Hindawi
Mobile Information Systems
Volume 2022, Article ID 3558558, 13 pages
https://doi.org/10.1155/2022/3558558

*Research Article*

# Deep Learning for College English Education Evaluation

**Jing Shi**

*Science and Technology College Gannan Normal University, Jiangxi Province 341000, Ganzhou, China*

Correspondence should be addressed to Jing Shi; p114378@siswa.ukm.edu.my

Received 30 April 2022; Accepted 5 July 2022; Published 10 August 2022

Academic Editor: Muhammad Babar



With the expanding and growth of the present reform of English education and teaching, the study of English education quality is receiving more and more attention. The focus of enhancing the quality of English education is to enhance the quality of teaching, and English education assessment is a main initiative to improve the quality of English education and teaching. So, the formation and development of the English education quality assessment system are of great importance to education management. This paper is based on an in-depth study of the present condition and characteristics of English education quality evaluation in colleges and combines the characteristics of deep learning. To provide a feasible solution for the English education evaluation model, this paper constructs a deep learning-based English education quality evaluation model and theoretically analyzes and compares the training results of the deep learning algorithm and the algebraic algorithm used in the model, respectively. Through simulation analysis, we can conclude that the English education evaluation based on deep learning suggested in this paper has achieved good evaluation results.

## 1. Introduction

Since 1999, all Chinese higher education institutions have steadily increased their enrolment to boost educational progress. This development speed is unparalleled in the history of advanced education development in China and never before in the past of higher education development in the world [1]. On the other side, the development of advanced education has helped China's financial organization and played a positive role in achieving maintainable economic growth. Similarly, the capacity of higher learning organizations and the quality of education have been put to a great test under this extraordinary expansion. In the fast growth of higher education today, the school status has become the first choice of students, and it mostly is determined by on the excellence of education. The excellence of education is the top priority of schools, which not only is associated with the existence and growth of schools but also directly affects the upcoming and fortune of pupils. Yet, with the significant growth of universities and colleges in consecutive centuries, sequences of connected difficulties have appeared, like deficient teachers, declining quality of students, tight educational and coaching apparatus, logistic facilities of service, etc. These difficulties have aroused the general concern of the civilization; thus triggering the discussion on college education, the excellence of English education has become a focal issue of discussion and a complete consideration of all the effort of universities and colleges [2].

Besides the above, the author in [3] pointed out in the executive meeting of the State Council that higher education in China is facing numerous contradictions and difficulties, especially since the quality of higher teaching cannot completely come across the requirements of financial and social growth. The meeting pointed out that the development of higher education should fully implement the scientific concept of development and effectively focuses on improving quality. The conference pointed out that the development of higher education should fully implement the scientific idea of development and effectively focuses on improving the quality. Similarly, the author of [4] pointed out in his speech at the seminar on the exchange of experience in undergraduate teaching evaluation and the work of evaluation expert group leaders in ordinary higher education schools that higher education has entered the stage of mass development. China's education has reached a new stage of growth, with the most fundamental stage feature being that it has entered a new stage of transformation from a huge human resource nation to a strong human resource country, as well as a new stage of enhancing educational excellence in all aspects. Consequently, enhancing the excellence of education is the main task of higher education in the coming period, and the focus of enhancing the excellence of education is to advance the excellence of teaching, while teaching assessment is the important initiative to enhance the excellence of teaching. Enhancing the excellence of education is the eternal topic of higher education. The proposal of "improving the quality of higher education" has profound practical significance. So, the formation of a teaching excellence assessment scheme in universities is the top priority of internal evaluation work.

Keeping the above in mind, significant effort has been done to build an English teaching quality evaluation using artificial intelligence, big data, machine learning, deep learning, and so on. Deep neural networks, also known as deep learning, may repeatedly absorb the technique of design structures and then incorporate feature knowledge into the procedure of developing the model, therefore reducing the insufficiency due to human design features. It is critical to construct a network capable of obtaining pattern aspects of English teaching skills to evaluate English teaching capacity. As a result, deep learning may be used in this study. At the moment, certain systems using deep learning at their heart have attained identification or classification accuracy that outperforms conventional algorithms in particular application scenarios [5]. A technique of pupil performance detection and training impact assessment based on deep learning is presented to boost the effectiveness of learning evaluation. Students' learning behavior is examined and tallied during international Chinese interaction in college English teaching, and teaching the influence assessment model is built to realize the teaching impact assessment and finally increase the efficacy of college English coaching.

The assessment of English education excellence is a complicated issue. The evaluation of English education includes various aspects like teaching circumstances, difficulty of course, teaching of teachers, and effects of learning that interrelate with one another, while the connection between pupils and teachers is complicated and there are more aspects affecting English education. Therefore, the current state of investigation is worried, and it focuses on three aspects: one is the research of the evaluation subject, the other is the research of the materials in the teaching excellence valuation scheme, and the third is the research on what ultimately to be researched. After determining each index in the system, evaluate the method of classification of English education. To solve these problems, this research work tries to introduce the structure, model, and working principle of deep learning, details the learning algorithm of the deep learning neural network layout, and establishes a deep learning-based English teaching evaluation model.

### *1.1. Innovations of the Proposed Work*

(1) This research provides a deep learning-based college English education evaluation method for successfully improving the effect of English teaching evaluation.

(2) This work addresses the low accuracy and poor impact of the typical college English education evaluation method in solving practical situations.

(3) This research employs a previously undiscovered deep learning method in the evaluation of college English education.

*1.2. Structure of the Paper.* Below is a research overview: Section 2 reviewed the relevant work of foreign and national scholars who worked on the paper's chosen topic. Section 3 introduces the deep learning approach and college English education evaluation. Section 4 presents the studies on deep learning-based English teacher assessment. Section 5 discusses the examination and experiment, and Section 6 concludes the study.

## 2. Related Work

Throughout the situation that talents in colleges grasp the English language, the overall situation is not optimistic, and it is hard to satisfy the need reality of language talents for society. Based on this, the work of [6] makes a brief analysis of the gap between college English teaching and employment guidance and pays attention to the college English teaching reform program based on employment orientation. Similarly, the early work of [7] tries to explain the significance of English teacher development program assessment. The assessment model of English teacher education ability is presented in the MOOC environment to increase the accuracy of English teachers' education ability evaluation and to encourage the upgrading of the level of English teacher education [8]. The cognitive process simulation was used to investigate the features and regulations of college English education [9]. The goal of [10] is to examine and describe the meanings of the English terms "review," "assessment," and "evaluating," as well as to establish Ukrainian counterparts capable of expressing the significance of the aforementioned English phrases in Ukrainian education circles. Based on a previous study of related literature, [11] analyzes the students' style, the instructional impact of the automatic evaluation process, the particular vocabulary concentration and accurateness, the use of sentencing guidelines and the overall number of phrases, and the student's satisfaction with the teaching assessment process using the teaching experiment technique, survey questionnaire technique, and analytical hierarchical procedure. The author in [12] investigates workable solutions that connect open-source GIS technologies with supermodel tools, while [13] seeks to explore the practical operation of different education assessment methods in education to successfully use education evaluation techniques to improve the efficacy of college English instruction. The early work of [6] exposes thorough assessment methods incorporated by formative assessments, final assessments, and value-added assessments into the education analysis of business English skills and abilities training to successfully reflect instructional quality by increasing teaching quality. The work of [14, 15] attempts to incorporate globally recognized clinical recommendations into machine learning algorithms to help foreign students in Australian institutions evaluate health resources. Inspired from the above, this paper provides a deep learning-based college English education evaluation method for successfully improving the effect of English teaching evaluation. In addition, it addresses the low accuracy and poor impact of the typical college English education evaluation method in solving practical situations.

