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Construction and Improvement Path of Digital Literacy Evaluation Model for Higher Vocational Teachers Based on Deep Learning and Soft Computing

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ABSTRACT

In view of the rapid development of information technology, the cultivation and promotion of digital literacy of higher vocational teachers has become an important issue in the field of education. The application of deep learning and soft computing technology provides strong technical support for this. This paper is to explore the construction and promotion path of digital literacy evaluation model of higher vocational teachers from the perspective of "AI+". This study deeply analyzes the status quo of digital literacy of higher vocational teachers, and focuses on the combination and application potential of deep learning and intelligent algorithm in the evaluation model and promotion path of digital literacy of higher vocational teachers based on "AI+" perspective. This research plays an important role in promoting personalized education and cultivating talents with high-quality technical skills. Future research will further deepen relevant theories and promote the scientific, standardized and intelligent evaluation model of digital literacy of higher vocational teachers.

KEYWORDS

Informatization, Evaluation model, Digital literacy, Improvement path

INTRODUCTION

As an indispensable part of the vocational education system, higher vocational education is committed to cultivating high-quality technical and technical talents with both professional theoretical knowledge and practical operation ability. Such talents not only meet the demand of social and economic development for talents but also provide solid support for the upgrading of industrial structure and technological innovation (Qiu, 2023). Therefore, the quality and level of higher vocational education are directly related to the speed and quality of national economic development. In higher vocational education, the quality and ability of teachers are undoubtedly the core elements that determine the quality of education. With the rapid development and wide application of information technology, digital literacy has become one of the indispensable basic literacies of modern teachers. For teachers in higher vocational education, as the backbone of promoting the reform and development of vocational education, it is particularly important to improve their digital literacy (Fan et al., 2024). This will not only help to improve the teaching effect and promote the in-depth development of educational informatization but also set an example for students and cultivate the students' information literacy and innovation ability.

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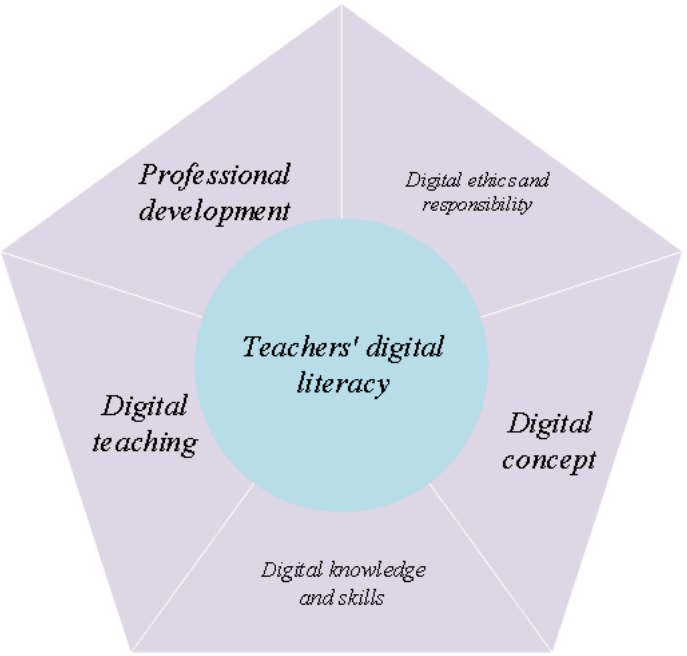
Figure 1. Connotation of Digital Literacy of Higher Vocational Teachers



The composition of digital literacy of higher vocational teachers involves three levels: the basic level covers digital office, digital social interaction, and digital security (Alnasib, 2023). The professional level focuses on the digital application of this major. The identity level includes multiple roles, such as digital teacher, digital technician, digital social worker, and digital science and technology. Improving the digital literacy of higher vocational teachers is not only of great significance to their own working ability but also helps to improve students' digital literacy and promote the overall development of digital education in higher vocational colleges. The connotation of digital literacy of higher vocational teachers mainly includes five aspects. First, it refers to the deep understanding and cognition of digital technology by higher vocational teachers, including cognition, attitude, and values of digital technology (Antonietti et al., 2022). The second is to require higher vocational teachers to master and effectively use the theoretical knowledge and practical skills of digital technology, including the use of digital tools and the development of digital resources (Ng et al., 2023). Third, higher vocational teachers can flexibly use digital technology and resources to innovate teaching modes to promote students' all-round development, which involves digital teaching design, teaching implementation, and academic evaluation (Nadia, 2023). The fourth is to emphasize the ability of higher vocational teachers to use digital technology and resources to promote their own and teachers' community professional growth, including digital learning and teaching research (Ovcharuk et al., 2020). Fifth, higher vocational teachers are required to strictly abide by relevant laws, regulations, and ethics when using digital technology and resources and assume the responsibility of digital security protection (Dahri et al., 2023). Figure 1 below is a summary of the connotation of digital literacy of higher vocational teachers.

