In order to improve the effect of piano information teaching, a piano information teaching mode based on deep learning algorithm is proposed. The teaching objectives are divided into three levels: classroom teaching objectives, curriculum objectives, and education and training objectives. A piano information classroom integrating cloud application platform, teaching platform, resource platform, learning space, and interactive classroom is built. The previous teaching mode is optimized to build an innovative teaching mode of piano information classroom. The evaluation index system of piano informatization classroom teaching quality is constructed, and the hierarchical structure model of each evaluation index is established by using the analytic hierarchy process. The hierarchical analysis method is used to establish a hierarchical structure model of each evaluation index. The judgment matrix is determined by the nine-digit scale method. After the consistency verification of the judgment matrix, the weight of the quality evaluation of piano information classroom teaching is calculated. The new mode optimizes the weight and threshold of BP neural network in deep learning algorithm by genetic algorithm (GA). The weight of each classroom teaching quality evaluation index is input into the GA-BP neural network, and the network output result is the piano information classroom teaching quality evaluation score. The test results show that the optimal number of hidden layer nodes for the BP neural network is 7, when the GA-BP neural network iterations are 95. This method can evaluate the quality of piano information classroom teaching, with high evaluation accuracy and strong practical application.

1. Introduction

In the twenty-first century, the world has entered the vigorous development period of “informatization,” and the informatization process of various industries and fields has been accelerating. As the cradle of talent training, the education industry is also gradually strengthening the informatization construction, introducing informatization technology into classroom teaching to achieve the purpose of piano informatization classroom teaching [1]. Piano informatization classroom teaching is an advanced teaching method relying on modern educational ideas. In the process of classroom teaching, it makes full use of information technology to expand curriculum resources [2], breaks the constraints of time, space, and region of traditional classroom teaching, and can fully mobilize students’ subjective initiative and realize independent learning. Piano information-based classroom teaching is a new form of teaching mode [3]. There are relatively few studies on the evaluation of teaching quality under this mode. At the same time, there are many interference indicators to control the teaching quality of piano information-based classroom, and the indicators have high relevance [4, 5], which restrict each other, and the evaluation indicators are comprehensive. Integrity is an important basis for judging the outstanding effect of piano information classroom teaching quality evaluation.

The research on the construction of piano information classroom has attracted extensive attention of scholars at home and abroad [6, 7]. Reference [8] uses the educational environment narrative (EEN) game function in virtual reality (VR) technology to optimize the traditional face-to-face teaching mode and provide students with a fully immersive and interactive storytelling experience. Reference [9] uses the mixed learning mode to optimize the teaching process,
improve the learning effect, and finally, promote the realization of teaching objectives. Reference [10] studies and implements an interactive light augmented reality teaching system for numerical optimization teaching, which can effectively improve learners’ learning efficiency and is an innovative teaching method. Reference [11] optimizes the traditional face-to-face teaching mode based on the MOOC teaching mode in the era of big data. Reference [12] focuses on computing GIS and applying it to teaching and puts forward a series of measures to supplement teaching activities and improve the user experience in the field of education.

In order to solve the problem of improving the effect of information-based teaching, this paper puts forward the piano information-based teaching mode based on in-depth learning, constructs the piano information-based classroom, and innovates the teaching mode. Based on the construction of piano informatization classroom, the BP neural network algorithm in deep learning is used to evaluate its teaching quality, and genetic algorithm (GA) is used to improve the accuracy of teaching quality evaluation. According to the evaluation results, the piano informatization teaching mode is optimized to ensure the effect of piano informatization teaching, so as to further improve the quality of talent training.

2. Build Piano Information Classroom

2.1. Teaching Objectives. The teaching objectives are divided into three levels: classroom teaching objectives, curriculum objectives, and education and training objectives [13, 14]. In the construction of the piano informatization classroom, the education and training goal is to train intelligent talents, the piano curriculum goal is to meet the discipline curriculum standard, and the classroom teaching goal is to implement values and emotional attitudes, methods, and processes, skills, and knowledge in the teaching link.