## 3. Evaluation of College English Education and Deep Learning Neural Networks

This section examined the evaluation of English teaching and English traditional classroom evaluation. It also describes deep learning neural networks.

*3.1. Evaluation English Teaching.* The purpose of the process is to assess the quality of persons or objects. We frequently make subjective assessments about the good and bad qualities of persons or groups, which would be a kind of judgment and evaluation. There are difficulties in the action between the evaluation topic and the evaluation target; thus, the good or poor achieved will be the ultimate judgment outcome[16]. Furthermore, the evaluation topic is the evaluation target, which itself is primarily concerned with the subject of evaluation activities. Inside the actions, there are difficulties with the assessment topic and the assessment objects, so the positive or negative acquired will be accepted as the ultimate judgment outcome, namely, the modifications of the value topic and the quality object. Moreover, evaluation methodologies, such as quantitative and non-qualitative, contain parallels and variations. In a nutshell, quantitative assessment is the value judgment of items using the numerical quantitative technique. This approach is used to assess object memory abilities; however, it has severe limitations, while qualitative assessment corresponds to value judgments made that used a non-numerical quantitative research approach. The nonquantitative assessment discoursed in this work does not utilize objective educational assessment as a diagnostic indication but instead employs important detection instruments for teaching English, providing prompt feedback, and completing a standardized assessment analysis. It is dependent on the accumulation of knowledge. Learning evaluation systems, which include quantitative and qualitative diagnostic indications, inspire pupils who frequently engage in learning of English. It also offers instructional resources for English instructors [17].

*3.2. English Traditional Classroom Evaluation.* As we know, evaluation of English teaching is the emphasis of the syllabus of English, as per the English curriculum standards. This is the actual monitoring of the English teaching procedure per the new syllabus standard. The English classroom is not just the major component of the assessment system, but also an essential instructional tool for evaluating English teaching. A logical and technical traditional teaching assessment can help students learn English by improving their understanding of the English curriculum. All areas of students' skills have completely developed, so that teachers may receive timely feedback from students and encourage overall growth between teachers and students, allowing the school to comprehend the core condition of English classroom teaching in real time. This helps in the teaching of management skills as well as the ongoing refinement of the novel syllabus [18]. College English teaching assessment mostly relates to teachers assessing students' learning processes and rating learning of student attitudes, interests, and English competence based on self-evaluation by teachers. This increases student interest and allows teachers to enhance their teaching approaches. Moreover, pupil self-assessment and joint assessment, collection assessment and encouraging assessment, picture assessment, and game assessment are the primary approaches in English teaching that assist to enhance the assessment of English traditional classroom [19].

Flexible English teaching has been shown to enhance the integrity and transfer of English education in college. Modular teaching has steadily gained popularity and uses in basic English instruction. The development of professional communication ability is prioritized, to provide verbal and writing expert expertise and analyze it with colleagues at home and overseas in English. As a result, modular instruction can serve as a self-contained and efficient relationship. Students who encounter business English for the first time in our system will be puzzled and frustrated. When employing recommended indicators, teachers are more attentive and responsive toward which indicators are utilized for evaluation. Consequently, the significance of the teaching assessment would be lost owing to the random index decision. In the learning evaluation process, students are the objects of assessment, while supervisors, instructors, other students, and pupils themselves are the assessment subjects. Figure 1 shows the overall indicators for the suggested model.

*3.3. Introduction to Deep Learning Neural Networks*

*3.3.1. Deep Learning Basic Idea of the Algorithm.* Deep learning is a machine learning approach based on data characterization. Its main concept is too abstract vast volumes of data at a top standard using numerous computing layers. Typically, the processing stages contain complex results or many nonlinear transformations. As opposed to typical machine learning approaches, it replaces artificial feature extraction techniques with unsupervised learning of feature and effective tree extracting feature procedures to extract deeper features by learning. Furthermore, it may also be used to train unlabeled statistics to extract richer features extracted, which has developed a significant benefit of deep learning [20]. These decades, the creation of great performance GPU had also significantly amplified the speed of mathematical processes and procedures; consequently, tremendously shortening the exercise and running moment of deep learning models that helps make it expensive deep learning has redeployed.

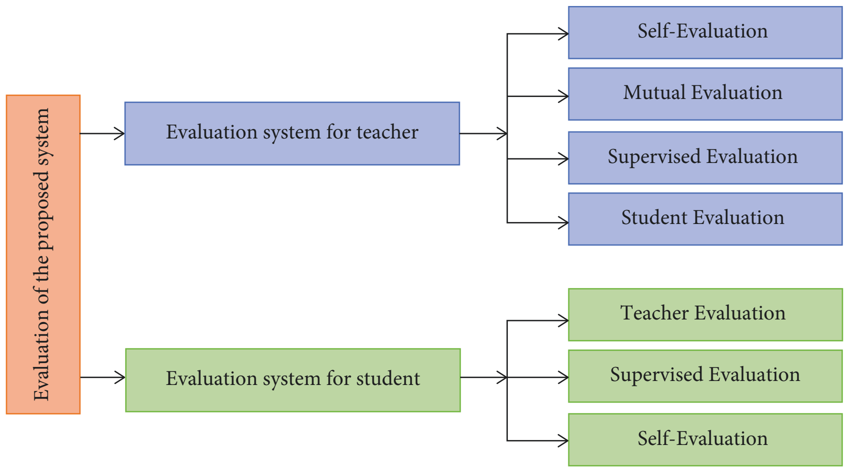



Figure 1: Overall indicators for the suggested model.

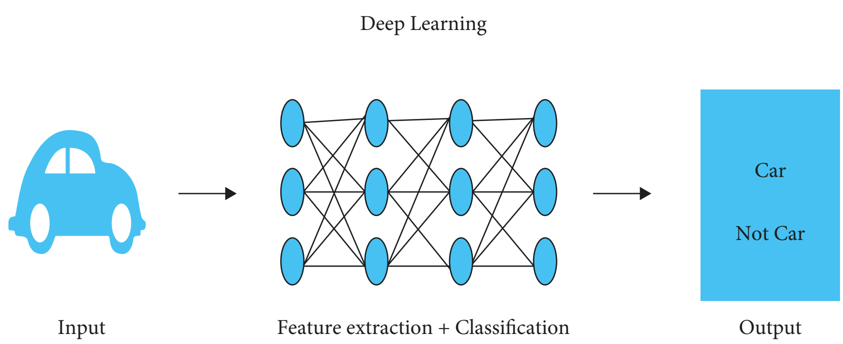



Figure 2: Deep learning block diagram.