After the concept of artificial intelligence was first put forward by McCarthy and Hayes (1981) in the 1950s, it has become a cutting-edge technology to change production and lifestyle after more than 70 years of development. The concept of “AI+” and its derivative technologies and products cover almost all industrial fields, especially in natural language processing, computer vision, and unmanned driving (Liu et al., 2023). Through model training and testing, computers have human-like

brain functions (Kim et al., 2020). In the current era of rapid development of information technology, AI technology has widely penetrated into all fields of social life, which has had a far-reaching impact on social development (Liu et al., 2023). And with the continuous progress of technology, their applications in the field of vocational college education are also increasing. In the field of education, AI technology provides the possibility of personalized teaching, intelligent assessment, and autonomous learning and injects new vitality into the innovation and change of education. From the perspective of AI technology, it is particularly critical to study the evaluation and promotion of digital literacy of higher vocational teachers.

Soft computing (SC) is an imprecise but usable solution to complex computing problems by using approximate computing. This method can solve the problem that current hardware can't solve or is very time-consuming. Compared with hard computing, SC is sometimes called computational intelligence. It provides a method to solve problems by means other than computers. Different from the traditional computing model, SC can tolerate partial truth, uncertainty, inaccuracy, and approximation by taking human thinking as an example. The fault tolerance of SC allows researchers to deal with some problems that traditional computing cannot handle (Zhang et al., 2021). With the rapid development of computer performance, artificial intelligence has gradually become an important driving force of the fourth industrial revolution. Deep learning (DL) is proposed as the main branch of machine learning (ML), and ML always uses a more complex multilayer neural network architecture (Sahu et al., 2023). Compared with other ML methods, DL needs less manual guidance but a lot of data to explore the complex, diverse, and internal relationships hidden in the data.

Soft computing is defined as a set of methodologies, which is an important factor in building a new generation of intelligent computing systems and has achieved great success in solving practical computing problems. On the other hand, deep learning has become one of the most promising technologies in the field of artificial intelligence in the past decade (Kasongo, 2023). As an important branch of AI technology, deep learning and soft computing provide scientific and objective methods for the evaluation of the digital literacy of higher vocational teachers. By using deep learning and soft computing technology, we can comprehensively and accurately evaluate the digital literacy level of higher vocational teachers and provide targeted guidance for their professional development (Tang, 2024). In addition, the research on the improvement of digital literacy of higher vocational teachers based on deep learning and soft computing has far-reaching significance. It not only helps to promote the informationization and modernization of higher vocational education but also provides strong support for cultivating talents with high-quality technical skills. At the same time, it also provides a new path for the development of higher vocational teachers and helps them to play a greater role in educational reform and innovation.

Under this background, this paper takes the construction and promotion of evaluation models for the improvement of digital literacy of higher vocational teachers as the research goal and discusses the realization mode of combining deep learning with soft computing from the perspective of "AI+," focusing on the construction method and approach nerve of the model. In the "AI+" vision, the evaluation model and interactive thought of digital literacy of higher vocational teachers based on deep learning and soft computing are constructed, and the data standardization processing method is discussed. Finally, the data normalization method is discussed from the aspects of teachers, schools, and soft computing software. This research has an important supporting role and reference value for promoting personalized education and cultivating talents with high-quality technical skills.

The research goal of this paper is to develop and popularize an evaluation model to improve the digital literacy of higher vocational teachers. The model utilizes the integration of deep learning and soft computing methods within the framework of "AI+." The main goal is to create a comprehensive and accurate evaluation tool, which can effectively measure the digital literacy level of vocational teachers. This paper combines deep learning with soft computing technology to provide a scientific and objective method for the evaluation of the digital ability of higher vocational teachers. The evaluation is very important to guide their professional development and ensure that they have the necessary skills

to adapt to the needs of the modern digital environment. In addition, the research aims to promote the development of higher education by promoting the informationization and modernization of this department. By improving the digital literacy of vocational teachers, we can cultivate a group of highly skilled technical talents who can promote innovation and educational reform.

