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Research Article

Optimized Design of English Learning Environment Based on Deep Neural Network

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The learning environment is an important support condition for learning and an important variable affecting learning, so it is an important research content of learning theory, and the understanding of the learning environment is also developing and changing as the educational theory continues to develop. The new curriculum standards for college English demand teachers alter the original conventional way of pedagogy and optimize students' mode of learning. In teaching practice, the learning atmosphere exerts an extremely influential influence on the smooth implementation of teaching activities and the healthy development of students' minds and bodies. Deep learning is a hot research topic among machine learning areas in recent years, and deep belief networks as a pioneer in constructing such deep structures. Also, deep neural network (DNN) has been a hot research topic in the field of artificial intelligence and big data analysis in recent years. A DNN-based English learning environment optimization design is put forward in this paper, focusing on the problems of the English learning environment in colleges and the causes of the problems, and exploring strategies to optimize the English learning environment in colleges in order to promote the normal development of English teaching in colleges. The experimental results show that the DNN can improve the overall recognition rate of fault identification and fault location by 13% and 25% on average compared with the other two algorithms, so the deep learning can extract features directly from the original samples and overcome the defect that the neural network is easy to fall into local optimum, and obtain better results. The optimization of the learning method will help to realize the education concept of "human-oriented and comprehensive development," and help to stimulate students' enthusiasm, initiative, and exploration in learning.

1. Introduction

The development and changes in the times will put forward newer and higher requirements for foreign language teaching, and students, as the main subjects of learning, will also constantly put forward new requirements for foreign language teaching [1]. The current English teaching in higher education cannot meet the new requirements and needs of society and students, and this contradiction will push foreign language teaching to continuously reform and develop [2]. The new curriculum standard of college English requires teachers to change the traditional teaching style, optimize students' English learning style, and strengthen the cultivation of students' learning strategies so as to improve their learning ability [3]. However, because of the impact of traditional English education, the English learning environment in colleges has certain problems in terms of physical and psychological environment that need to be solved as soon as possible [4]. Thus, an in-depth understanding of the function and the role of the learning environment as an important teaching factor in teaching activities and its inner mechanism of influencing students' physical and mental development can help us to better explore the laws of education and improve the quality of teaching.

The concept of education has dramatically changed as the IT has rapidly developed, and the goal of achieving rapid development of education in China today is to modernize education with IT [5]. The classroom learning environment is a complex overall system composed of many elements, which produces a significant effect on students' cognition, emotion, and behavior in the learning process; is an

important hidden curriculum affecting teaching activities; and is an indispensable element for the healthy growth of students' personality [6]. The classroom environment is the atmosphere in the classroom group as a social collective, which potentially influences the teaching and learning behaviors that occur in the classroom; is a potential determinant of students' development; and is a basic prerequisite for classroom management [7]. In China, most students learn English surrounded by their native language environment and lack a natural English learning environment [8]. Furthermore, due to the long-term influence of the traditional Chinese English education model, students often show disinterest, burnout, and even boredom with English [9]. How to make up for this innate deficiency of language-learning environment and improve the efficiency of English learning is the problem facing English education at present.

Society demands the development of human resources with high quality in all aspects—good at learning, good at thinking; good at collecting, identifying, and processing various information; good at cooperating with others; and happy to continuously acquire new knowledge and actively explore it [10]. The advantages of DNN are that they overcome the disadvantages of time-consuming and labor-intensive manual feature design; primary features for each layer are obtained by pretraining layer-by-layer data; distributed data learning is more effective (exponential); and deep modeling provides a more detailed and efficient representation of real-world complex nonlinear problems than shallow modeling approaches. Learners need to understand their learning style and get technical guidance to optimize their learning style and build a more solid foundation for learning. In reality, the learning environment of college students has been seamlessly connected by information technology, and the application of various new media should not be studied in isolation; we should interconnect them to make them fit the current status of digital learning environment. Using modern information technology, we should reform classroom teaching, and cultivate and improve students' autonomous learning ability. This is because with the help of network and other information media, it provides students with more mathematical resources suitable for students at different learning levels. Students can choose suitable learning content according to their own interests and abilities. We determine the learning process according to your level or choose a suitable learning method to learn. You can also communicate with classmates, teachers, and even experts. In such a series of learning processes, students independently learn. Therefore, to achieve the desired results, it is necessary to unite English learning environment optimization and neural networks, a significant organic combination of features that is a very necessary and revolutionary progress with a breakthrough. This is because this move overcomes the drawbacks of learning environment optimization and neural networks from each other.