DL is based on the principle of ranked concept, which means that higher-level ideas may be learned from lower-level concepts. Deep learning's core foundation and dispersed depiction suppose that the interaction of various variables will produce the ending monitoring value, whereas DL also supposes that the method of this collaboration can be partitioned into multiple levels, with each level representing a distinct level of abstraction of the last observational data [8]. As a result, diverse grades of generalization of remarks may be constructed by varying the amount of layers of DL and the size of a unique layer. As shown in Figure 2, the learning process of a deep learning model consists of two phases: forward propagation of data and backward transmission of mistakes.

*3.3.2. Forward Propagation of the Working Signal.* The calculation and storing of potential mediators for a neural network from the source to the destination layer are referred to as forwarding propagation. We will now go over the fundamentals of a neural network including one hidden layer step by step. The input signal is transferred from the input layer to the output layer through the hidden unit, and the output signal is formed at the output, which is the working signal's forward propagation. The network's weights are constant throughout signaling forward propagation, and the state of the neuron in each layer only impacts the state of the neuron in the next layer. If the required output cannot be achieved at the output layer, then it is routed to the error signal's backward propagation.

*3.3.3. Error Signal Backpropagation.* Backpropagation is a neural network that is simply a method of propagating the complete loss back into the neural network to determine how much of the loss each node is responsible for, and then upgrading the weights to minimize the loss by offering the nodes the higher the failure rate, the lower the weight, and vice versa. The difference between the actual output of the network and the desired output is the error signal, and the error signal is propagated forward layer by layer starting from the input, which is the backpropagation of the working signal. The error feedback adjusts the network weights during the error signal backpropagation phase. Continuous weight adjustment brings the network's real output closer to the planned output. This process of adjusting the weights of each layer of signal forward propagation and error backpropagation is carried out week by week. The process of continuous adjustment of weights is also the learning training process of the network. This procedure is repeated until the network output error is decreased to an acceptable level, or until a set number of learning, sessions are completed.

*3.4. Deep Learning Structure and Algorithm of Neural Network*

*3.4.1. Structure of Deep Learning Neural Network.* A deep learning neural network, also known as a feedforward neural network, is a 3-feedforward hierarchy network composed of an input layer, an inference layer, and an output layer, as shown in Figure 3. When a collection of inputs is presented to the network, the deep learning network can learn them progressively as follows: the input sequences are initially sent from the input nodes to the implied layer unit. Following the processing of the implicit layer unit layer by layer, an input pattern is formed and transferred to the output layer, a process known as forwarding propagation. The result is then evaluated to the predicted value, and if it does not match, it is changed into loss backpropagation, which sends the error along the natural route and reduces the error signal by altering the weights of the connections of the neurons in each layer. This forward and backward propagation alternates and is referred to as a "memory training" process. The structure tends these two procedures until the difference between both the output value and the predicted value is within a certain limit, at which point the system finishes learning. The fresh samples are then input into the neural model, and the associated output values are calculated.

In the networks with three layers, the input vector is $X = (x_1, x_2, \ldots, x_i, \ldots, x_m)^p$; if we add $x0 = -1$, then we can introduce threshold value for the hidden layers. If the output vectors of the hidden layers are $Y = (y_1, y_2, \ldots, y_j, \ldots, y_m)^p$, and if we add $y0 = -1$, threshold values can be introduced for output layer neurons. Similarly, the output vector of output layer is $O = (o_1, o_2, \ldots, o_k, \ldots, o_m)^p$. The desired output vector is $d = (d_1, d_2, \ldots, d_i, \ldots, d_m)^p$. The matrix of masses among the input layer and the hidden layer is denoted by $V = (v_1, v_2, \ldots, v_j, \ldots, v_m)^p$. Here, the column vector $V_j$ is the weight vector consistent to the $j_{\text{th}}$ neuron in the hidden layer; the weight matrix amid the hidden layer and the output layer is represented by $W = (W_1, W_2, \ldots, W_j, \ldots, W_m)^p$, where the column vector $W_j$ is the weight vector matching to the kth neuron in the output layer. The mathematical relationships between the signals in each layer are examined under:

For the output layer, we have

$$\begin{aligned} o_j &= f\left(\text{net}_j\right), \quad j = 1, 2, \ldots, l, \\ \text{net}_j &= \sum_{k=0}^{z} w_{kj} y_k, \quad j = 1, 2, \ldots, l. \end{aligned} \tag{1}$$

For the hidden layer, we have

$$\begin{aligned} y_k &= f\left(\text{net}_k\right), \quad k = 1, 2, \ldots, z, \\ \text{net}_k &= \sum_{k=0}^{z} v_{kj} x_i, \quad k = 1, 2, \ldots, z. \end{aligned} \tag{2}$$

In both of the above equations, the transfer function f(x) is a unipolar sigmoidal function (or hyperbolic tangent function).

$$f(x) = \frac{1}{1 + e^{-x}}. \tag{3}$$

Here, $f(x)$ is continuous and derivable, and has

$$f'(x) = f(x)[1 - f(x)]. \tag{4}$$

*3.4.2. DL Algorithm Network Error and Weight Modification.* When the network output is not equal to the desired output, there exists an output error Er, defined as follows:

$$\text{Er} = \frac{1}{2}(d - o)^2 = \frac{1}{2}\sum_{j=1}^{l}\left(d_j - o_j\right)^2. \tag{5}$$

Expanding the above error definition equation to the hidden layer, we have

$$\begin{aligned} \text{Er} &= \frac{1}{2}\left(d_j - f\left(\text{net}_j\right)\right)^2 \\ &= \frac{1}{2}\sum_{j=1}^{l}\left(d_j - f\left(\sum_{j=0}^{z} w_{kj} y_k\right)\right)^2. \end{aligned} \tag{6}$$

Expanding further to the input layer, we have

$$\begin{aligned} \text{Er} &= \frac{1}{2}\sum_{j=1}^{l}\left(d_j - f\left(\sum_{k=0}^{z} w_{kj}\text{net}_k\right)\right)^2 \\ &= \frac{1}{2}\sum_{j=1}^{l}\left(d_j - f\left(\sum_{k=0}^{z} v_{kj} x_i\right)\right)^2. \end{aligned} \tag{7}$$

From the above equation, it can be realized that the network input error is a function of the weights $w_{kj}$, $v_{kj}$ for every layer, so correcting the weights can alter the error Er. Clearly, the principle of regulating the weights is to make the error decrease continuously, and therefore, the modification of the weights must be made relative to the negative incline of the error, i.e.,

$$\Delta w_{kj} = -\eta \frac{\partial E}{\partial w_{kj}}, \quad k = 0, 1, 2, \ldots, z;\ j = 1, 2, \ldots, l, \tag{8a}$$

$$\Delta v_{ik} = -\eta \frac{\partial E}{\partial v_{ik}}, \quad i = 0, 1, 2, \ldots, n;\ k = 1, 2, \ldots, z, \tag{8b}$$

where the negative sign indicates gradient constant and the descent $\eta \in (0, 1)$ indicates the scale factor that reproduces the knowledge amount in training. It can be noticed that the deep learning procedure belongs to the class of $\delta$-learning procedures.