LITERATURE REVIEW

Teachers' digital literacy refers to the teachers' ability to understand, apply, and innovate when facing various digital technologies, especially their ability to integrate these technologies into information-based teaching (Eraku et al., 2021). For primary and secondary school teachers, digital literacy is mainly reflected in the following aspects: being able to skillfully use digital technology in teaching, designing and developing innovative and effective teaching strategies and resources, guiding students to use digital technology scientifically and reasonably, and using digital technology to effectively analyze and evaluate teaching effects.

There are different views on the elements of digital literacy in academic circles. Wang et al. (2013) and other scholars discussed the digital literacy education of teachers from three dimensions: instrumental knowledge and skills, advanced knowledge and skills, and application attitude. They believe that teachers should not only master the basic operation but also have a high-level knowledge system and a correct application attitude when using digital technology. Gao and Guo (2019) define teachers' digital literacy from three levels: technology, education, and society. Among them, the technical level covers technical consciousness, emotion, ontology knowledge, application ability, and technical thinking. The education level involves intelligent education concept, intelligent educational thinking, intelligent teaching design, intelligent teaching development, and evaluation. The social level pays attention to social cognition, social responsibility, and social guidance. Xiaoyong et al. (2023) elaborated on the ways to cultivate teachers' digital literacy from four aspects: knowledge base, ability aggregation, thinking support, and deepening cultural value. Falloon (2020) described the digital literacy that teachers should have from six aspects: digital foundation, digital office, digital teaching, digital scientific research, digital social interaction, and digital security. The American New Media Alliance defines teachers' digital literacy from three aspects: general literacy, creative literacy, and subject literacy, and emphasizes the basic skills, innovative thinking, and interdisciplinary application ability that teachers should have in the digital age (Hobbs, 2010). The European Commission described the digital literacy framework of teachers in detail from five aspects: professional participation domain, digital resources domain, teaching and learning domain, evaluation domain, and empowerment learner domain, highlighting the multiple roles of teachers in digital education (Caena & Redecker, 2019). Although there has been a lot of research on teachers' digital literacy education, under the background of "AI+," the research on how to improve teachers' digital literacy by combining advanced technologies such as deep learning and soft computing is still insufficient. This may be related to the rise of deep learning and soft computing technology in recent years and their preliminary exploration in the field of education. In the future, with the further development and popularization of technology, I believe there will be more research on how to use these new technologies to improve and cultivate teachers' digital literacy.

MATERIALS AND METHODS

Current Situation of Digital Literacy of Higher Vocational Teachers

At present, there are many characteristics of digital literacy of higher vocational teachers. First, most higher vocational teachers have mastered basic digital skills and can skillfully use common digital tools and platforms for teaching and research. They generally agree with the key role of digital technology in teaching and scientific research and are willing to try new technologies to

optimize teaching methods and improve research efficiency. However, the current situation also has shortcomings. Some higher vocational teachers have limited digital skills, so it is difficult to give full play to the advantages of digital technology in teaching and scientific research (Mutohhari et al., 2021). This may be due to their insufficient investment in digital technology learning and training, or the challenge of time and energy. In addition, higher vocational teachers also show some limitations in the application of digital technology. They may rely too much on traditional digital tools and have relatively little understanding and application of emerging technologies. At the same time, they lack innovation consciousness when using digital technology, and it is difficult to realize the deep integration of technology and teaching and scientific research content, thus limiting the potential of digital technology in related fields (Kossybayeva et al., 2022). External environmental factors also have an impact on the digital literacy of higher vocational teachers. The lack of digital resources and facilities in some higher vocational schools restricts the improvement of teachers' digital literacy. At the same time, some schools don't pay enough attention to teachers' digital literacy and lack corresponding training and support, which further limits the development of teachers' digital literacy in higher vocational colleges.