The innovative points of this paper are as follows:

(1) This study takes a systematic approach to the college English teaching process, focusing on each element in the teaching system and the relationship between each teaching element inside and outside the classroom.

(2) It gives a more comprehensive introduction to the principles of deep learning, training methods, and the network models involved, and gives a detailed introduction to the structure of DNN.

(3) This thesis attempts to explore the optimization of English learning environment and neural network, and seamlessly connects the learning environment in which college students live under the scope of digital learning environment research, and provides teaching process design and teaching case design to provide some reference for teaching staff.

This paper combines the DNN with English learning environment optimization to solve the time-consuming and laborious problem of manual feature extraction. The research is divided into four parts. The first part expounds on the background that the current English teaching in higher education meets the new requirements and the needs of society and students. The second part analyzes the optimization design of English learning environment based on DNN. It integrates and optimizes the material environment, including the integration and optimization of the institutional environment. The third part discusses the application of DNN in the optimization of English learning environment. The structure is analyzed through the DNN training process analysis. Section 4 summarizes the full text in order to improve students' satisfaction, participation, and interaction in course learning. We promote their in-depth understanding of the deep integration of technology and subject knowledge, and support the development of their information-based teaching skills.

2. Thoughts on Optimal Design of English Learning Environment Based on DNN

2.1. Integration and Optimization of Material Environment. Facing the problems of the current English learning environment in higher education is relatively simple, the construction of physical environment is weak, and there are many factors that restrict the construction of English learning environment in higher education. The optimization of learning environment is to use a systematic approach, analyze all factors, use relevant resources, and coordinate and configure them through a set of specific procedures to realize the organic combination of all elements and resources in order to make the best effect of learning. The formation of integrated language skills is based on the integrated development of language skills, language knowledge, emotional attitudes, learning strategies, and cultural awareness. The course objectives are shown in Figure 1.

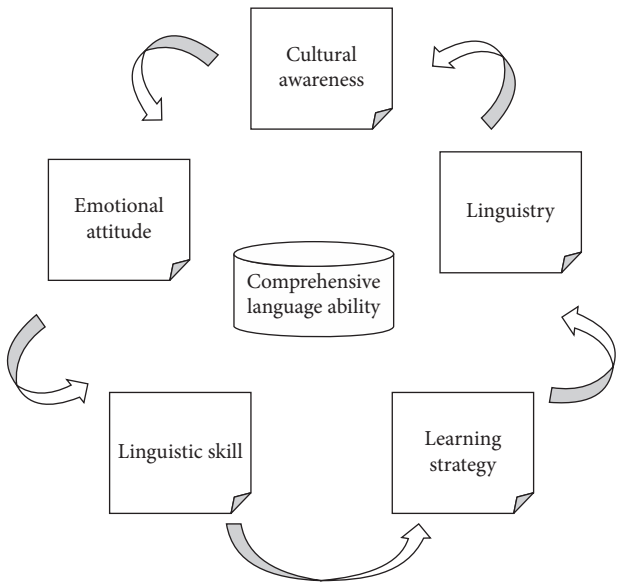

Figure 1: Course objective structure.

First, in the online learning environment, the optimal design of the network media equipment environment mainly includes the construction of hardware environment at the classroom level, the construction of hardware environment at the campus network level, and the construction of hardware environment at the public place level. According to the experience in teaching practice, the indexes are determined from the whole system composed of teaching evaluation elements, and after careful study, a tiered teaching quality assessment index system is established. The radial basis function and dynamic weights are the key to DNN, and the expression of radial basis function is as follows:

$$\begin{aligned} R &= \left(x_p - c_i\right) \\ &= \exp\left(-\frac{\left\|x_p - c_i\right\|^2}{2\sigma^2}\right), \end{aligned} \tag{1}$$

$\|x_p - c_i\|$—the norm of $x_p - c_i$, x_p—sample data input by the input layer, and c_i and σ—center and width of radial basis function.

In the optimization of the way of learning English at the university, the optimization is the improvement of individual localities, for example, the establishment of the evaluation system of English classroom learning style, more humane evaluation of learning style. In terms of teaching time, colleges and universities should reasonably arrange teaching time, insist on the combination of work and rest principle, build a stable teaching order in the classroom, and improve the teaching quality. Using the DNN to learn the output features as the input of the next layer for feature learning, the features of the existing space samples are mapped to another feature space after the layer-by-layer feature mapping. For a practical problem, we are most concerned, about the probability distribution of the input data, and its corresponding edge distribution; the edge distribution is also called the likelihood function.

$$\begin{aligned} P(v)\&9; &= \sum_h P(v,h) \\ \&9; &= \frac{1}{Z}\sum_h e^{-E(v,h)}, \end{aligned} \tag{2}$$

v—input data, $P(v)$—probability distribution, and $P(v,h)$—edge distribution.