## 4. Design of Teaching Quality Evaluation Model Based on Deep Learning Neural Network

The steps for establishing the teaching quality evaluation model based on deep learning neural network can be explained in Figure 4.

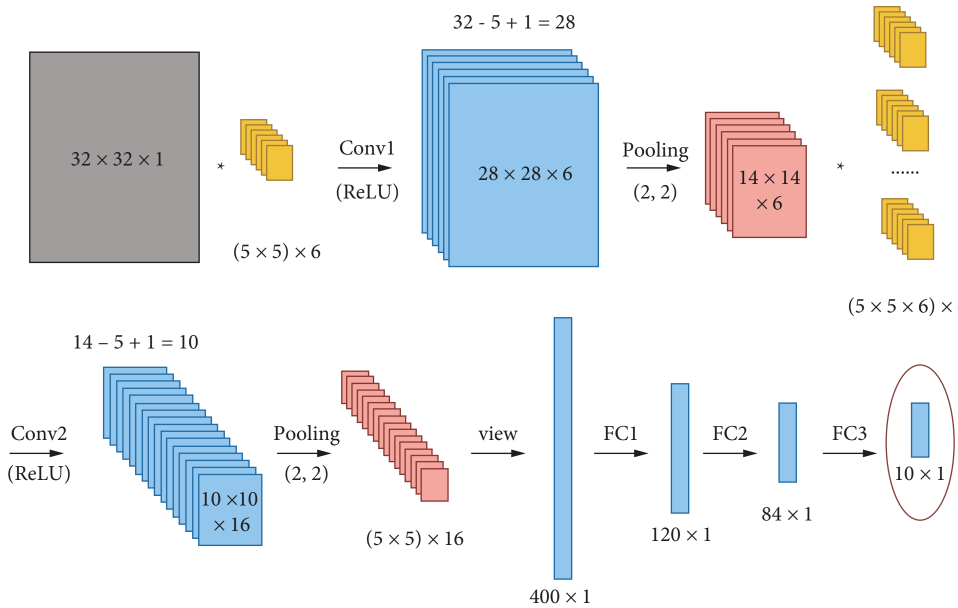



Figure 3: Three-layer deep learning network model.

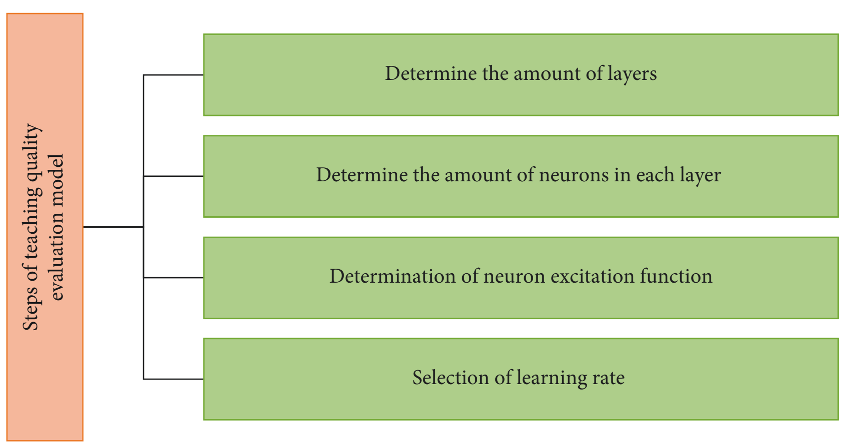



Figure 4: Steps of teaching quality evaluation model based on deep learning neural network.

*4.1. Determination of the Number of Layers.* Deep learning methods are extremely sensitive to network topology, and various network designs handle problematic situations. The much more advanced the neural network architecture, the better it handles complex nonlinear circumstances, but the lengthier the training phase, whereas if neural network architecture is overly simple, network training will be hard to convergence, and if it converges at all, it will take too much time. It is demonstrated that raising the number of hidden layers may increase the neural network's nonlinear mapping capability and make the system more capable of tackling complicated nonlinear issues. Nevertheless, too many hidden layers will increase the network's study time. In 1989, Robert Hecht-Nielson published Kolmogorov's theorem for deep learning neural network models and demonstrated that every continuous function in the finite interval can be represented by a deep learning neural system with one hidden layer. As a result, a three-layer deep learning neural system can perform any n-dimensional to m-dimensional mappings, providing a basic premise for creating deep learning neural systems. In deep learning neural networks, there are 2 methods to minimize errors and enhance accuracy: one would be to increase the number of network layers, and the other is to increase the number of neurons in the hidden layer. The former frequently overcomplicates the system and greatly increases network time training; however, the latter's training impact is easier to evaluate and change than the first. As a consequence, the neural network-based teaching quality assessment model in this paper employs a three-layer deep learning neural structure with one hidden layer.

*4.2. Looking at a Number of Neurons in Each Layer.* The amount of neurons in each layer is determined by the dimensionality of the input vector. The foregoing results show that the input vector is divided into 4 main primary components. Based on the improved principal component of the seven indicators in the instructional quality assessment evaluation system, the number of neurons in each layer is $n = 4$. It is decided how many neurons will be in the implicit layer. The amount of neurons in the hidden layer is generally determined by the network's resolution efficiency. When there are not enough neurons in the hidden layer, the network will not be ready to practice, the system will not be "strong" enough to discriminate previously unknown samples, and error tolerances will be insufficient. However, putting too several neurons in the hidden layer may cause the training curve to be too lengthy, and the error may be nonoptimal; therefore, calculating the right number of neurons in the hidden layer is a challenge. Generally, we may use the "trial-and-error technique" to assess the fit between both the production error and the intended error and choose the number of nodes in the hidden layer whenever the simulation is optimal, but this method is time-consuming and laborious. The number of neurons in the hidden layer can be determined by (9) and (10), respectively.

$$s = \sqrt{0.43\mathrm{mm} + 0.12\mathrm{m}^2 + 2.54n + 0.77\mathrm{m} + 0.35} + 0.51, \tag{9}$$

$$\text{or } s\sqrt{m + n} + a, \tag{10}$$

where $a$ is constant within [1, 10], $n$ is the number of neurons in the input layer, and $m$ is the amount of neurons in the output layer.

According to the empirical method, the number of neurons in the hidden layer is $s = 4$.

The amount of neurons in the output layer is determined. The results of teaching quality evaluation are taken as the production of the system neurons, i.e., the amount of production layers $m = 1$.

