \, d\varphi, \tag{10}$$

$$f(\theta,\varphi) = \sum_{n=0}^{\infty} \sum_{m=-n}^{n} a_{n,m} Y_n^m(\theta,\varphi) \quad (n > 0), \tag{11}$$

$$Y_n^m(\theta,\varphi) = \sqrt{\frac{(2n+1)(n-m)!}{4\pi(n+m)!}} P_n^m(\cos\theta) e^{im\varphi}. \tag{12}$$

The three-dimensional discrete Fourier calculation is performed as follows (Eq. (13) through Eq. (15)):

$$y_{u,v,w} = \frac{1}{N^3} \sum_{i=-N/2}^{N/2-1} \sum_{j=-N/2}^{N/2-1} \sum_{k=-N/2}^{N/2-1} x_{i,j,k} \exp\left(-j\frac{2\pi}{N}(iu + jv + kw)\right), \tag{13}$$

$$X = \left\{x_{i,j,k} \in \mathbb{R} \mid -\frac{N}{2} \leq i, j, k \leq \frac{N}{2}\right\}, \tag{14}$$

$$Y = \left\{y_{u,v,w} \in \mathbb{R} \mid -\frac{N}{2} \leq u, v, w \leq \frac{N}{2}\right\}. \tag{15}$$

3. Methods

3.1. Model Building

From the perspective of evaluation systems, universities aim to improve knowledge and education policies by defining evaluation objectives, selecting appropriate thematic evaluations, establishing scientific indicator systems, collecting relevant data, and monitoring the effective use of evaluation results. However, these efforts are often carried out in isolation and lack systemic integration [2]. To ensure effective evaluation, support from related systems, such as national legislation, school personnel departments, and teacher salary systems, is necessary. From a sustainable development perspective, it is essential to accelerate legislative evaluation, deepen evaluation theory research, improve evaluation indices, and establish external evaluation mechanisms [14].

A 10-year evaluation model based on network topology is proposed, focusing on centralized evaluations that consider the network structure to assess various aspects of a complex information network. Different evaluation models, such as node correlation, centrality, control evaluation, and heterogeneous fusion models, are analyzed under local network topology. The relationship between these models is shown in Figure 1.

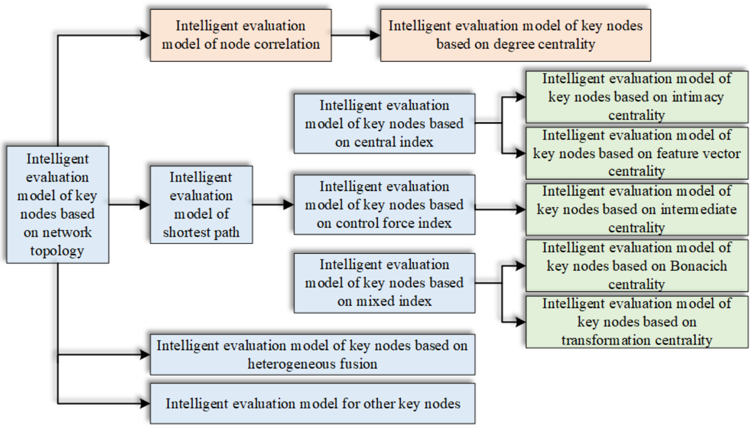

Fig. 1. Relationship diagram of intelligent evaluation models for key nodes based on network topology

Complex networks integrate intelligent computing models and algorithms. For a 3D model retrieval system, many models contain concave shapes, and the non-uniqueness of extended Gaussian images (EGI) on concave surfaces presents a significant challenge, as shown in Figure 2.

A 3D model retrieval system consists of a database of 3D models, a feature library extracted from these models, program modules for analyzing the geometric features of user input models, a matching module for comparing extracted features with the feature library, and an output module. The structure of a standard 3D model retrieval system is shown in Figure 3.

