Data Analysis Method of English Education Based on Improved Deep Learning Algorithm

Jie Wu(✉)

English Department, School of Foreign Languages, Dalian Polytechnic University, Dalian 116033, Liaoning, China
wujie@dlpu.edu.cn

Abstract. In the reform of college foreign language education, it is often one of the focuses of discussion whether the college curriculum can make students fully prepared to cope with the challenges of learning, future life and career. This is mainly because some students still have low learning efficiency at the stage of higher education, rely on mechanical memory and recitation, and lack high-level thinking ability, especially the ability to solve practical problems. Deep learning algorithm is the latest research trend of English education data analysis. It has been widely used in computer vision, speech recognition and text processing. Deep learning algorithm is an artificial intelligence (AI) technology, which uses neural networks to achieve advanced cognition. It can be divided into two types: 1. Deep convolution network 2. Deep recursive network in this paper, we will mainly focus on using deep convolution network to analyze English data, and provide a method to improve the accuracy of its results by using its improved deep learning algorithm.

Keywords: English education · Deep learning · Data analysis

1 Introduction

Since the Ministry of Education promulgated the College English curriculum teaching requirements in 2002, the reform of College English education has aroused heated discussions. Scholars have conducted extensive discussions on the increasingly prominent problems in teaching objectives and teaching methods. The low teaching efficiency has gradually become a dilemma faced by College English education, which is mainly caused by the traditional teaching mode of Teacher centered and simple teaching of language knowledge. Under its influence, students often adopt traditional learning methods such as memorization and recitation and exercises to learn English, which is not conducive to the internalization and transfer of language knowledge [1]. Therefore, although the traditional learning methods have made some achievements, it is difficult to achieve more efficient English learning today. In order to solve this problem, researchers began to pay attention to the role of "deep learning" in improving learning efficiency, and regarded it as one of the indicators to measure students' meaningful learning. Deep learning originates from Marton and saljo's research on the learning process and learning strategies

J. C. Hung et al. (Eds.): IC 2023, LNEE 1045, pp. 89–95, 2023.
https://doi.org/10.1007/978-981-99-2287-1_13

of college students in 1976. It is proposed that when using shallow learning strategies, students should pay attention to the retelling of original materials and the solution of surface problems, while when using deep learning methods, they should pay more attention to the integration and rational solution of themes and viewpoints [2].

Domestic research on deep learning started relatively late. The earliest discussion on deep learning appeared in the article "promoting students' deep learning" published by Li Jiahou in 2005. From 2005 to 2014, deep learning gradually became a hot research field [3]. The research focuses mainly on education and teaching application, computer field, strategy research and technical support, Among them, the research on deep learning methods is the main focus of researchers, namely, strategy research, teaching mode, environmental design and model design (fan Yaqin, Wang Binghao, Wang Wei, & Tang yewei, 2015). For the front-line educators, it is their primary concern to design reasonable teaching programs and adopt appropriate teaching methods to promote students' deep learning, which is particularly important to localize the deep learning theory and improve teaching practice [4].

2 Related Work

2.1 Deep Learning

The research on students' learning methods began with Marton and saljo (1976), who explored the two methods of students' reading academic articles and defined them as deep learning and shallow learning. The former tries to find meaning in the problems studied and critically links them with other experiences and thoughts; The latter relies on rote learning and treats the learning content separately. Biggs initially divided learning methods into three categories: shallow learning, deep learning and achievement learning. Shallow learning is based on the external motivation of students' learning. The main goal is to complete the learning tasks as effortlessly as possible. Therefore, the characteristics of learning are to concentrate on important topics and accurately reproduce them; Deep learning is based on internal motivation and curiosity. Students connect the content with meaningful situations or prior knowledge, and then conduct theoretical derivation to obtain expanded knowledge [5]; Achievement learning is affected by competition and self-achievement, and the main goal is to obtain high scores. Although deep learning and shallow learning are mutually exclusive concepts, achievement learning can be related to them and only depends on the learning environment; For this reason, in the follow-up studies, researchers often focus on both deep learning and shallow learning, while omitting achievement learning. When exploring the characteristics of shallow learning and deep learning, the researchers found that deep learning reflects the learners' investment in understanding the content of materials, which is reflected in the use of a variety of strategies, such as extensive reading, integration of resources, peer discussion, and practical application of knowledge. While shallow learning focuses on the characteristics or signs of information [6]. The goal of learning is to avoid failure, rather than mastering key concepts and understanding their relationship with other information and the application of this information in other situations. In short, when students use deep learning methods, they are often internally driven and try to understand the learning content.

Correspondingly, when they use shallow learning methods, they are usually characterized by rote learning and aiming at passing the examination. Both deep learning and shallow learning can be regarded as the combination of students' learning motivation and accompanying learning activities.