Deep learning is a special field of study that aims to promote effective learning and to insist on the "unity of knowledge and action" through the interaction and interaction of learners, environment, artifacts, and active learning guided by strong intrinsic motivation [11–13]. It is "meaning-making" learning characterized by conceptual transformation, integrated understanding, and creative cognitive restructuring. The standardization of the collected data is required to minimize the effect of large-scale data on small data, and the standardization formula is as follows:

$$\overline{x}_{ij} = \frac{x_{ij} - \overline{x}_j}{s_j}. \tag{3}$$

Second, the network software conditions are optimized to design the main teaching platform construction. At present, the English network teaching platform generally adopts browser/server (browser/server) operation mode, which is based on web technology and adopts ASP development tools. Deep learning is a kind of active exploration learning mode, which requires students to engage in deep information processing, active knowledge construction, critical higher-order thinking, effective knowledge transformation and transfer application, and practical problem-solving. The optimal design also includes systematically integrating the various parts so that they work with each other to bring about greater synergy. The pretraining is mainly to get a generative model structure by training RBM layer by layer; the fine-tuning is to add a softmax output layer corresponding to the target classification in the final output layer of DBN and then fine-tune the model parameters using the traditional BP algorithm [14, 15]. Moreover, English teachers in colleges and universities should avoid a fill-in-the-blank teaching style and keep classroom lectures within twenty minutes, leaving sufficient time for students to discuss and analyze, and training their analytical skills and troubleshooting capabilities. The main elements of China's teacher training resource allocation mainly include the government, society, and schools, which interact and coordinate with each other to form the organic whole of the main body of teacher training resource allocation. The English teacher training system is shown in Figure 2.

Finally, the optimal design of resource content mainly emphasizes the construction of course content resources, network resources, thematic resources, and shared resources. The new curriculum requires teachers to guide students to take the initiative in learning, to help them form a learning style aimed at developing their abilities, and to

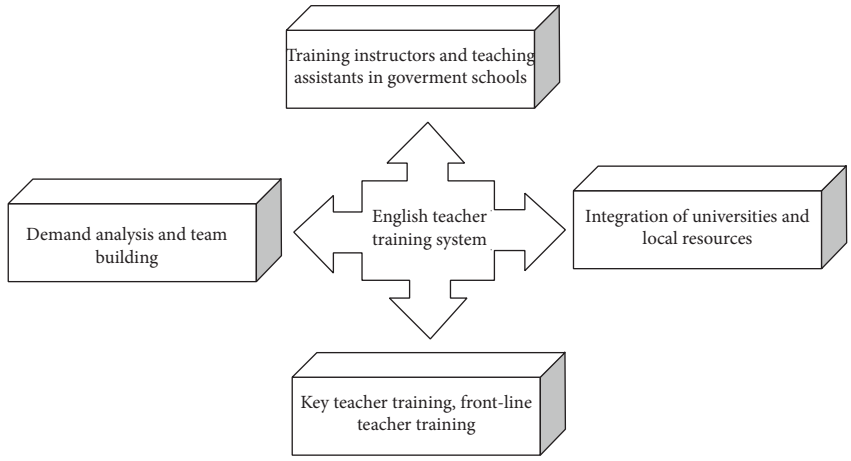

Figure 2: English teacher training system diagram.

encourage them to develop their comprehensive language skills through practice, experience, and communication. The occurrence of deep learning is influenced by the learner's motivation, learning strategies, learning environment, and learning process. It emphasizes high levels of cognitive goals and thinking skills, reflection and metacognition in the learning process, and high emotional engagement in the learning behavior. A deep belief network model can be viewed as a stack of several RBMs, and the process of learning a deep belief network is the process of learning these RBMs unsupervised and step by step. In the send, we are concerned with the probability that a neuron on the hidden layer is activated when given the state of all neurons on the visible layer, i.e., computing the posterior probability:

$$P(h|v) = \prod_{j=1}^{m} P\left(h_j|v\right). \tag{4}$$

Then, the speedup index is used to reflect the acceleration performance of parallel computing, which is defined as follows:

$$\text{Speedup}(p) = \frac{T_i}{T_1} \times 100\%, \tag{5}$$

T_1—time for 1 node to perform tasks and T_i—time for i nodes to perform tasks.