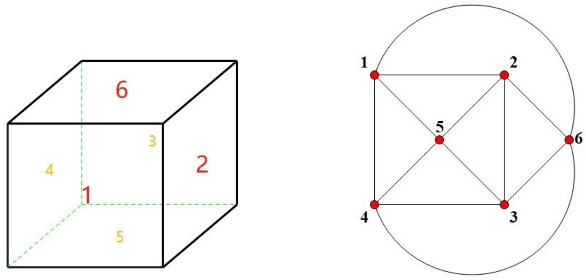

Fig. 2. Optimization of three 3D models with the same EGI

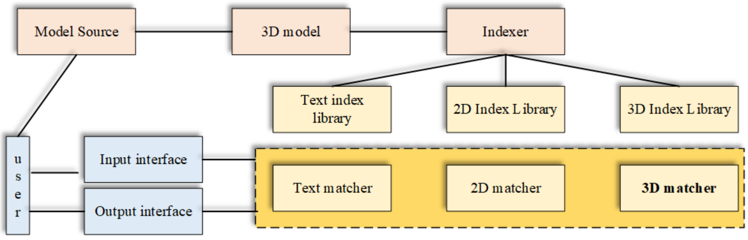

Fig. 3. Structure of the 3D model retrieval system

3.2. Research Assumptions

The true value of ideological and political education lies in helping students develop foundational ideological and political values through teacher guidance, fulfilling the essential task of moral education. However, current ideological and political education often focuses solely on knowledge delivery, neglecting students' emotions, attitudes, and values. This mismatch between teaching content and processes is expressed in Eq. (16):

$$c\left(\mathbf{x}_i\right) = \underset{c_i \in Y}{arg\,max} P_w\left(c_i\right) \prod_{j=1}^{n} P_w\left(x_{ij} \mid c_k\right). \tag{16}$$

Figure 4 illustrates an adaptive atomization system for evaluating ideological and political learning based on a BP neural network.

The first three layers correspond to the T-S fuzzy neural network precursor, and the last two layers correspond to its successor network. Each layer's functions are optimized, as shown in Figure 5.

3.3. Database Structure for Evaluation

The database for evaluation includes diversified information such as student details, teacher data, and curriculum records. Table 1 outlines the structure of the index boundary value database, while Table 2 presents the structure of the sample database. Table 3 provides the database structure for students' ideological and political learning evaluation.

Hence, education's ultimate goal is to directly reflect its quality through its impact. The proposed models and evaluation systems provide valuable insights into improving ideological and political education in universities.

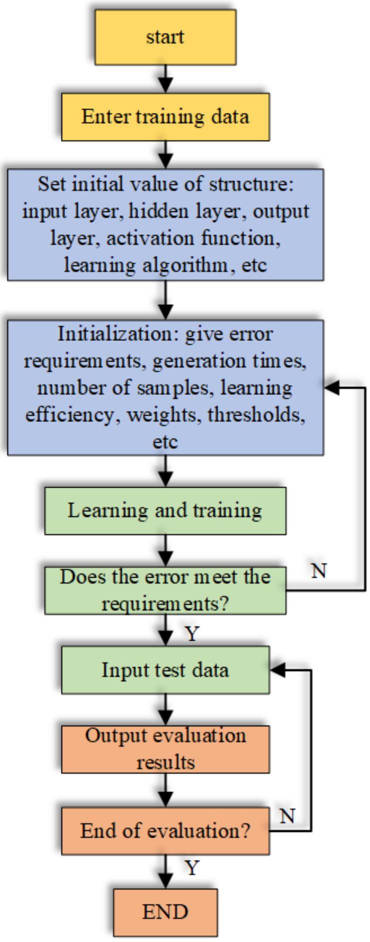

Fig. 4. Optimization of ideological and political learning evaluation process based on BP neural network

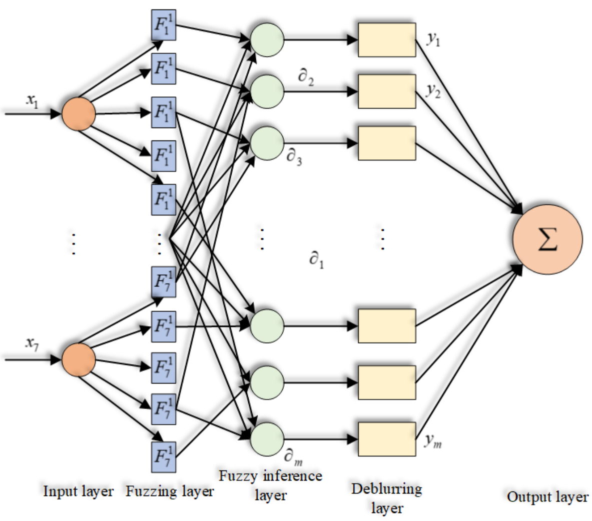

Fig. 5. Optimization of ANFIS (Adaptive Neuro-Fuzzy Inference System)