2.2. Implementation Conditions. Design the technical support for the construction of piano information classroom. It mainly applies wireless communication to build a piano information classroom integrating cloud application platform (including student learning cloud and teacher teaching cloud), teaching platform [15, 16], resource platform, learning space, and interactive classroom [17].

The hardware requirements for building piano information class are shown in Table 1.

The software element of building piano information class is to build cloud application platform based on wireless communication. The cloud application platform built is an educational platform integrating management, office, resources, learning, teaching and research, teaching, and other services. It can provide wireless communication services and cloud services for piano information class. The specific functions of the platform include resource sharing and coconstruction, classroom feedback and interaction, discussion and exchange, homework test, cooperative learning, autonomous learning, teaching, and lesson preparation.

The platform mainly provides cloud services through cloud computing technology, that is, the teaching application of piano information classroom is deployed on the public cloud platform through cloud computing technology. And realize the communication function of cloud computing through wireless communication. This deployment mode will not affect the development of teaching applications, but change the mode of computing and storage. The deployment mode is shown in Figure 1.

The teaching platform built according to the deployment mode in Figure 1 can realize the functions of piano information teaching support, integrating management system and teaching resource database, organizing and managing teaching, and so on. The specific functions of piano information teaching platform include management, counseling, evaluation, discussion, testing, resources, teaching, and lesson preparation.

The resource platform can realize the sharing of resources, mainly focusing on the implementation of piano online teaching and the creation of high-quality resources. It is a resource platform integrating knowledge management, resource evaluation, resource management, and distributed resource storage.

The learning space in the piano information classroom can provide a network learning environment for piano learners. Its functions include individual counseling, online testing, group cooperation, interactive discussion, and online learning.

The interactive classroom in the piano information classroom is used for the interactive feedback in the classroom, which can realize the seamless connection of after-school review, class, and lesson preparation and build a coherent and complete teaching situation.

Taking the microclass platform as an example, the piano information teaching mode based on microclass has the following characteristics: the first is mobility. Thanks to the popularity of mobile Internet, learning in the Internet era breaks the restrictions of time and space. Students can make full use of their free time to study, communicate, and discuss other activities through intelligent terminals; the second is autonomy. Because the piano teaching resources on the microclass platform are rich, students can choose the learning content suitable for themselves according to their learning progress. In addition, the playback of the platform can be played back and paused indefinitely, which is convenient for students to study repeatedly for the knowledge points they cannot master; third, the short and concise knowledge points are convenient for students to make full use of their fragmented time for learning. For example, students can take out their mobile phones to learn for a quarter of an hour on the subway, waiting for friends and queuing, which is an incomparable advantage to traditional classroom teaching; finally, the interactivity of piano teaching based on microclass greatly exceeds the traditional classroom teaching mode. The network increases the interactivity of learning and allows teachers to communicate with students and students in real time, which is more conducive for students to gradually improve their piano playing ability.

2.3. Innovative Teaching Mode. Optimize the previous teaching mode and build an innovative teaching mode of piano
information classroom. In this teaching mode, teachers are the leadership, and students are the main body. The teaching mode is divided into four steps, and the specific contents are as follows:

Step 1: teachers: conduct intelligent guidance, that is, make plans after understanding the learning situation; students: carry out intelligent guidance, that is, put forward difficult points after autonomous learning

Step 2: teachers: explore, that is, carry out transfer training after summarizing and guiding; student: to explore, that is to experience through activities after exploring problems

Step 3: teachers: implement display and communication, that is, display and exchange emotional strategies and methods; students: display and exchange, i.e., display and exchange of experience, knowledge, and ability

Step 4: teachers: consolidate and extend, that is, reflect on the topic and optimize and refine it; student: carry out consolidation and extension, that is, carry out self-consolidation and strengthen and expand

2.4. Piano Informatization Classroom Teaching Quality Evaluation

2.4.1. Piano Informatization Classroom Teaching Quality Evaluation Index System. Analytic hierarchy process is more suitable for decision-making problems with hierarchical and staggered evaluation index target system, and the target value is difficult to describe quantitatively. Therefore, when constructing the piano informatization classroom teaching quality evaluation index system, using this method, the hierarchical structure of piano informatization classroom teaching quality evaluation index is shown in Figure 2.