In order to achieve the reproduction of the original input, the encoder must capture the most significant elements that can represent the original input data. English teachers in colleges should reasonably arrange class time, design listening, reading, writing, and classroom, and comprehensively cultivate students' English ability; second, English teaching in colleges should reasonably control class size, and keep class size to about forty students to avoid too many students in the class and increased teaching difficulty.

2.2. Integration and Optimization of Institutional Environment. Integrating the survey results of higher vocational English learning environment and the demand of higher vocational English learning environment, the integration and optimization of institutional environment involve the following: accelerating the construction of higher vocational English curriculum system, improving the evaluation system of students' English performance, and providing corresponding policy guarantee. In this environment, various knowledge construction tools and various creative tools can be provided through technological means, and learners can improve their personal and organizational problem-solving decisions and abilities by participating in real life-based practical activities. The final outcome will be unstructured, rich in possibilities and variability.

The first is to accelerate the construction of the English curriculum system for higher education, the main purpose of which is to enhance their independent learning ability and improve their comprehensive cultural literacy in order to meet the needs of China's economic development and international exchange. The overall goal of the university English curriculum is to enable students to build on their compulsory English learning, to further clarify the purpose of English learning, to develop the ability to independently and cooperatively learn, to form effective English learning strategies, and to develop students' comprehensive language skills. Deep learning means that learners can critically learn new ideas and facts based on understanding and integrate them into their original cognitive structures, make connections between many perspectives and transfer existing knowledge to new contexts, and finally make decisions and solve problems. The structure of DNN is shown in Figure 3, which includes input layer, output layer, and implicit content.

But it can be indicated that there is not necessarily good learnability, i.e., how many parameters and the depth of the network model are needed to solve the problem of interest. That is, how many training samples are needed for the constructed model to make the network satisfy the fit state. Expanding the features in a sequence, where the aggregated features at each moment are obtained by stitching together feature words of different granularity at that moment, the results are shown in the following equation:

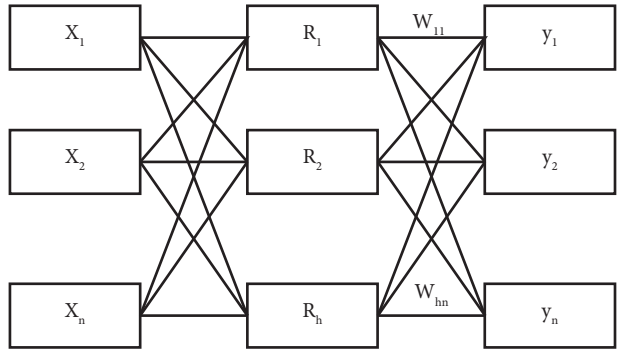

Figure 3: DNN structure.

$$c_i = \left[c_i^1; c_i^2; \ldots c_i^k\right], \tag{6}$$

c_i^k—the convolution window of the i word is the characteristic representation of k.

The second is to improve the evaluation system of students' English performance, which should be based on students' original foundation and the degree of improvement of their individual abilities achieved during the learning process, so as to motivate students to learn English. The generative model of DNN can obtain the joint distribution between observed data and labels, and can evaluate both the prior probability P (observed data|labels) and the posterior probability. In contrast, the traditional feedback neural network only evaluates the posterior probability, i.e., the network weights and radial basis function parameters are determined, and the output of the DNN can be expressed as follows:

$$y_j = \sum_{i=1}^{h} \omega_{ij} \exp\left(-\frac{\left\|x_p - c_i\right\|^2}{2\sigma^2}\right), \quad j = 1, 2, 3, \ldots, n, \tag{7}$$

ω_{ij}—weight of hidden layer and output.

The teaching recommendations of the new curriculum state that students should be provided with opportunities for independent learning and interaction, and space for full expression and self-development, and those conditions should be created to enable students to explore problems of their own interest and solve them on their own. In the text, we define the percentage of correct classification, the percentage of training samples, and the percentage of test samples as follows:

$$\begin{aligned} P &= \frac{r}{N} \times 100\%, \\ v &= \frac{m}{M} \times 100\%, \\ w &= \frac{n}{N} \times 100\%, \end{aligned} \tag{8}$$

p—classification accuracy rate, N—total number of test samples, r—correct identification of sample number, v—training sample proportion, M—total number of training samples, m—selected number of training samples, w—test sample proportion, and n—number of selected test samples.