Field Name	Type	Width	Decimal Digits	Remarks
Indnum	Character	2	-	Index No
Indname	Character	20	-	Index Name
BJ1	Numerical	4	1	Excellent and good boundary
BJ2	Numerical	4	1	Good and medium boundary
BJ3	Numerical	4	1	Intermediate and pass boundary
BJ4	Numerical	4	1	Pass and difference boundary

Table 1. Index boundary value database structure

Field Name	Type	Width	Remarks
swnumber	Character	6	Index No
onlinetime	Character	4	Indicator 1 (Online duration)
execrate	Character	4	Indicator 2 (Operation completion rate)
soutime	Character	4	Indicator 3 (Learning resource usage)
prosum	Character	4	Indicator 4 (Number of initiated questions)
anssum	Character	4	Indicator 5 (Number of answered questions)
aveworkagr	Character	4	Indicator 6 (Average operation score)
avetestagr	Character	4	Indicator 7 (Average test score)
evaluationagr	Character	4	Comprehensive evaluation grade

Table 2. Sample database structure

Field Name	Type	Width	Remarks
S_NUM	Character	10	Student ID
C_NUM	Character	4	Course No
S_onlinetime	Character	4	Learning duration
S_exerate	Character	4	Operation completion rate
S_routine	Character	4	Resource usage duration
S_prosum	Character	4	Number of initiated questions
S_assum	Character	4	Number of answered questions
S_aveworkagr	Character	4	Average operation score
S_avetestagr	Character	4	Average test score

Table 3. Database structure for students' ideological and political learning evaluation

4. Case Study

4.1. Verification of Complex Information Intelligent Computing Model and Algorithm

To improve the system of knowledge and political progress in scientific construction and education, it is essential to adapt to societal developments. The ideological and political theory courses in China's higher vocational education must adhere to the principles of Marxist theory, align with the development of socialist society, and reflect the goals of moral education. These courses must evolve with the times, ensuring their relevance and effectiveness.

The ideological, political, and moral development of college students is a complex and iterative process. Teachers must provide consistent guidance throughout the teaching process to facilitate positive development. Building a model path system for university ideological and political education involves leveraging students' moral and ideological potential and evaluating their developmental trends. Figure 6 illustrates the knowledge and political outcomes of emotion-based learning assessments.

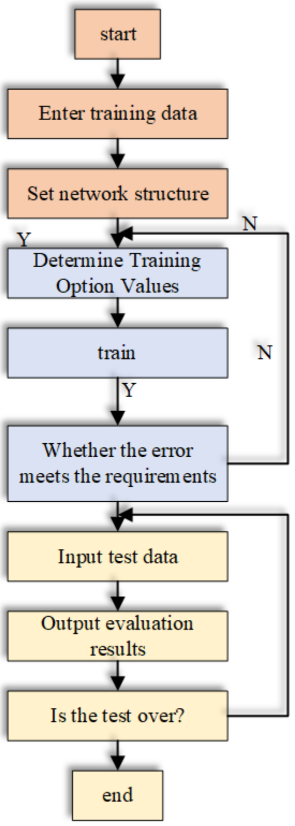

Fig. 6. Optimization path of the evaluation process for ideological and political learning based on ANFIS

Since sample data comes from diverse sources and categories, subjective factors can influence sample collection, leading to variations in evaluation results. Eliminating outliers is critical to maintaining the integrity of the dataset. Figure 7 shows the optimization steps for constructing an effective sample set of BP networks after removing interference points.