The Important Value of Improving Higher Vocational Teachers' Digital Literacy

The importance of improving the digital literacy of higher vocational teachers is mainly reflected in the following three aspects. First, adapt to the development trend of digital education. With the rapid development of science and technology, digital education has become an important development direction in the field of education. As the key executor of education, it is very important for higher vocational teachers to improve their digital literacy. This will not only promote the in-depth development of digital education and enhance the vitality, flexibility, and individuality of the teaching process but also better meet the needs of social development and provide better education services for students. Secondly, it promotes the all-around growth of teachers. Digital literacy has become an indispensable basic quality for contemporary teachers. Improving the digital literacy of higher vocational teachers will not only help them master digital teaching tools and methods and improve their professional ability but also promote exchanges and cooperation among teachers and build a good environment conducive to teachers' professional development, thus improving the quality and ability of the whole teaching team. Finally, promote the realization of personalized education. Because of individual differences among students, digital education can provide personalized learning paths and teaching resources according to students' different characteristics and needs. Improve the digital literacy of higher vocational teachers, so that they can make full use of digital teaching tools and platforms and provide students with rich, diverse, and personalized teaching content and differentiated teaching methods. This can not only meet students' learning needs and improve the teaching effect but also help students to know their learning level and progress more accurately, adjust their learning strategies, and realize personalized development.

Construction of Digital Literacy Evaluation Model Based on Deep Learning and Soft Computing from the Perspective of AI+

AI technology plays a particularly key role in the production of social life and is profoundly changing the development mode and speed of all walks of life. It shapes our intelligent life from smart cities, smart driving, and intelligent diagnosis, which not only further optimizes production efficiency and resource allocation but also provides great convenience for our own development. Higher vocational teachers are the important disseminators and guides of vocational education in China, and their digital literacy is directly related to the development of advanced technical talents in the future. However, the traditional literacy evaluation and promotion path cannot meet the requirements of social development in the new era, so it is very important to carry out the evaluation model and promotion path of digital literacy of higher vocational teachers combining deep learning and soft computing under the background of AI.

Figure 2. Relationship Among AI, Deep Learning, and Soft Computing

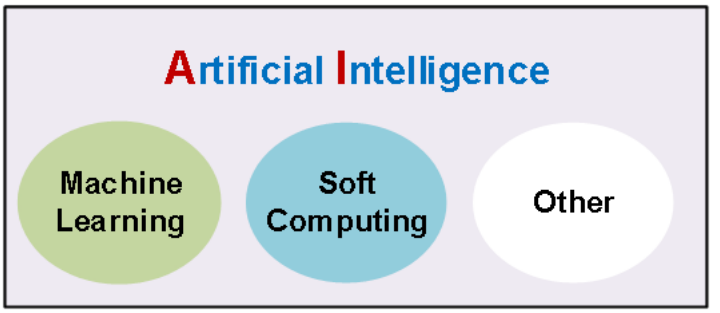


Figure 2 shows the relationship between AI, deep learning, and soft computing. As shown in the figure, artificial intelligence is a discipline that covers a series of technologies, methods, and applications and has the ability to make computers behave intelligently (including but not limited to learning, reasoning, perception and language understanding, etc.), among which deep learning and soft computing are important branches. Deep learning is to realize complex pattern recognition and feature extraction by simulating the structure of the human brain neural network in machine learning, which has an excellent performance of fitting various high-order nonlinear mapping relationships. Soft computing is a way to solve fuzzy and uncertain problems based on human thinking methods, such as pattern recognition and optimal decision-making. In the actual operation of the model, the process of deep learning and training often depends on parameters. Although the effect fitting can be realized through a lot of training and exhaustive forms, it will occupy a lot of computing resources and reduce the real-time performance of the model. Therefore, this paper plans to optimize the model parameters by combining soft computing, to reduce the training cost of the model and make the optimized algorithm have both excellent antiinterference ability and fast learning and fitting ability.

Figure 3 shows the algorithm model of combining deep learning and soft computing proposed in this paper. The evaluation index dimensions of digital literacy should include basic technical operation, information acquisition, screening and processing ability, innovative application level, etc. Information can be collected by organizing teachers' digital ability tests, teaching system logs, teaching effect feedback, students' evaluation results and curriculum setting, etc. In the aspect of model construction, one or more combinations of common deep learning algorithms can be adopted, including but not limited to one or more combinations of Multilayer Perceptron (MLP), Recurrent Neural Networks (RNNs), Autoencoder (AE), Deep Reinforcement Learning (DRL), and other networks. Soft computing adopts one or more combinations of genetic algorithms (GAs), Artificial Immune Systems (AISs), and Evolutionary Computing (ES). It is worth noting that the key parameters of soft computing optimization deep learning will change with the adjustment of a deep learning algorithm model. Considering that the dimension difference of all kinds of data is large, it is easy to cause the convergence of error operation, this paper plans to use the min-max standardization method to preprocess the data, and its basic idea is to map the parameter fluctuations of all dimensions to a 0~1 interval: Xnom = (X – Xmin)/ (Xmax – Xmin), where Xnom is the standardized data set, x is the original data set, and Xmax and Xmin are the maximum and minimum values in the data set, respectively.