Shallow learning, on the other hand, is limited to a lower level of cognition and is a one-way acquisition of data and information. This is because if the input data have a high dimensionality and many identical features, this will greatly increase the time for model training and the model's generalization ability will be less effective. The input samples are normalized to ensure that the data are in the specified range [1, 2] interval, which facilitates the processing of the data and improves the network efficiency. The input sample normalization process is given by the following:

$$X = \frac{T - T_{\min}}{T_{\max} - T_{\min}}, \tag{9}$$

T—unprocessed input value; $T_{\max}$—maximum value of neural network input; and $T_{\min}$—minimum value of neural network input.

However, deep learning and shallow learning are not completely opposed to each other. That is, while advocating deep learning, shallow learning is not completely rejected, and shallow learning is the precondition and foundation of deep learning. According to the approximation theory of neural networks, every nonlinear function can be represented by a shallow model and a deep model.

Finally, the school should provide appropriate policy protection, strengthen the financial policy protection of the hardware and software investment required for English teaching, and further optimize the physical environment for English teaching, especially in the construction of the resource base. The traditional way of learning English behind closed doors is bound to result in a single way of thinking and inefficient learning due to the lack of communication with others. Hence, teachers should actively use teaching aids, using multimedia equipment, microlessons, and online videos to assist teaching, enhance the attractiveness of English teaching, enrich the content of English teaching, and thus raise the efficiency of teaching. At this time, the deep

structure is to reduce the original data and remove the abstraction and relevant information. The target formula for the fine-tuning part is the likelihood probability function plus the sum of intraclass distances.

$$f = e * \left(-\sum_{1} x_i \log\ f_i\left(R\left(x_i, w_i\right)\right) \right) - \sum_{I} \left(1 - x_i\right) \log\left(1 - f_i\left(R\left(x_i, w_i\right)\right)\right), \tag{10}$$

R—new feature representation after learning, $f(R(\cdot))$—decoded data, and e—regulatory factor.

Deep learning is a qualitative description of a learning state that involves many aspects such as level of engagement, level of thinking, and cognitive experience; and it emphasizes the understanding of the nature of knowledge and the critical use of the learned content. Stacking RBMs together makes up a deep belief network, and a deep belief network can extract more abstract features from high-dimensional complex abstract inputs, i.e., features of lower dimensionality that differ from each other more from complex, high-dimensional input elements. Thus, for a certain class of functions, the deep model is well represented with fewer parameters compared to the shallow model. An effective way to build multilayer neural networks on unsupervised data is a two-step process; one is to train the network one layer at a time, and the other is to tune it.

3. Application Optimization of DNN in Learning Environment Optimization

3.1. Analysis of Training Process of DNN. The teaching process is manifested in the bilateral activities of teacher-student interaction, that is, the student-centered and teacher-led learning and teaching practice, which is different from other social activities. If all layers of the deep network are trained at the same time, the time complexity will be too high; if you only train one layer at a time, the deviation will be transferred layer by layer. In addition, because the deep network has too many neurons and parameters, it will face the problem opposite to the above supervised learning, in which the data will be seriously insufficient. Therefore, we should analyze the training process of deep learning.

First, single-layer neurons are constructed layer by layer so that a single-layer network is trained each time. The number of network layers of the whole system is set to 5, 8, and 10 layers in order. The contribution of the number of network layers N to the performance of the DNN is determined by comparing the false recognition rate of the whole system against the MNIST database. The results are shown in Figure 4.

It is to construct single-layer neurons layer by layer and to train the parameters of each layer from the bottom layer using the wake-sleep algorithm with the simple distribution of uncalibrated data layer by layer, so this step is an unsupervised training process, called the feature-learning process. In the reliability testing, 50 students were randomly selected, the interval between two tests was 20 days, and the average retest reliability was 0.63. The items with low reliability, i.e., the items with a correlation of 0.37 or less, were removed. The status of the retest reliability of the learning environment is shown in Table 1.

In face-to-face teaching, learners' flexibility can be increased, which means that learners have certain control over the time, place, path, or speed of learning. We fix the number of layers of the DNN and control the size of the different convolutional kernels. By setting the convolutional kernel sizes to $3 * 3$ and $5 * 5$, respectively, the system mean square error convergence curves are shown in Figure 5.

However, the simple distribution introduced must not differ too much from the original distribution; otherwise, the estimates will have a large deviation, which will eventually lead to an inaccurate model, which will not be worth the loss. This means that the hardware and software factors in the environment, namely, teaching objectives, curriculum system, teaching resources, evaluation system, hardware facilities, and teaching services, must support each other and evolve in a coordinated manner, working together to improve the quality of student learning. To give full play to the diagnostic, guiding, motivating, and directing functions of teaching evaluation in the process of secondary school English teaching, integrating curriculum, teaching, and evaluation into one organism is an important step to optimize the teaching process.