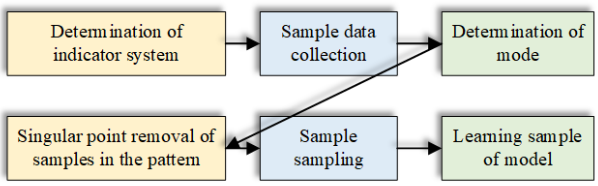

Fig. 7. Optimization steps for BP networks after eliminating interference points

Universities must cultivate theoretical thinking, scientific research abilities, and practical applications of knowledge. However, vocational curriculum research often overlooks the importance of ideological and political theory. Table 4 presents the test results of various datasets to evaluate algorithm performance.

From the evaluation of teaching methods, classroom atmosphere, and student feedback, it is evident that traditional teaching methods often fail to engage students effectively. Therefore, data simulation

Dataset	Example	Attribute	Class	Defect	Numerical
Anneal	899	38	7	yes	yes
Anneal.ORIG	899	38	7	yes	yes
Balance-scale	626	6	4	yes	yes
Breast-cancer	287	11	3	yes	no
Breast-w	699	211	3	yes	no
Colic, ORIG	369	29	3	yes	yes
Credit-a	691	17	3	no	yes
Credit-g	1000	22	3	no	yes

Table 4. UCI dataset test results

is necessary to assess the accuracy of educational models.

4.2. Data Simulation

Traditional lecture-based teaching reduces classroom interaction and student participation, leading to disengagement. This study employs noise reduction on ANFIS and BP network datasets using a limited multi-view mixed distribution as the optimization path. The experimental results are shown in Figure 8.

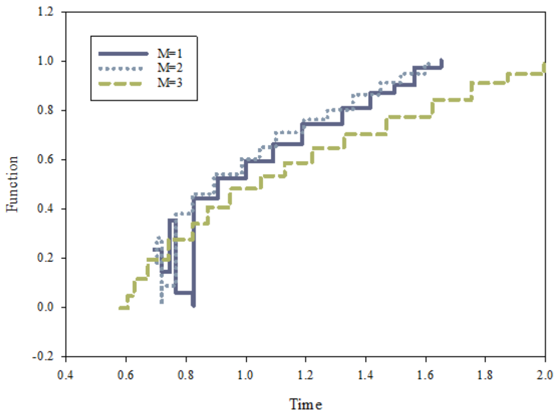

Fig. 8. Mixed distribution experiment results of ANFIS and BP networks from different perspectives

The retrieved data was tested using AI neural networks with continuous weight adjustments to enhance retrieval effectiveness and enable unsupervised learning. Figures 9 and 10 illustrate the optimized flow of theory and political education.

The proposed atomization logic system simplifies into four steps: fuzzification, establishing rule sets, fuzzy reasoning, and defuzzification, as shown in Figure 11.

To enhance reliability, the closed-loop operation mechanism ensures continuous optimization. Figure 12 demonstrates this mechanism, which includes a training and testing loop for ideological and political learning evaluation.

Table 5 and Table 6 compare test results, highlighting the superior performance of the ANFIS model over BP networks.

The results indicate that emotion-based evaluation models outperform neural network models in assessing educational knowledge and policies. Figures 13 and 14 show the empirical results, aligning with expected assumptions.

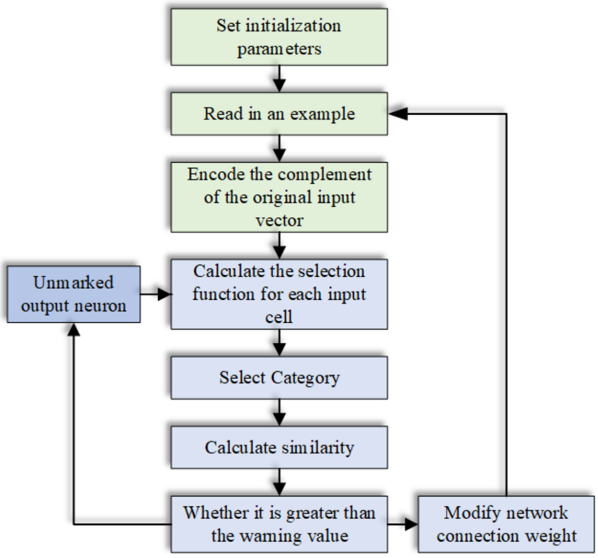

Fig. 9. Flowchart of ideological and political path algorithms based on emotional education