Teachers play a leading role in piano information-based classroom teaching. They need to conceive the teaching

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Hardware requirements</th>
<th>Specific configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Combined table and chair convenient for splicing and moving</td>
<td>Configure according to the number of people, one table and one chair for each person</td>
</tr>
<tr>
<td>2</td>
<td>Teacher's side</td>
<td>A pad supporting mobile teaching [18, 19]</td>
</tr>
<tr>
<td>3</td>
<td>Student side</td>
<td>One pad per person</td>
</tr>
<tr>
<td>4</td>
<td>Wireless AP</td>
<td>One</td>
</tr>
<tr>
<td>5</td>
<td>Router</td>
<td>One</td>
</tr>
<tr>
<td>6</td>
<td>Charging car</td>
<td>One</td>
</tr>
<tr>
<td>7</td>
<td>Electronic whiteboard</td>
<td>One</td>
</tr>
<tr>
<td>8</td>
<td>Basic equipment</td>
<td>Multimedia console, teacher computer, curtain + projector</td>
</tr>
</tbody>
</table>

Table 1: Hardware requirements for building piano information class.

![Figure 1: Details of deployment mode.](image)
form and situational interaction [20, 21], focusing on the design and integration of classroom teaching. A key factor affecting the quality of piano information classroom teaching is the teaching content. Whether the teaching content involves cutting-edge science in the professional field and whether the teaching content is presented by media technology determine the students’ classroom learning effect and interest. Informatization construction is to build the infrastructure of piano informatization classroom teaching, deploy hardware facilities, and supply software services. Whether students are good at using the piano learning resources in the classroom depends on whether the students are good at absorbing the piano learning resources in the classroom. All indicators complement each other, and all indicators can have an impact on the quality of piano informatization classroom teaching [22]. Therefore, the evaluation index system of piano informatization classroom teaching quality is established through the above indicators.

2.4.2. Weight Determination of Classroom Teaching Quality Evaluation Index Based on Analytic Hierarchy Process (AHP)

(1) Determining the weight of classroom teaching quality evaluation index

AHP method is used to determine the weight of piano informatization classroom teaching quality evaluation index. The specific process is as follows:

Step 1: build a hierarchical structure model. The evaluation index level of piano information classroom teaching is established based on AHP method.

Step 2: determine the judgment matrix. In the piano informatization classroom teaching evaluation index, select two index factors at the same level, compare them with the ninth percentile scale method, and analyze the importance of each index factor [23]. For index factor \( j \), the importance of factor \( i \) to it can be reflected by the value of \( a_{ij} \). \( A \) represents the judgment matrix, which is of order \( n \) and can be expressed as:

\[
\begin{pmatrix}
   a_{11} & a_{12} & \cdots & a_{1n} \\
   a_{21} & a_{22} & \cdots & a_{2n} \\
   \vdots & \vdots & \ddots & \vdots \\
   a_{n1} & a_{n2} & \cdots & a_{nn}
\end{pmatrix}
\]

(1)

The eigenvalue of the judgment matrix is represented by \( \lambda \) and must meet the condition \( A\omega = \lambda E \omega = 0 \). \( \omega \) is the eigenvector of the judgment matrix. When \( \lambda \) takes \( \lambda_{\max} \), the equation group can be obtained. The weight of each index factor can be determined by solving the solution vector of the equation group [24, 25], which is \( W = (\omega_1, \omega_2, \ldots, \omega_n) \).

Step 3: check the consistency of the matrix. \( C \cdot R \) is the consistency ratio, and the consistency of the matrix can be verified by the \( C \cdot R \) value. When verifying the consistency of the judgment matrix, it is necessary to meet the condition that \( C \cdot R \) is small enough, that is, \( C \cdot R \leq 0.1 \). At this time, a good hierarchical single sorting effect can be achieved. When the condition \( C \cdot R \) cannot be met, the judgment matrix needs to be adjusted [26] until it meets the condition \( C \cdot R \).