Determine the maximum (Xmax) and minimum (Xmin) values for each dimension or feature in the data set. For each data point (X) in the data set, apply the min-max formula:

$$Xnom = (X - Xmin)/ (Xmax - Xmin)$$

Figure 3. Algorithm Flow of Combining Deep Learning With Soft Computing

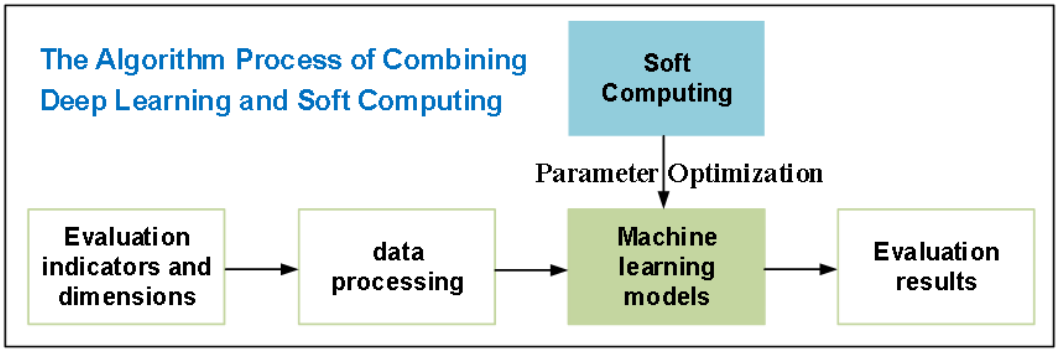


Table 1. Port Allocation of Various Indicators

Order number	Index	Attribute
1	The amount of digital teaching resources created	I_1
2	Online teaching activity	I_2
3	Frequency of using digital tools	I_3
4	Effect of improving students' digital literacy	I_4
5	Data analysis ability of teaching effect	I_5
6	Assessment result	O_1

X: Represents the original data point.
Xmin: Denotes the minimum value for the specific dimension.
Xmax: Denotes the maximum value for the specific dimension.
Xnom: Represents the standardized data point, mapped to the [0, 1] interval.

Apply the min-max formula to every data point in the data set, ensuring that each dimension is standardized relative to its own maximum and minimum values. The resulting standardized data set (Xnom) will have values scaled to the range [0, 1]. This normalization process allows for consistent comparison and analysis across different dimensions or features of the data set. By following these steps, researchers can standardize the data set using the min-max standardization method, facilitating further analysis and modeling in the context of deep learning and soft computing algorithms for digital literacy assessment.

RESULTS AND DISCUSSION

Example Analysis

In this paper, taking a BP neural network in deep learning and a GA in soft computing as examples, the evaluation model of digital literacy of higher vocational teachers is established. The evaluation dimensions include five dimensions: the amount of digital teaching resources created, the online teaching activity, the frequency of using digital tools, the effect of improving students' digital literacy, and the data analysis ability of teaching effect. Taking the evaluation results as the output, the BP neural network is constructed, and the training times are optimized by GA. Port allocation is shown in Table 1.

Table 2. Training Data Set

Order number	I_1	I_2	I_3	I_4	I_5	O_1
1	0.85	0.85	0.39	0.67	0.76	0.63
2	0.42	0.42	0.56	0.89	0.09	0.91
3	0.63	0.63	0.71	0.22	0.49	0.77
4	0.91	0.91	0.04	0.36	0.14	0.28
5	0.77	0.77	0.53	0.98	0.68	0.39
6	0.28	0.36	0.88	0.45	0.27	0.56
7	0.39	0.98	0.33	0.81	0.75	0.71
8	0.56	0.45	0.76	0.72	0.41	0.04
9	0.71	0.81	0.09	0.17	0.83	0.53
10	0.04	0.72	0.49	0.94	0.61	0.12
11	0.53	0.17	0.14	0.58	0.37	0.67
12	0.12	0.94	0.68	0.29	0.11	0.89
13	0.67	0.58	0.27	0.65	0.99	0.22
14	0.89	0.29	0.75	0.88	0.85	0.36

Table 3. Test Data Set

Order number	I_1	I_2	I_3	I_4	I_5	O_1
1	0.36	0.17	0.88	0.14	0.83	0.82
2	0.98	0.94	0.33	0.68	0.61	0.68
3	0.45	0.58	0.76	0.27	0.37	0.64
4	0.81	0.29	0.09	0.75	0.11	0.24
5	0.72	0.65	0.49	0.41	0.99	0.14

The amount of digital teaching resources created (I_1): This could be calculated by quantifying the number or volume of digital teaching materials created by the teacher, such as lecture slides, videos, interactive modules, etc.