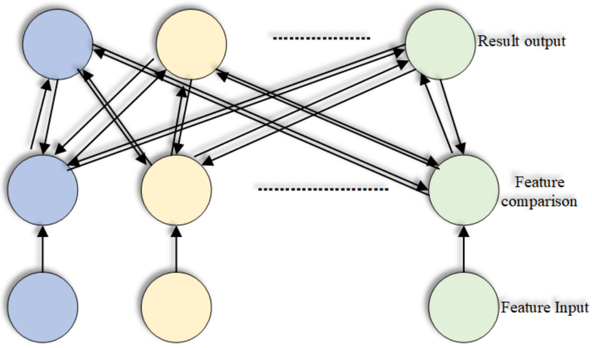

Fig. 10. Optimization flowchart of theoretical and political education based on neural networks

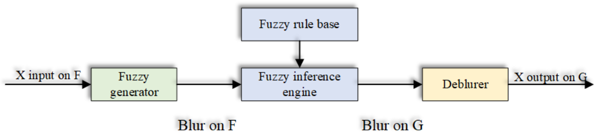

Fig. 11. Optimization structure of the fuzzy system

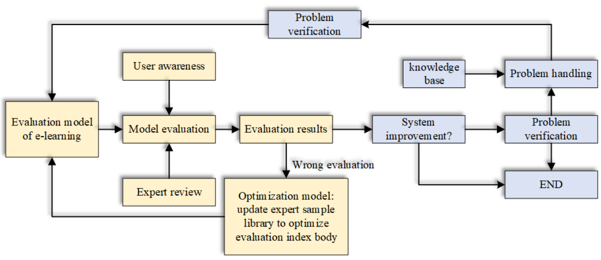

Fig. 12. Closed-loop operation mechanism of the evaluation system

5. Conclusion

The evaluation of theoretical and political approaches in education remains a critical issue. This study compares two improvement methods, demonstrating the superior reliability and efficiency of the ANFIS model. The accuracy exceeds 91%, and the absolute error is below 0.06, confirming the

Model	Accuracy	Square Absolute Error	Root Mean Square Error
Based on BP Model	78.18%	0.0983	0.2735
Based on ANFIS Model	83.27%	0.0757	0.1575

Table 5. Comparison of cross-test results

Model	Accuracy	Square Absolute Error	Root Mean Square Error
Based on BP Model	68.57%	0.1127	0.3033
Based on ANFIS Model	91.43%	0.0700	0.2320

Table 6. Comparison of test results

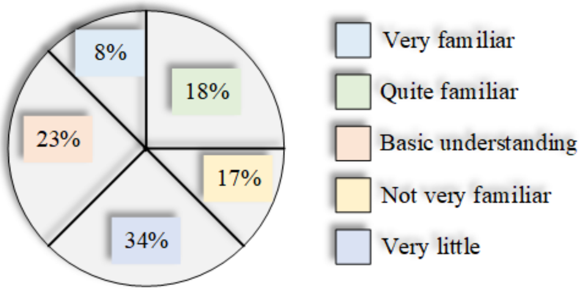

Fig. 13. Empirical results of path optimization and teaching assessment

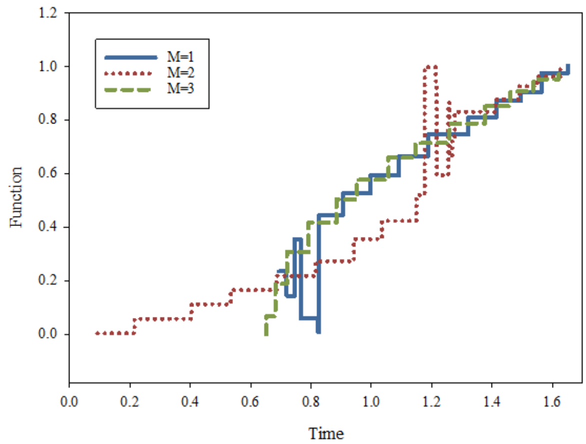

Fig. 14. Empirical results of teaching impact evaluation

model's validity. These findings provide valuable insights for enhancing educational ideology and political theory courses in universities.

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