The verification processes are as follows:

(A) The consistency index can be expressed by formula

\[
C \cdot I = (m - 1)^{-1} (\lambda_{\max} - m)
\]

(B) The average random consistency index \( R \cdot I \) can be obtained by query

(C) Solve \( C \cdot R \), and the solution formula is \( C \cdot R = C \cdot I \ast (R \cdot I)^{-1} \). If \( C \cdot R \leq 0.1 \), take \( A \) as the judgment matrix; otherwise, readjust the judgment matrix.

(2) Solving the weight of classroom teaching quality evaluation index

(A) First level index weight solution. In the hierarchical structure of piano information classroom teaching
quality evaluation, the first-class teaching quality evaluation indicators are teachers, students, teaching content, teaching effect, and information construction. The judgment matrix of piano informatization classroom teaching quality evaluation is determined by means of questionnaire and expert opinions, and its consistency is tested. When the test is successful, the corresponding eigenvector is solved under the condition of maximum eigenvalue of the matrix [27, 28], and \( W = (w_1, w_2, w_3, w_4, w_5) \) is the first-order weight vector.

(B) Solve the weight of secondary indicators. In the piano informatization classroom teaching quality evaluation system, several secondary teaching quality evaluation indexes are used to realize the description of the primary indexes.

(a) The primary indicator “teacher” is divided into four secondary indicators, and the weight value of each secondary indicator can be expressed as \( w_1 = (w_{11}, w_{12}, w_{13}, w_{14}) \).

(b) The four secondary indicators belong to the primary indicator “student,” and their weight value can be expressed as \( w_2 = (w_{21}, w_{22}, w_{23}, w_{24}) \).

(c) Two secondary indicators constitute the teaching content of primary indicators, and \( w_3 = (w_{31}, w_{32}) \) represents the weight value of each secondary indicator.

(d) The first level evaluation index includes two second level evaluation indexes under the teaching effect, which are students’ ability to master the concept and principle of the course and students’ ability to analyze problems, and its weight value is expressed as \( w_4 = (w_{41}, w_{42}) \).

(e) There are three secondary evaluation indicators under the informatization construction of primary evaluation indicators, and \( w_5 = (w_{51}, w_{52}, w_{53}) \) represents the weight value of each secondary evaluation.

2.4.3. Evaluation Model of Piano Informatization Classroom Teaching Quality Based on GA-BP Neural Network. In deep learning, no matter how complex the structure is, it cannot escape three structures, that is, model, strategy, and algorithm. They are all deformed, expanded, and enriched on the basis of these three structures. Therefore, this paper introduces BP neural network algorithm into the evaluation of piano information classroom teaching quality. BP neural network is a multilayer feedforward neural network. Its main feature is that the signal propagates forward and the error propagates back. BP neural network is a simplified biological model. Each layer of neural network is composed of...
neurons. Each individual neuron is equivalent to a perceptron. After the input layer is stimulated, it will pass it to the hidden layer. As for the hidden layer, it will pass the stimulation to the output layer according to the weight of neurons and the rules. If not, the output layer will compare the results, returning the weights of the neurons to be adjusted. Its outstanding advantage is that it has strong non-linear mapping ability and flexible network structure. The number of middle layers and neurons of each layer of the network can be set arbitrarily according to the specific situation, and its performance varies with the difference of structure. However, BP neural network also has some defects, such as easy to fall into local minimum.

Genetic algorithm (GA) is a method to search the optimal solution by simulating the process of natural evolution. By means of mathematics and computer simulation, the algorithm transforms the problem-solving process into a process similar to the crossover and mutation of chromosome genes in biological evolution. When solving complex combinatorial optimization problems, compared with some conventional optimization algorithms, it can usually obtain better optimization results faster.