*4.3. Determination of Neuron Excitation Function.* It is straightforward to describe due to the differentiability of the S-type function and the simple differential equation, and it also has high nonlinear mapping ability; hence, it is typically employed as a mapping function. The sigmoidal function is selected in this research for the excitation function of the neurons in the deep learning neural network, which can be derived using

$$f(x) = \frac{1}{1 + \exp(-x)}. \tag{11}$$

*4.4. Selection of Learning Rate.* The learning rate determines the amount of change in weights generated in each training cycle. A high learning rate may cause network instability or even divergence. A low learning rate will result in a long training period and slow network convergence, but it will ensure that the network's error value does not jump out of the trough of the error surface and finally converges to the smallest error value. As a result, it is often preferable to use a lower learning rate to maintain system stability. The network is trained at multiple possible learning rates during the design process, and the adequacy of the chosen learning rate is assessed by measuring the rate of fall of the error sum of squares after each training session. If the error sum of squares decreases quickly, the learning rate is appropriate; if the error sum of squares oscillates, the learning rate is too large. For each network, there is a proper learning rate. Different learning rates may be required at different locations on the error surface in more sophisticated networks. This research employs a changing adaptive learning rate, which causes the network's training to automatically select different learning rate sizes at different stages, to decrease the number of training sessions required to determine the learning rate as well as the training duration. According to the above analysis, the structure of the deep learning neural network-based teaching quality evaluation model is shown in Figure 5.

## 5. Deep Learning Training Results and Analysis

*5.1. Selection of Data.* In English language teaching (ELT), evaluation and testing are also done or conducted to evaluate or estimate the student's performance, discover their inadequacies in certain elements, and rectify them for development in the subject of exercise they perform. It is also critical for instructors to analyze themselves and enhance their learning methods to provide quality education. The ELT evaluation consists of four parts: leader evaluation, expert evaluation, peer evaluation, and student evaluation. The English teaching evaluation data are obtained as below:

(i) Leader evaluation: It is the assessment of a leader's style and abilities. It might be a useful analysis tool for people considering a career in business management. Several business administration and corporate development trainings include leader evaluation. In addition, leader evaluation involves randomly listening to the class and assessing the teacher's English instruction as well as the students' learning.

(ii) Expert evaluation: This evaluation, also known as a heuristic evaluation, is a written evaluation performed by a specialist who has a specialized understanding of a certain issue like overall fitness, psychological health, mental health, sexual perversion, substance misuse, and family violence. The evaluation gives information about an individual's operating in the field of the professional's specialized expertise, as well as if the individual's work affects his or her protected activity when the specialist is assessing a parent. The Office of Academic Affairs and each college determine the review and evaluation courses, respectively, and the expert group conducts inspection and listens to the classes.

(iii) Peer Evaluation: Peer assessment is a sort of feedback mechanism used in performance evaluation. The technology is intended to track and enhance work performance. It is frequently done by coworkers who are on the same team. Supervisors are

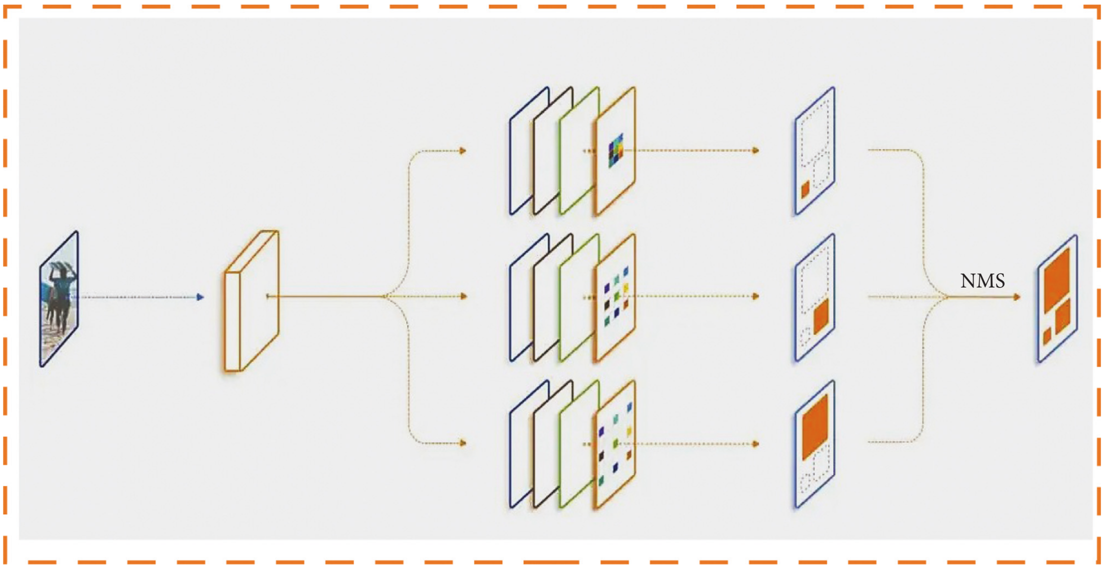



Figure 5: English teaching evaluation model based on deep learning.

not included in this sort of evaluation tool. In this kind of evaluation, organize experienced teachers to evaluate peer teachers and adopt the way of listening to, evaluating, and discussing the lessons to improve the English teaching strategies and methods of the evaluated teachers and to improve the English teaching ability.

(iv) Student Evaluation: It is a rating given by students of the institution's service, whether it is primarily for the classroom experience or all parts of the learning process. In this kind of evaluation, students evaluate the quality of English teaching of their teachers in their classes each semester. The evaluation of instructors' English instruction in each semester is often scheduled in the middle of the semester, before the semester's final test.

This paper gathered English teaching data and translated the 7 evaluation indicators into 4 comprehensive indicators based on the English teaching evaluation indicators derived from the abovementioned method of getting English teaching evaluation data. This study employs enhanced principal component analysis, from which the principal component expression equation may be obtained as follows.

$$u1 = 0.4223 \times 1 + 0.1082 \times 2 + 0.3882 \times 3 + 0.3141 \times 4 + 0.3224 \times 5 + 0.4917 \times 6 + 0.4635 \times 7$$

$$u2 = -0.4054 \times 1 + 0.6229 \times 2 + -0.3780 \times 3 + 0.4445 \times 4 + 0.2841 \times 5 + 0.1307 \times 6 + -0.0969 \times 7$$

$$u3 = -0.1566 \times 1 + -0.2821 \times 2 + -0.1198 \times 3 + -0.4544 \times 4 + 0.7145 \times 5 + 0.3323 \times 6 + -0.2327 \times 7$$

$$u4 = -0.0237 \times 1 + -0.2524 \times 2 + -0.6386 \times 3 + -0.0488 \times 4 + 0.0318 \times 5 + -0.0873 \times 6 + 0.7190 \times 7$$

The values of the four principal components corresponding to each sample are determined using the exploratory factor expression equation shown above. Furthermore, the values of the four main components are adjusted before being employed as training samples and predictors of the deep learning neural network.

*5.2. Determination of Network Topology.* This study uses a three-layer deep learning neural network, with one layer for each of the input, hidden, and output layers. According to the improved principal component analysis in Section 3, the dimension of the input vector is 4. Furthermore, the study in Section 4.2 showed that the number of neurons in the input layer is four, the amount of neurons in the output layer is one, and the amount of neurons in the hidden layer is four. As a result, the deep neural network-based instructional quality assessment model's network structure is 4-4-1.