Online teaching activity (I_2): This might involve measuring the teacher's engagement in online teaching activities, such as the number of online lectures delivered, participation in online discussions, or the frequency of posting learning materials on online platforms.

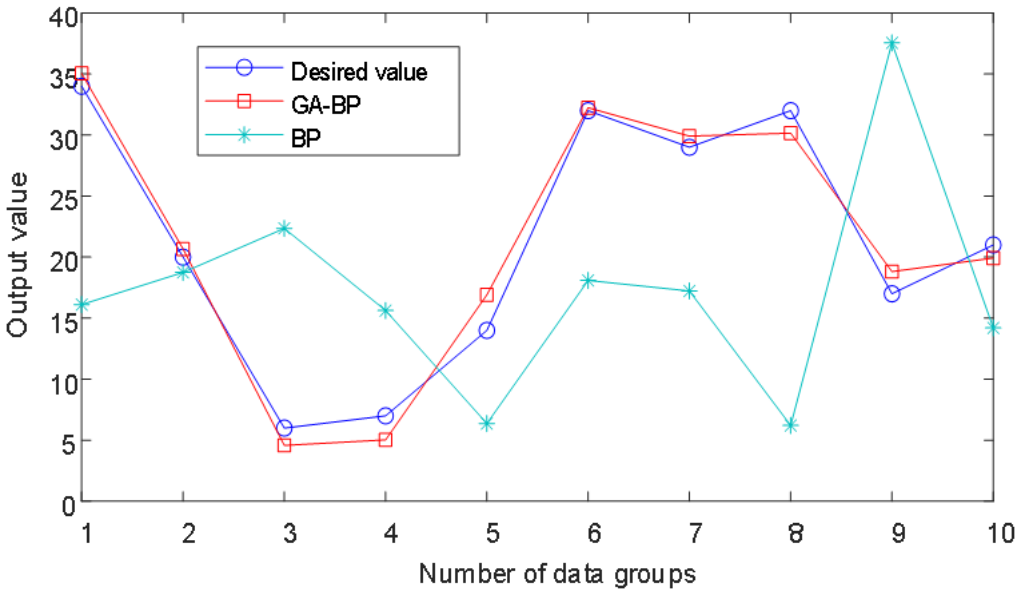
Frequency of using digital tools (I_3): This could be assessed by tracking how often the teacher utilizes digital tools in their teaching practices, including software applications, online platforms, or educational technologies.

Effect of improving students' digital literacy (I_4): This attribute value may be determined by evaluating the impact of the teacher's efforts on enhancing students' digital literacy skills, possibly through pre- and post assessments, student surveys, or performance indicators.

Data analysis ability of teaching effect (I_5): This might involve assessing the teacher's proficiency in analyzing data related to teaching effectiveness, such as student performance data, learning outcomes, or feedback from assessments to gauge the effectiveness of their teaching methods.

In order to verify the validity of the model established in this paper, the digital literacy data and evaluation results of a higher vocational college are taken as an example in a Matlab environment to verify its feasibility. Tables 2 and 3 are the standardized training data set and test data set, respectively.

Figure 4. Fitting Effect of the Model Proposed in This Paper



In the training data set and the test data set, each sequence is associated with a plurality of attribute values (I_1 to I_5) and an output value (O_1).

The attribute values (I_1 to I_5) likely represent features or input variables, while the output value (O_1) represents the target variable or the value we are trying to predict. Order number 1 has attribute values (I_1 to I_5) of 0.85, 0.85, 0.39, 0.67, and 0.76, respectively, and an output value (O_1) of 0.63. Order number 2 has attribute values (I_1 to I_5) of 0.42, 0.42, 0.56, 0.89, and 0.09, respectively, and an output value (O_1) of 0.91. Similarly, the test data set follows the same structure, with attribute values (I_1 to I_5) and an output value (O_1) for each order. The goal of a machine learning model would typically be to learn from the training data set by finding patterns or relationships between the attribute values (features) and the output value (target). Once the model is trained, it can then make predictions on new or unseen data, such as the test data set.