Based on the above analysis, this paper determines the optimal input weight and threshold of BP neural network through genetic algorithm (GA), so that BP neural network has high accuracy in the evaluation of piano information classroom teaching quality [29, 30]. The construction process of piano informatization classroom teaching quality evaluation model based on GA-BP neural network is shown in Figure 3.

The specific steps are:
Step 1: take the weight of piano information classroom teaching quality evaluation index as the input of BP neural network, take the teaching quality evaluation results as the output of BP neural network, initially set the input, output, and hidden layer nodes of BP neural network, and determine the number of network layers.
Step 2: solve the weight and threshold quantity required in the process of piano information classroom teaching quality evaluation based on BP neural network. According to the three-layer topology of BP neural network, the network weight and threshold are solved to determine the final quantity.
Step 3: initial setting of GA population. The individual code of the population can be arbitrarily selected from binary method and real number method [31, 32]. LEN is its coding length, set the population size, and set the parameters such as crossover and mutation probability.
Step 4: determine the fitness function of GA algorithm, which is the sum of training errors of BP neural network. The trained BP neural network outputs the prediction results. Compared with the target output, the absolute error value of the two is the individual fitness value, expressed in \( F \), and its solution formula can be described as follows:

\[
F = h \sum_{i=1}^{n} (y_i - a_i).
\]

Step 5: the selection of individual population of GA algorithm can be realized by the following formula:

\[
p_{\text{select}} = \left(\frac{\sum_{i=1}^{N} f_i}{f_i}\right)^{-1},
\]

where \( N \) is the total number of input nodes of BP neural network, \( f_i = h/F_i \), any individual \( i \), the fitness value is \( F_i \), and the value of \( F_i \) is small enough to be more favorable to the individual, and the individual scale in the population is expressed as \( f \).

The real number method is used to encode the individuals of group \( a_{\text{m}} = a_{\text{n}} - (a_{\text{n}} - a_{\text{m}})b \). For individuals \( a_m \) and \( a_n \), the solution formula of cross operation in \( j \) position can be described by the following formula:

\[
\left\{ \begin{array}{l}
\bar{a}_{\text{m}} = a_{\text{m}} - (a_{\text{m}} - a_{\text{n}})b, \\
a_{\text{n}} = a_{\text{n}} - (a_{\text{n}} - a_{\text{m}})b,
\end{array} \right.
\]

where \( b \) is any value in the \([0, 1]\) interval.

For the \( r \)th individual in the population, the \( j \)th gene is expressed as \( a_{ij} \). The mutation operation of this gene can be described by the following formula:

\[
\left\{ \begin{array}{l}
a_{ij} = a_{ij}(1 + f(c)) - a_{\text{max}} * f(c), \text{rand} > 0.5, \\
a_{ij} = a_{ij}(1 - f(c)) + a_{\text{min}}f(c), \text{rand} < 0.5,
\end{array} \right.
\]

where the upper limit of \( a_{ij} \) gene is expressed as \( a_{\text{max}} \) and its lower limit is expressed as \( a_{\text{min}} \), \( f(c) = r(1 - c)^{\text{index}}/(\text{index})^2 \) and \( r \) are any number. At this moment, the number of iterations is \( c \), the maximum number of iterations is \( \text{index} \), and \( \text{rand} \) is any number in the value interval \([0, 1]\).

Step 6: determine the best individual. When the number of iterations meets the extreme value, the best fitness is determined according to [33, 34].
Step 7: determine the optimal weight and threshold of the network. The specific needs to be determined by the coding of the best individual.
Step 8: train BP neural network. After the network is trained by the training data, the mean square error (MSE) [35, 36] is solved. If the MSE is lower than the expected value, the iteration ends, and the piano information classroom teaching quality evaluation is completed.