*5.3. Implementation of Deep Learning Neural Network Model Based on MATLAB.* The first 60 sets of 68 data sets are utilized as training samples in this research, whereas the remaining 8 sets are employed as detection values, i.e., simulation values. The output expected value is the relevant evaluation goal with a target error of 0.0001. Figure 6 shows how to design and train a deep learning neural network using MATLAB software.

The sample size has a considerable influence on deep learning-based auto-segmentation effectiveness. The instrument's fundamental properties influence the link between sample size and performance. In some circumstances, tiny samples might provide adequate results. A demonstration of deep learning neural network training is shown in Figure 7.

Deep learning neural systems are trained to use the stochastic gradient descent technique. It is an optimization approach that determines the error gradient for the present state of the system using instances from the training data and then changes the modeling weights using the back-propagation of error procedure, sometimes known as just backpropagation. The step size is the total number by which

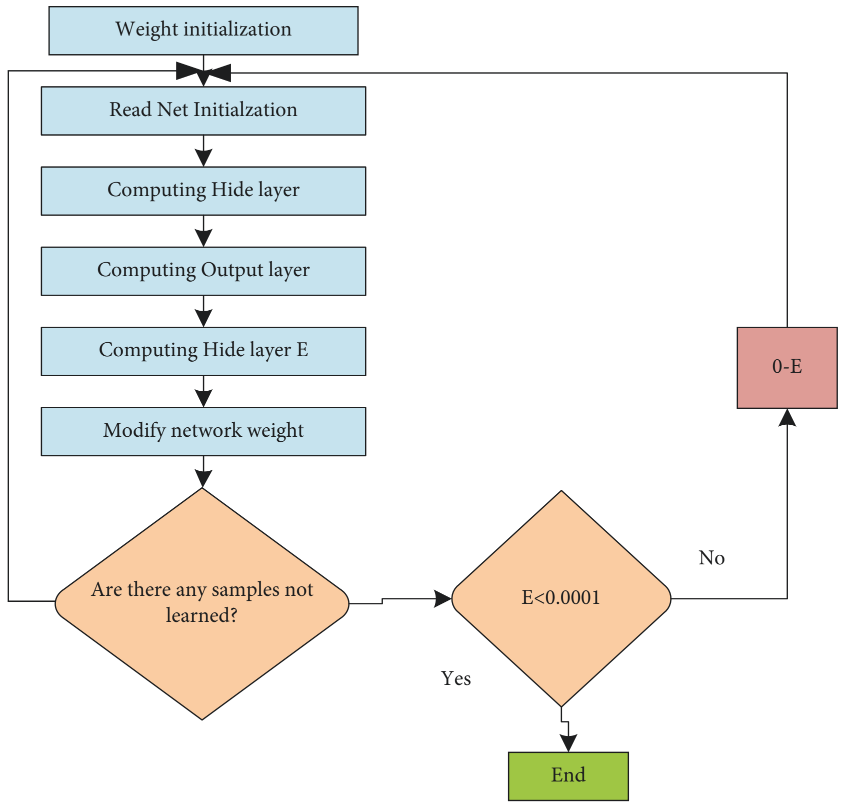



Figure 6: Algorithm flowchart.

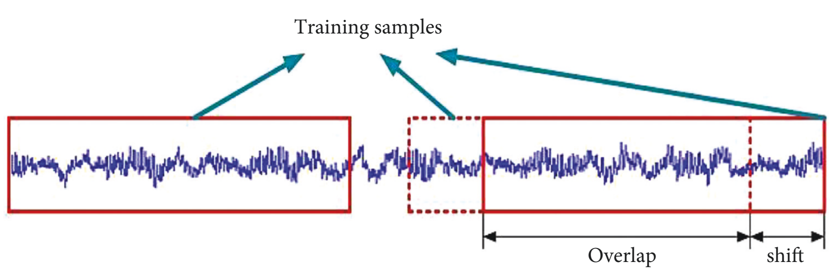



Figure 7: Sample training.

the weights are adjusted throughout training. The training error is a customizable hyperparameter used during neural network training that has a modest positive value, typically between 0.0 and 1.0. The training error determines how fast the model adapts to the situation. Low learning rates require more adequate training, because the weight factor adjustment in the iteration is very small, while greater learning rates produce quick changes and necessitate fewer training iterations. The training effect at a precision of 0.01 can be seen in Figure 8. According to this figure, the required accuracy is achieved after 70 training sessions.

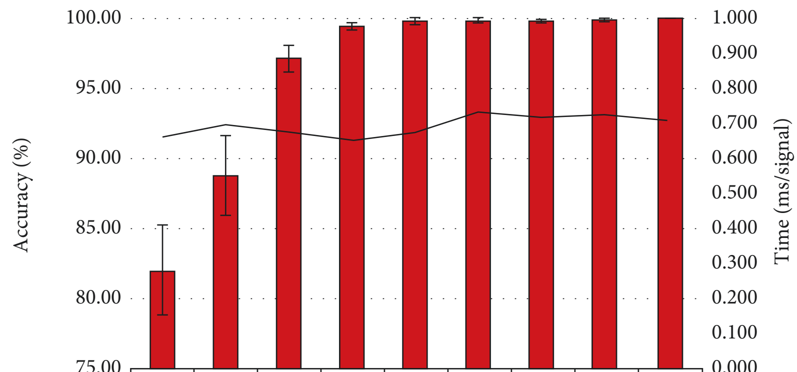
The error profile at a goal of 0.001 is shown in Figure 9. According to this graph, the requisite accuracy is achieved after 179 training sessions. As a result, by continuing to train, the accuracy increased to 0.001.

Figure 10 depicts the simulation results of deep learning neural network training. These findings reveal that the deep learning neural network's prediction values after training deviate from the assessment outcomes of the original data.

There are certain errors, and the main reasons for the above errors are as follows.

(i) The coverage of evaluation indexes is not comprehensive enough, and there are errors in the subjective evaluation of evaluation subjects.

(ii) The deep learning method has certain disadvantages, such as difficulties assuring convergence, slow convergence speed, tendency to slip into local minima, and increased accuracy requirements. More training sessions are required, resulting in a longer training period. According to the findings, the neural network teaching quality evaluation model based on a deep learning algorithm cannot effectively assess teaching quality.




| | 90 | 120 | 300 | 900 | 1500 | 3000 | 6000 | 12000 | 19800 |
|---|---|---|---|---|---|---|---|---|---|
| Accuracy (%) | 82.07 | 88.80 | 97.14 | 99.35 | 99.72 | 99.77 | 99.87 | 99.74 | 100.00 |
| time (ms) | 0.662 | 0.697 | 0.677 | 0.659 | 0.677 | 0.735 | 0.718 | 0.725 | 0.705 |

FIGURE 8: Error profile at a target of 0.01.