Second, when all layers are trained, tuning is performed using the wake-sleep algorithm. An abstract representation of each layer is generated from external inputs and upward cognitive weights. Since learners can be anywhere in the world and no longer need to co-locate in a classroom, asynchronous communication can be used instead of synchronous communication. In addition, learners can control the pace through the sequence and speed of course content, making steady academic progress at their own pace through independent learning of the material. Students themselves should place more emphasis on learning English before they enter secondary school, invest more effort in learning English well, maintain a strong desire to learn, develop good English learning habits, and become competent in English learning strategies. The likelihood of the RBM for the data is estimated by the Monte Carlo method, where the algorithm does not use MCMC in the approximation, but invokes an annealing importance sampling algorithm. The generative weights are then used to generate a reconstructed information, and finally, the residuals between the input and the reconstructed information are calculated and the generative weights are modified using the conjugate gradient descent method. It is used to evaluate and test the effectiveness of language teaching and learning and to achieve the level of

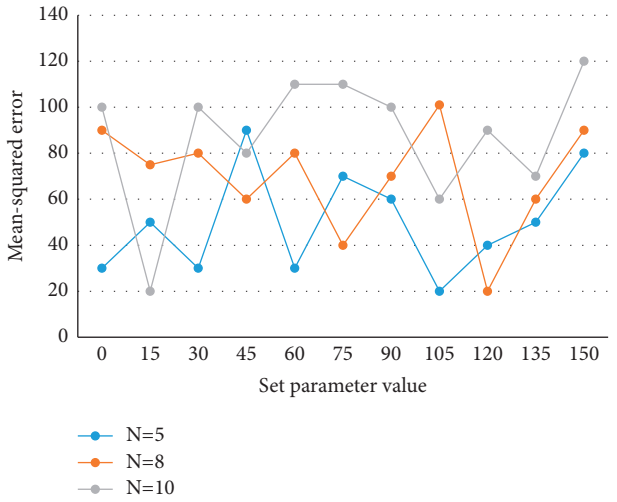

Figure 4: Influence of network layer number on the convergence of system mean square error.

Table 1: Table of retest reliability of learning environment.

Project	Reliability coefficient
Learning environment	0.62
Physical environment	0.57
Institutional environment	0.71

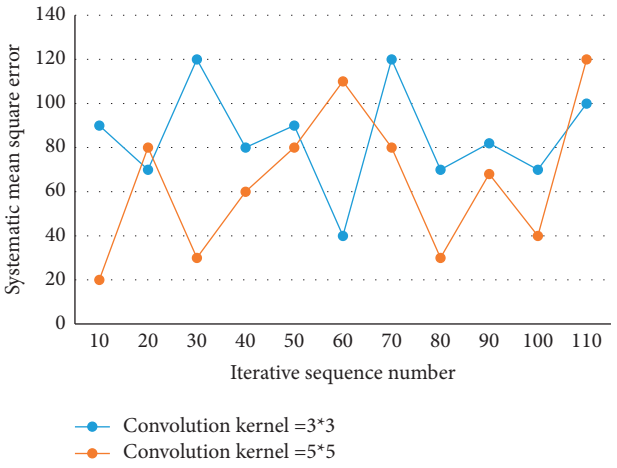

Figure 5: Convergence curves of the system mean square error of different convolution kernels.

teaching expectations. It is a means to make accurate and fair measurements of students' language ability, and is the main method for schools and teachers to test the effectiveness of teaching and learning and to obtain feedback information.

Finally, a classifier is added to the topmost encoding layer of autoencoder, which is then trained by the standard supervised training method of multilayer neural networks. A new abstract mirror is generated by abstract representation and downward generation of weights. Teachers should foster more of an emotional learning atmosphere for students, such as by showing more empathy for students, being more humorous, providing encouragement, or directing attention to task-relevant content, and paying more attention to individual student differences. When samples are computed after a distribution, the DNN algorithm does not sample the current distribution directly if the probability distribution is more concentrated, but instead samples through an alternative, relatively simpler distribution. The residuals of the initial external input and the newly created abstract mirror are calculated, and the cognitive weights are modified using the conjugate gradient descent method. In daily learning, teachers should understand each student's actual situation and current knowledge level in many aspects, and then set up problems in layers, and create more opportunities for those students who lack self-confidence in learning and have high learning pressure to get a successful experience and try their best to explore their potential.