Input the weight of each classroom teaching quality evaluation index into GA-BP neural network to realize the piano informatization classroom teaching quality evaluation. The network output result is the score of piano informatization classroom teaching quality evaluation. The evaluation results are divided into five evaluation grades, namely, “very excellent,” “excellent,” “satisfactory,” “qualified,” and

Among them, the total number of input nodes of BP neural network is expressed as \( n \), for the \( i \) node of BP neural network, the target output result is expressed as \( y_i \), the prediction result is expressed as \( a_i \), and the coefficient is expressed as \( h \).
3. Experimental Analysis

The experimental data set is the data set made by a university to collect the online and offline teaching effect data after the application of piano information classroom, and it is divided into two data sets. Data set 1 is mainly the data of students’ classroom performance and learning feeling, while data set 2 is mainly the data of teachers’ classroom performance and students’ teaching effect evaluation. During the experiment, the online and offline piano informatization classroom application data are collected in an all-round way, and the collected data are classified and put into the corresponding experimental data set, respectively. Online data includes students’ learning effect data, participation data, and learning attitude data. Offline data includes students’ classroom interaction data, interest and attitude data, learning status data, learning harvest data, as well as teachers’ teaching design data, teaching implementation data, and teaching evaluation data. The data set contains 200 training data and 50 test data. This method is used to evaluate the piano information classroom teaching quality, which is simulated by MATLAB software to analyze the evaluation effect of this method.

The number of GA population is set to 30, and the individuals are encoded in real number, with a length of 70, and the crossover and mutation probabilities are 0.62 and 0.006, respectively.

This method is used to solve the index weights required for the evaluation of piano information classroom teaching quality. The obtained index weights are shown in Table 3.

According to Table 3, the piano informatization classroom teaching quality evaluation index system is composed of five types of first-class indexes, including 15 second-class indexes. Through this method, the weight value of each evaluation index can be calculated and input into the piano informatization teaching quality evaluation model. The output score of the model is 92 points. It can be seen from Table 2 that the evaluation grade corresponding to this score is “excellent”; therefore, it can be determined that the evaluation result of piano information classroom teaching quality is “excellent.” The experimental results show that this method can evaluate the quality of piano information classroom teaching.

The network structure of BP neural network has a great impact on the accuracy of the evaluation results of piano information classroom teaching quality. According to the

---

**Table 3: Weight value of each index of piano informatization classroom teaching quality evaluation.**

<table>
<thead>
<tr>
<th>Primary index</th>
<th>Weight</th>
<th>Secondary index</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher H1</td>
<td>0.3324</td>
<td>Informatization teaching design ability H11</td>
<td>0.2406</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Information technology curriculum integration ability H12</td>
<td>0.2258</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Creating problem situations and teacher-student interaction H13</td>
<td>0.1624</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encourage students to express and discuss h14 freely</td>
<td>0.3712</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning interest and enthusiasm H21</td>
<td>0.2896</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning resource utilization H22</td>
<td>0.3014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning interaction H23</td>
<td>0.1952</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning style H24</td>
<td>0.2138</td>
</tr>
<tr>
<td>Student H2</td>
<td>0.2179</td>
<td>Combination of cutting-edge and professional content H31</td>
<td>0.5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Content organization and media combination H32</td>
<td>0.5000</td>
</tr>
<tr>
<td>Teaching content H3</td>
<td>0.1596</td>
<td>Students’ mastery of course concepts and principles H41</td>
<td>0.5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students’ ability to analyze problems H42</td>
<td>0.5000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Computer configuration scale h51</td>
<td>0.2986</td>
</tr>
<tr>
<td>Teaching effect H4</td>
<td>0.1324</td>
<td>Network bandwidth H52</td>
<td>0.3126</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software construction h53</td>
<td>0.3888</td>
</tr>
<tr>
<td>Informatization construction H5</td>
<td>0.1577</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

![Image](image.png)
evaluation indexes and results of piano information classroom teaching quality, the number of input and output nodes of BP neural network can be determined as 15 and 1, respectively, and the number of hidden layer nodes can be set as 3, 5, 7, and 9, respectively. BP neural network is trained by training data. According to the change trend of mean square error under different iteration times, the optimal number of hidden layer nodes of BP neural network is determined. The experimental results are shown in Figure 4.