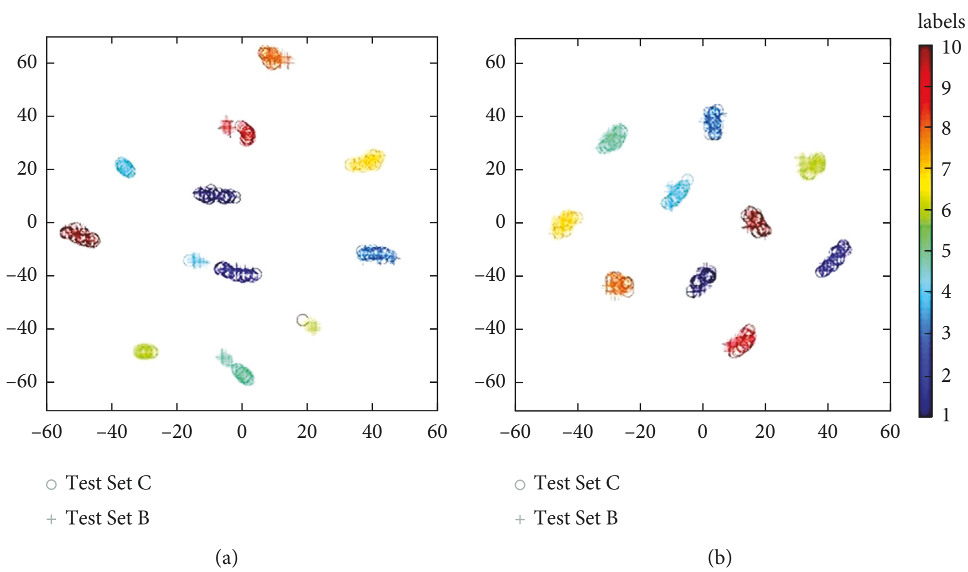



FIGURE 9: Error profile at a target of 0.001.

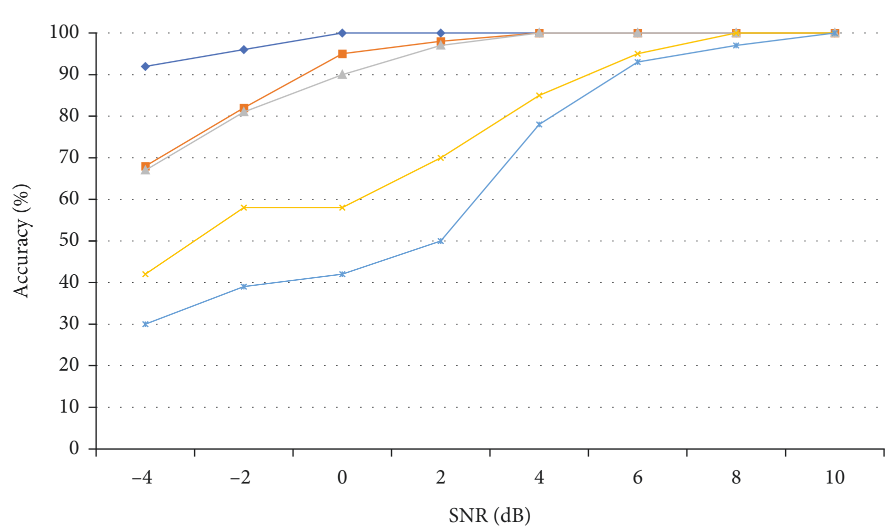



FIGURE 10: Deep learning simulation results in the comparison chart.

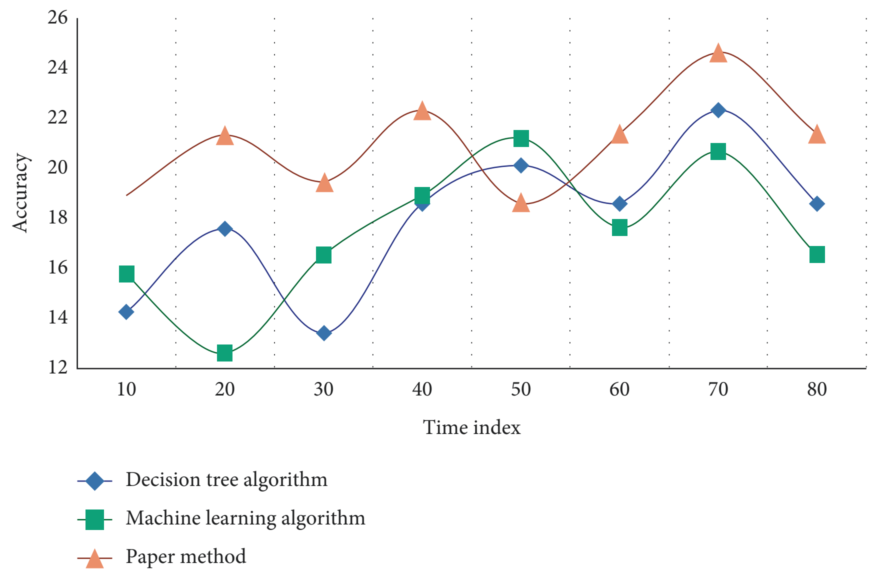



Figure 11: Results of the 1st college English education evaluation.

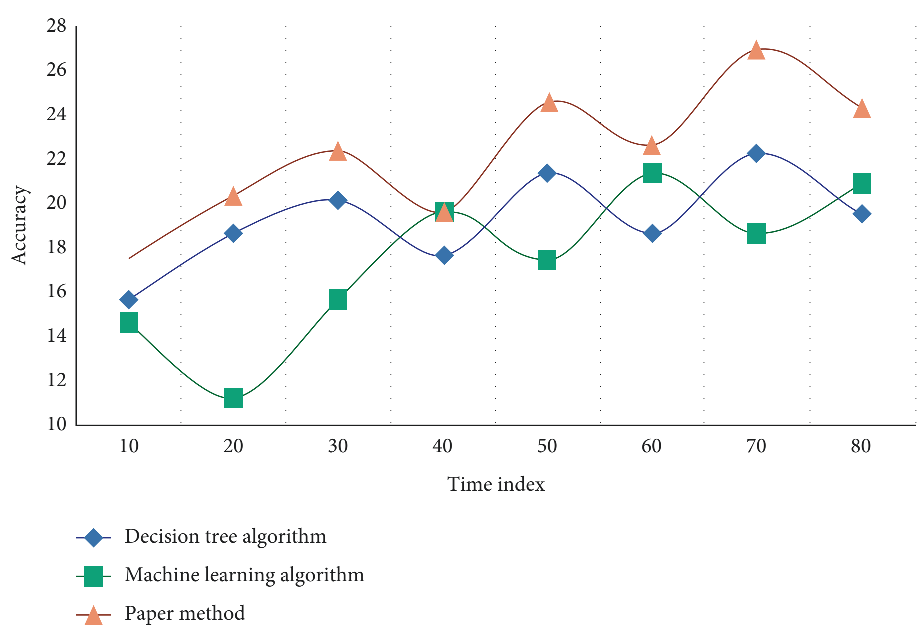



Figure 12: Results of the 2nd college English education evaluation.