Figure 4 shows the fitting effect of the model established in this paper. It can be seen from the figure that the BP neural network optimized by a GA has a better fitting effect, which shows that optimizing the parameters in the deep learning model by soft computing is helpful to improve the fitting accuracy, improve the data set tracking effect, and have better dynamic performance.

The fitting effect of a model is typically calculated by comparing the predicted values from the model with the actual values in the data set. One common metric for regression models is the coefficient of determination (R^2), which measures the proportion of the variance in the dependent variable (output) that is predictable from the independent variables (inputs).

Here's how the fitting effect is calculated:

1. Actual versus Predicted Values: For each data point in the data set, the model predicts an output value based on the input features. These predicted values are compared to the actual values in the data set.
2. Residuals: The difference between the actual and predicted values is calculated for each data point. These differences are called residuals.
3. Squared Residuals: The squared residuals are calculated by squaring each residual value. This step ensures that both positive and negative errors contribute positively to the overall measure.

4. Sum of Squared Residuals: The squared residuals are summed to get the total sum of squared residuals (SSRs).
5. Total Sum of Squares (SSTs): The total sum of squares measures the total variance in the dependent variable. It is calculated by summing the squared differences between each actual value and the mean of all actual values.
6. 6.R^2 (Coefficient of Determination): Finally, the coefficient of determination (R^2) is calculated using the formula:

[R^2 = 1 – \ frac{SSR}{SST}]

R^2 ranges from 0 to 1, where 1 indicates a perfect fit, and 0 indicates that the model does not explain any of the variances in the dependent variable.

Process Optimization

Input Variables:

I_1 to I_5: These represent the independent variables or input factors in the experiment. Each row corresponds to a specific combination of input variables for a particular experiment.

Output Variable:

O_1: This is the dependent variable or output response that is being measured or observed in the experiment.

Observations:

Variability in Inputs:

The input variables (I_1 to I_5) vary across the experiments, indicating that different combinations of factors are being tested.

Output Variation:

The output variable (O_1) also varies across different experiments, suggesting that the input factors have an effect on the outcome being measured.

Potential Relationships:

By examining the relationship between the input variables and the output variable, we can identify potential patterns or correlations. For example, we can explore whether certain combinations of input variables lead to higher or lower values of the output variable.

Influence of Individual Inputs:

We can analyze the influence of each individual input variable on the output variable by examining how changes in each input affect the output across different experiments.

Interaction Effects: Additionally, we can investigate potential interaction effects between different input variables, where the combined effect of two or more inputs may differ from the sum of their individual effects.

Further Analysis:

Correlation Analysis:

Calculate correlation coefficients between each input variable and the output variable to quantify the strength and direction of their relationship.

Regression Modeling:

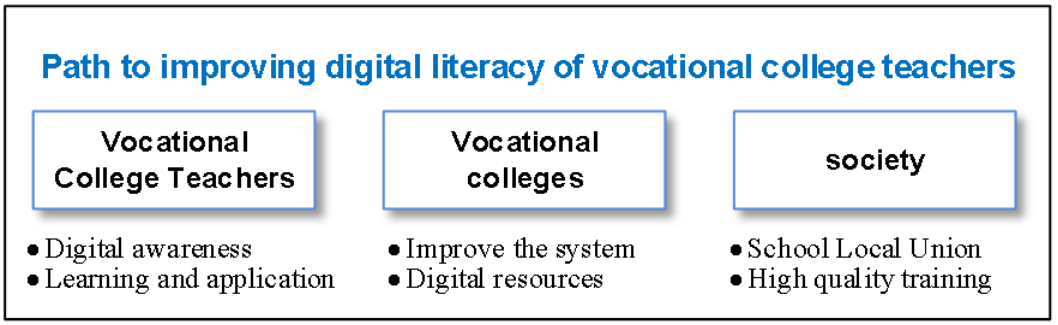
Fit a regression model to the data to predict the output variable based on the input variables and assess the significance of each input factor.

ANOVA or Design of Experiments (DOE):

Conduct an analysis of variance (ANOVA) or use DOE techniques to assess the significance of individual factors and interactions.

Optimization:

Figure 5. Digital Quality Improvement Path



Use optimization techniques to identify optimal combinations of input variables that maximize or minimize the output variable.

Through further analysis, we can understand the relationship between input variables and output variables more deeply, which is helpful to provide information for decision-making and optimize the process or system according to the experimental results.