According to the analysis of Figure 4, with the continuous growth of the number of iterations, the mean square error index of BP neural network under different hidden layer nodes shows a downward trend. When the number of iterations is the same, with the continuous increase of the number of hidden layer nodes, the mean square error first decreases and then increases. When the number of hidden layer nodes is 7, the mean square error index is the lowest, and the network can converge after 60 iterations. When the number of nodes continues to increase to 9, the mean square error begins to increase. Thus, the optimal number of hidden layer nodes of BP neural network is 7.

In this paper, GA-BP neural network is used to evaluate the teaching quality of piano information classroom. In order to ensure the high accuracy of teaching quality evaluation, the performance of GA-BP neural network is verified through mean square error sum curve and fitness curve. The experimental results are shown in Figures 5 and 6.

According to Figure 5, compared with the ideal evaluation curve, the actual evaluation curve of piano information classroom teaching quality obtained by this method is basically consistent with it. With the continuous increase of the number of iterations, the mean square error shows a downward trend, and the curve begins to converge when the number of iterations is 95. It can be seen from Figure 6 that with the continuous growth of the number of iterations, the fitness value shows an increasing trend, and the actual evaluation curve shows the same changed trend as the ideal evaluation curve, with a small deviation. When the number of iterations is 95, the curve begins to stabilize. The experimental results show that GA-BP neural network can effectively improve the accuracy of piano information classroom teaching quality evaluation. When iterating 95 times, GA-BP neural network has the best performance.

Five classes are randomly selected in the University. According to the piano information classroom teaching of each class, the teaching quality is evaluated by using this method, and compared with the actual evaluation results to analyze the accuracy of the evaluation results of this method. The experimental results are shown in Figure 7.

It can be seen from the analysis of Figure 7 that this method is used to evaluate the quality of piano informatization classroom teaching in different classes of a university. The teaching quality evaluation results of this method are...
basically consistent with the actual results, and the deviation is very small. The evaluation results of this method and the actual results are in the same grade range; among the five classes, the teaching quality evaluation score of class 3 is the highest, and the score can reach 96 points. According to Table 1, it can be divided into “very excellent” grade. The teaching quality evaluation score of class 2 is the lowest, but it can still reach 86 points, and the corresponding evaluation grade is “excellent.” The experimental results show that the accuracy of teaching quality evaluation of this method is high. The university attaches great importance to the informatization construction of classroom teaching, with high informatization level, novel teaching content design, and outstanding teaching effect. Therefore, this method has practical application.

Based on the above experimental results, after the application of this method, the output score of the model is higher than 86, the quality evaluation result is “excellent,” and the score of some classes can be “very excellent”; the curve base in the evaluation process has the same change trend with the actual evaluation curve base, and the deviation is very small, which can provide a reference for piano information classroom teaching evaluation.

4. Conclusion

Taking the piano information-based classroom teaching in a university as the research object, this paper constructs the piano information-based classroom teaching quality evaluation index system by using the deep learning method, determines the weight of each index of piano information-based classroom teaching quality evaluation, and uses the teaching quality evaluation model to solve the evaluation results. In order to ensure the high accuracy of teaching quality evaluation, MATLAB software is used to simulate and analyze the optimal number of hidden layer nodes of BP neural network, verify the performance of GA-BP neural network through the sum of mean square error and fitness curve, and analyze the application of this method through the teaching quality evaluation results of piano informatization classroom in five randomly selected classes. The experimental results show that:

(1) When the number of hidden layer nodes is 7, BP neural network has the best performance

(2) When GA-BP neural network iterates 95 times, the mean square error is the smallest, and the fitness is the highest

(3) This method can evaluate the quality of piano information classroom teaching in this university, with high accuracy and good applicability

Based on the evaluation results, the next research will specify the corresponding piano informatization classroom teaching quality improvement strategies and continue to evaluate them after implementation for a period of time, so as to continuously improve the piano informatization classroom teaching quality and cultivate high-quality talents.

Data Availability

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest

The author declared that there are no conflicts of interest regarding this work.

References