Deep learning techniques are often classified depending on how long they have been in use. Estimate the time it will take to complete the college English education evaluation in the next ten min, half an hour, or one hour in the extreme near term. The short-term aim is to estimate the future college English education assessment in a period of one day to one week. The medium term is often defined as the following three months and is measured in years. The college English education review is expected to take more than a half year. This research used a short-term collegiate English education evaluation approach. The parts that follow will go over the simulation procedure and the experiment outcomes. Two experiments are performed for comparison. The tests are carried out using the decision tree, the machine learning algorithm, and the approach described in this work. Figures 11 and 12 show the outcomes of the tests.

The experimental findings reveal that, among the three methods, this method's prediction accuracy is typically greater than the other two methods in the two studies. Teachers are accustomed to utilizing concept maps to create section summaries and then immediately present them to students throughout the teaching process. This type of concept map just substitutes the summary of mathematical knowledge elements with modified ways; therefore, it cannot have a good influence on students' thinking skills unless students participate in developing the concept map. At the same time, presenting kids with concept maps directly is a sign of ignoring their dominating position in learning.

Students still are puppets of professors in this type of education, and students' interests and passions have not been developed. To increase their capacity to learn independently in college English, students need to have a certain level of information fluency. To begin, students should choose and filter learning materials suited for them to study speaking, listen more, talk fearlessly, correct pronunciation, acquire real spoken English, and admire the scenery of the English language. Secondly, improving students' college English levels necessitates extensive oral English instruction in a real-world setting. Through the artificial intelligence instructional media and numerous mobile smart terminals, students may pick collaborative, investigation, gaming, and other learning techniques on their own.

## 6. Conclusions

This study discusses the structure, model, and working principle of deep learning, explains the learning algorithm of the deep learning neural network model, and creates a deep learning-based English teaching evaluation model to increase the efficacy of college English teaching assessment. According to the training findings, although network prediction is based on the premise of lowering the dimension of input vectors, the deep learning-based neural network model fails to accomplish the desired impact, and there is a relatively large error. There is a significant difference between the network output value and the intended value. The suggested English teaching capacity assessment method can increase English teaching capacity by meeting the criteria. Nevertheless, because the deep learning process necessitates very high hardware capabilities and a considerable time cost, reduced overhead solutions must be researched in the future.

## Data Availability

The data used to support the findings of this study are available from the author upon request.

## Conflicts of Interest

The author declares that he has no conflicts of interest.

## References


[1] Y. Li and S. Malin, "Research on BP neural network for nonlinear economic modeling and its realization based on MATLAB," in *Proceedings of the 2009 Third International Symposium on Intelligent Information Technology Application*, IEEE, Nanchang, China, November 2009.

[2] B. A. Hamdan, "Neural network principles and its Application," *Webology*, vol. 19, no. 1, pp. 3955–3970, 2022.

[3] R. He and L. Zhang, "Artificial neural network application in analog layout placement design," in *Proceedings of the 2009 Canadian Conference on Electrical and Computer Engineering*, IEEE, St. John's, NL, Canada, May 2009.

[4] X. Liu, W. He, Y. He, S. Zhang, Z. Yao, and Z. Cui, "Effect of dual-convolutional neural network model fusion for aluminum profile surface defects classification and recognition," *Mathematical Biosciences and Engineering*, vol. 19, no. 1, pp. 997–1025, 2021.

[5] X. Meng, L. Yang, H. Sun, X. Du, B. Yang, and H. Guo, "Using a novel student-centered teaching method to improve pharmacy student learning," *American Journal of Pharmaceutical Education*, vol. 83, no. 2, p. 6505, 2019.

[6] X. Wang, "Research on education evaluation of Business English talents training in the new era," in *Proceedings of the 2020 3rd International Seminar on Education Research and Social Science (ISERSS 2020)*, Qinhai, China, January 2021.

[7] D. N. Hidayat, "Evaluating English teacher education programs in Indonesian Tertiary Education: a proposed model," *IJECA (International Journal of Education and Curriculum Application)*, vol. 1, no. 2, p. 14, 2018.

[8] J. Wu, "Empirical analysis of evaluation of English Teachers' Educational ability under MOOC environment," in *Proceedings of the 2018 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS)*, IEEE, Xiamen, China, January 2018.

[9] X. Li, "Characteristics and rules of college English education based on cognitive process simulation," *Cognitive Systems Research*, vol. 57, pp. 11–19, 2019.

[10] O. Orzhel, "Contributing to teaching and learning enhancement: in search of Ukrainian equivalents for appraisal, assessment, evaluation," *International Scientific Journal of Universities and Leadership*, vol. 2020, no. 10, pp. 142–154, 2020.

[11] Y. Zhang, "English teaching evaluation system based on Big Data," in *Proceedings of the 2021 4th International Conference on Information Systems and Computer Aided Education*, Dalian, China, September 2021.

[12] L. Hongxia, "Retracted article: coastline Climate Environment and coastal city English smart teaching simulation based on GIS System," *Arabian Journal of Geosciences*, vol. 14, no. 15, p. 1481, 2021.

[13] C. Zhang and Y. Guo, "Retracted article: mountain rainfall estimation and online English teaching evaluation based on RBF neural network," *Arabian Journal of Geosciences*, vol. 14, no. 17, p. 1736, 2021.

[14] M. Ji, Y. Liu, M. Zhao et al., "Use of machine learning algorithms to predict the understandability of health education materials: development and Evaluation Study," *JMIR Medical Informatics*, vol. 9, no. 5, Article ID e28413, 2021.

[15] Y. Zhang, R. Alturki, H. J. Alyamani, M. A. Ikram, A. Rehman, and M. Haleem, "Multilabel CNN-based hybrid learning metric for pedestrian reidentification," *Mobile Information Systems*, vol. 2021, Article ID 5512382, 7 pages, 2021.

[16] İ Kazaz and N. Alagözlü, "Evaluation of teaching practicum for pre-service English language teachers: a scale development study," *Dil ve Dilbilimi Çalışmaları Dergisi*, vol. 16, no. 3, pp. 1562–1593, 2020.

[17] J. X. Luo, C. Wang, Z. X. Liu, and Y. Fu, "Covariance analysis for the evaluation of English teaching effect," in *Proceedings of*

*the 2019 International Conference on Informatics, Control and Robotics (ICICR2019)*, Shanghai, China, June 2019.

[18] X. Wu and Y. Zu, "The inspiration of American classroom teaching approach on fashion English teaching," *The Science Education Article Collects*, vol. 65, no. 21, pp. 88–97, 2019.

[19] H. Zhang, "Analysis and research on college English teaching based on humanities education," in *Proceedings of the 3rd International Conference on Education & Education Research (EDUER 2018)*, Xi'an, China, January 2019.

[20] N. Wang, Y. Zhang, and B. Huang, "Exploration of practical teaching reform based on cultivation of innovation ability," in *Proceedings of the 8e 12th International Conference on Modern Industrial Training*, Naning, China, April 2019.