IMPROVEMENT PATH AND FUTURE PROSPECTS

The improvement of digital literacy of higher vocational teachers is a systematic project, which requires the cooperative planning and joint efforts of teachers themselves, higher vocational colleges, and society. Teachers themselves are the main body of digital literacy, and they should take the initiative to improve digital literacy. In consciousness-driven behavior, many higher vocational teachers lie on their existing credit books and fail to fully understand the important value and urgency of digital literacy for their professional development and student training. Therefore, the first step to improve literacy is to sort out the digital concept from the deep heart, accept the change of mathematics teaching methods, improve the cognition of digital application, and enhance the awareness of lifelong learning. At the same time, we should take the initiative in the dialectical relationship between "learning" and "using," insist on applying what we have learned and "learning by using," and constantly strengthen the application of digital skills and consciousness in higher vocational education.

At the level of colleges and universities, it is necessary to actively cultivate the soil for the cultivation of teachers' digital literacy, attach great importance to the development of teachers' digital literacy, and actively coordinate the linkage between personnel, logistics, and educational administration departments. At the same time, a perfect system of teachers' digital literacy training, practice, evaluation, and examination is formulated, and teachers' digital literacy training resources are built. It is also necessary to strengthen the creation of environmental atmospheres, speed up the construction of a digital and intelligent campus, build a digital infrastructure so that digital resources can be seen everywhere and can be learned at all times, and update the hardware facilities of the digital campus simultaneously, such as multimedia classrooms, remote observation classrooms, and digital training rooms.

At the social level, it is necessary to fully mobilize all kinds of excellent digital resources into the campus, carry out the joint activities of digital resources between schools and places, organize the evaluation and exchange of digital teaching in higher vocational colleges on a regular basis, and carry out corresponding digital technology training in groups. Figure 5 is the schematic diagram of the digital quality improvement path proposed in this paper.

Higher vocational education is an important link in China's vocational education and the cultivation of blue-collar talents. The digital literacy of higher vocational teachers is directly related

to educational efficiency and students' cognitive level. At present, there are still few models and paths to study the digital literacy of higher vocational teachers from the perspective of "AI+." On the basis of extensive investigation on the connotation and research status of digital literacy of higher vocational teachers, this paper points out the important value of improving digital literacy, gives the relationship among artificial intelligence, deep learning, and soft computing, analyzes the beneficial value of combining deep learning and soft computing from the perspective of "AI+," puts forward the construction idea of digital literacy evaluation model based on deep learning and soft computing from the perspective of "AI+" and the combination way of them, and finally explores the path of improving digital literacy of higher vocational teachers from three aspects.

CONCLUSION

This paper takes the evaluation model construction and promotion path of higher vocational teachers' digital literacy improvement as the research goal, discusses the combination of deep learning and soft computing as the realization way in the view of "AI+," and focuses on the model construction method and approach nerve. This paper first explains the important position of higher vocational education in China's vocational education, points out the important value of improving the digital literacy of higher vocational teachers, clarifies the connotation of digital literacy of higher vocational teachers, extensively investigates the status quo of digital literacy of higher vocational teachers at home and abroad, expounds the definition relationship of "AI+" vision, deep learning, and soft computing, constructs an evaluation model and interactive ideas of digital literacy of higher vocational teachers based on deep learning and soft computing in the "AI+" vision, and discusses the data normalization processing method. According to the experimental results, the BP neural network optimized by a GA has a better fitting effect, which shows that optimizing the parameters in the deep learning model by soft computing is helpful to improve the fitting accuracy and the tracking effect of data sets. Finally, the ways to improve teachers' digital literacy are given from three dimensions: teachers, schools, and society.

By exploring the integration of emerging technologies, such as virtual reality (VR), augmented reality (AR), or blockchain into the evaluation model and promotion path of digital literacy among higher vocational teachers, these technologies could offer new opportunities for immersive learning experiences and secure data management. Conducting cross-cultural comparisons to explore variations in digital literacy among higher vocational teachers across different cultural and institutional contexts could help identify cultural-specific factors that influence digital skill development and inform strategies for promoting digital literacy globally. The combination of deep learning and intelligent algorithms has become a new development trend under the vision of "AI+." This paper focused on the feasibility of its application in the evaluation model and promotion path of higher vocational teachers' digital literacy. This research has an important supporting role and reference value for promoting personalized education and cultivating high-quality technical talents. In the next stage, it will carry out more in-depth theoretical research with specific assessment indicators and data models and gradually realize engineering.

DATA AVAILABILITY

The figures and tables used to support the findings of this study are included in the article.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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