3.2. Structural Analysis of DNN. The DNN uses spatial relationships to reduce the number of parameters to be learned in order to improve the training performance of the general forward BP algorithms. It is based on the parameters of each layer obtained in the first step, a classifier is added to the topmost layer of the network, and the parameters of the entire multilayer model of the network are fine-tuned by going through the data with labels for training. For each sample input to the network, the corresponding network structure is different, but all these different network structures share the weights of the implicit nodes at the same time, and the $\tanh(x) + \alpha x$ function graphs in this case are shown in Figures 6 and 7.

First, the convolutional layer, i.e., the feature extraction layer, connects the input of each neuron to a local receptive field of a certain size in the previous layer and extracts the features of this local part of the sample. Once that local feature is extracted, its positional relationship with other local features is also determined. Subdividing the instructional objectives into smaller objectives makes it easier for students to do personal reflection and helps teachers to understand how well students understand the instructional objectives of each lesson. A decoder was added to the artificial neural network modeling unit because the autoencoder was to be able to reproduce the essential features of the input data. When the probability distribution has multiple patterns and each model is very steep, the system no longer has to perform the proposal transfer slowly state by state but instead perform the pattern transfer directly between patterns. We optimize the construction and service of hardware environment and build an ecologically diversified and personalized software environment so that all elements of the environment (teaching equipment, platform design, teaching resources, curriculum, evaluation system, etc.) are compatible with each other and evolve in a coordinated manner in order to achieve the most optimal teaching effect. In the process of constructing knowledge, it includes not only the individual knowledge construction of learners but also the construction of collective knowledge of the spontaneously formed community members.

Next is the feature sampling layer, each computational layer in the sampling layer consists of multiple feature samples, each feature sample is a plane, and all neurons on

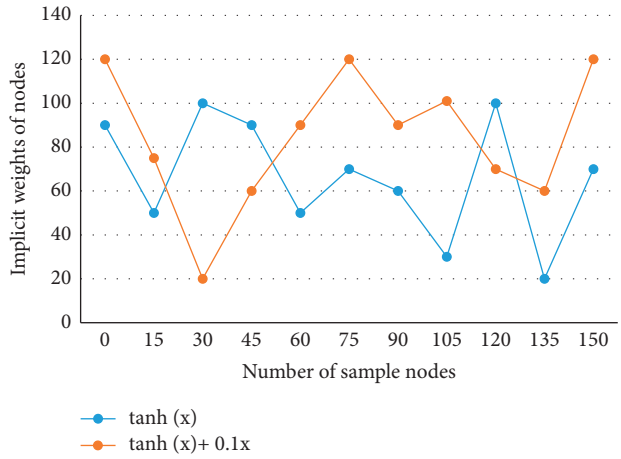

Figure 6: $\tanh(x) + \alpha x$ function curve.

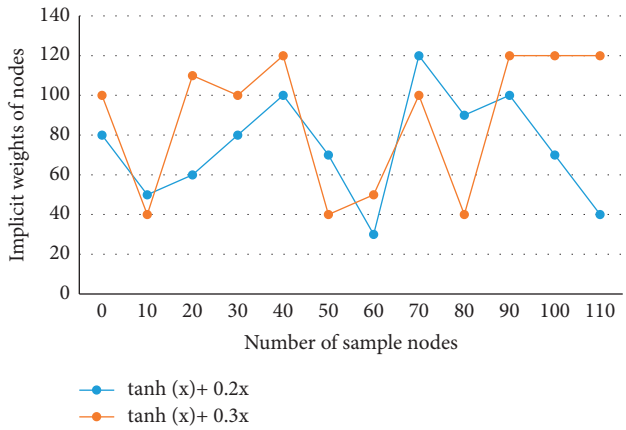

Figure 7: $\tanh(x) + \alpha x$ function curve.

the plane have uniform weights. In an autoencoder, we input the input information to the encoder, which naturally gives us an encoding, which is an alternative representation of the input, and then a decoder, which naturally gives us an output information. To complete the whole course and the learning materials, students need to understand the knowledge and skills required by the course. By determining the key issues, the teaching objectives of the unit or topic are finally formed. Additional collected pattern information can be used to assist in pattern skipping, primarily by statically using a search algorithm to collect probability distribution patterns prior to sampling. Alternatively, training data can be directly used to locate patterns. Community interaction among learners is consistent with the convergence of knowledge understanding and, by sharing individual knowledge understanding with other members of the community, can provide opportunities for individual and collective reflection, and then, receiving further feedback on the topic can promote long-term knowledge retention. For comparative analysis, experimental results were compared using apriori, SVM, and DBN, all using the 150-dimensional frequencies of the original data frequency domain transformed as feature vectors. The results are shown in Table 2.

From Table 2, it can be seen that the DNN has improved the overall recognition rate of fault identification and the overall recognition rate of fault location by 13% and 25% on average than the other two algorithms, so the deep learning can directly extract features from the original samples and overcome the defect that the neural network is easy to fall into local optimum and obtain better results.

Neural networks with more hidden layers are called the deep neural networks. The expressive power of deep neural networks is stronger than that of the shallow networks. A neural network with only one hidden layer can fit any function, but it requires a lot of neurons. The DNN can also be called multilayer perceptron (MLP). The network structure of DNN makes the number of neurons sufficient. The input layer nodes are the first 50 frequency points of the FFT transform of the vibration time-domain signal as the input of the visual layer, and the node count of the output layer is the classification number of the fault. The experimental outcomes of the DNN in terms of the number of layers and the number of implied layer neurons' scale are shown in Figure 8.

Finally, the complexity of the network parameter selection is reduced by sharing the weights among the neurons on a mapping surface, which in turn reduces the number of free parameters. The parameters in the encoder and decoder are adjusted so that the reconstruction error of the input and output is minimized, at which point the encoding is obtained. Based on the important concepts or key skills of each unit or topic, a knowledge network is eventually formed to help students understand the key ideas of the unit or topic. Distributed cognition focuses on introducing a social and physical context into conceptual thinking, requiring shared cognitive activity among the elements of the system. In the era of digital learning, ubiquitous web-based devices and computer equipment can support the requirements of learners to access learning at any time and from any place. It should carry out an ecologically integrated and diversified curriculum for college English, refine the diversified evaluation system, and further improve the construction of school-based special resources and teaching platforms. In the process of machine learning, the learning process based

Table 2: Statistics of fault diagnosis accuracy under three algorithms.

Algorithm	Apriori (%)	SVM (%)	DBN (%)
Overall recognition rate of fault identification	67	71	87
Overall recognition rate of fault location	59	67	88

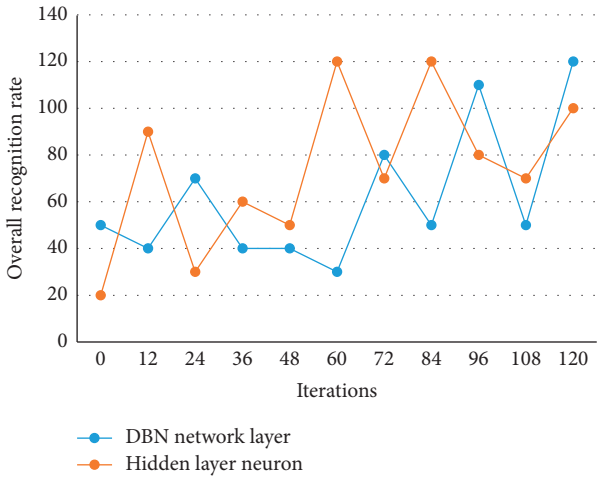

Figure 8: Scale experiment on the number of layers and hidden layer neurons of DNN.

on the RBM algorithm proceeds according to the Markov chain state, and after one transfer, the Markov chain can be applied to initialize the current distribution and speed up the speed of acquiring samples for the new distribution. Therefore, the state of each variable transfer is related to the state of the previous one, and the states of two adjacent transfers are very similar, so the images of the probability distribution functions are also similar.

4. Conclusions

This paper combines the DNN with English learning environment optimization to solve the time-consuming and laborious problem of manual feature extraction and the low efficiency of using machine learning algorithm to analyze and process large-scale growth data, and proposes an optimization setting for English learning environment based on DNN. The purpose is to improve students' satisfaction, participation, and interaction in course learning; promote their in-depth understanding of the deep integration of technology and subject knowledge; and support the development of their information-based teaching skills. This study adopts a systematic method to study the process of college English teaching, focusing on each element of the teaching system and the relationship between each teaching element inside and outside the classroom. This paper comprehensively introduces the principle, training method, and network model of deep learning, and introduces the structure of DNN in detail. This research attempts to explore and optimize the English learning environment and neural network within the scope of digital learning environment research, so as to seamlessly connect the learning environment of college students. It also provides teaching process design and teaching case design, and provides some references for teaching staff.

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 there are no known conflicts of financial interest or personal relationships that could have appeared to influence the work reported in this paper.

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