2.2 Deep Learning Model

According to the "3P" teaching and learning model, the mechanism of learning mechanism can be divided into three stages: presage, process and product. The learning process and results can be predicted by students' personal factors (prior knowledge and preferred learning methods) and teaching environment (teaching objectives, evaluation methods, environment, teaching and institutional procedures, etc.); The specific learning methods used in the learning activities also affect the learning results and other factors before learning [7]; The learning results include quantitative results based on facts and skills and qualitative results based on knowledge structure and transfer, which reflect the context based learning methods and also interact with the first two processes, as shown in Fig. 1.

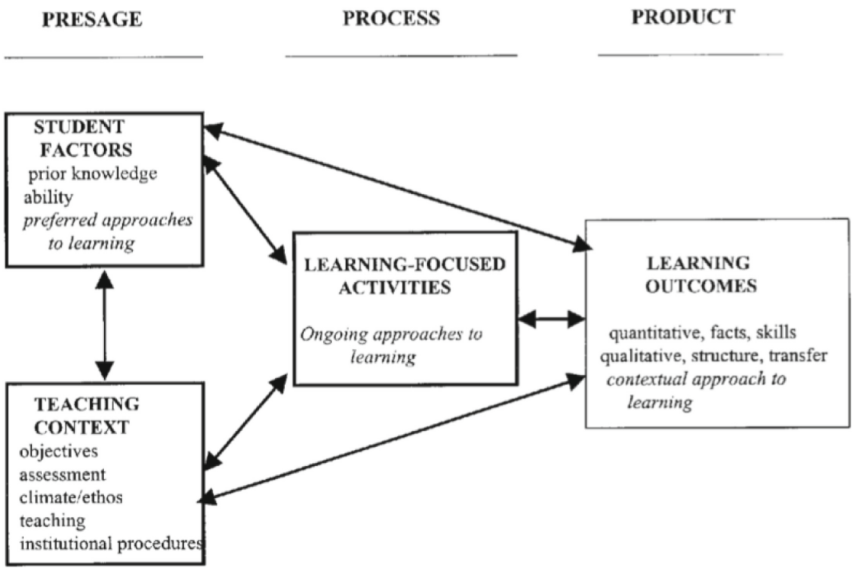

Fig. 1. "3P" teaching mode

3 Improved Deep Learning English Education Data Analysis Scheme

In the process of medical education, a large amount of teaching data will be generated. In order to optimize the education program, it is necessary to analyze the teaching data to

improve the educational effect of the teaching program. In this study, the improved deep learning algorithm is used for processing, the artificial intelligence algorithm is used to optimize the education information data, and the education status is analyzed through the data characteristics of different levels. The purpose analysis scheme of English education and training is shown in Fig. 2.

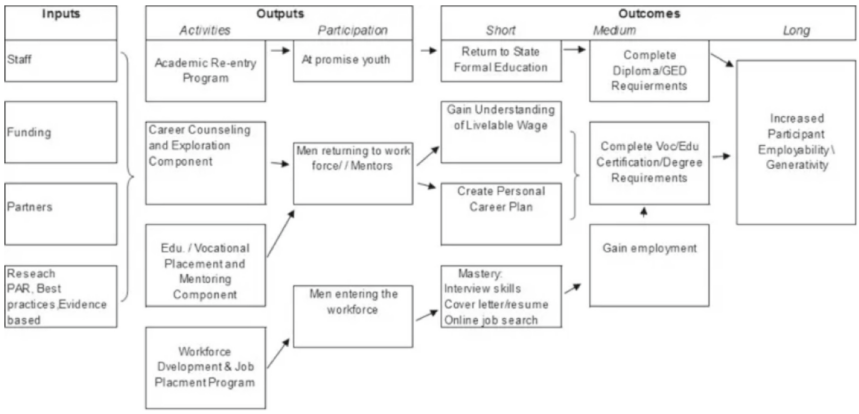

Fig. 2. Analysis on the purpose of English education and training

Combined with Fig. 1, this study analyzes the development mode of social enterprises, the life style required by people and the talent demand of higher vocational education, so as to improve the talent education and training ability and improve the talent output efficiency and quality. Optimize the education and training objectives according to the government's policies on talent cultivation, design the training programs according to the types, levels and functional requirements of skills needs, adopt different knowledge structures, ability structures and relevant moral character optimization training programs, and put forward different requirements at the national level, regional level and institutional level to achieve multi-level and multi-faceted training programs for talents, And then complete the teaching plan of the enterprise's demand for various talents [8].

In order to realize the multi-level training program for medical education, it is necessary to analyze the education data. In this study, we use classroom teaching response data, experiment execution data, homework and examination results data to analyze the students' learning level data, and analyze the job requirements of employees in relevant enterprises. We use back propagation (BP) algorithm to train the data, and use distributed algorithm (DA) to optimize the BP neural network algorithm, so as to improve the efficiency of algorithm searching for the optimal value, And prevent the algorithm from reaching the local optimal value.

4 Improved Deep Learning Model

In this study, the improved neural network algorithm is used to analyze medical education data, output English education quality information, so as to evaluate the teaching quality,

and complete the teaching courses and education programs required by the students through the long-term and short-term interest bias setting sequence recommendation program [9].

The key technologies of this study are analyzed below. Firstly, the Da Optimized BP neural network algorithm model is constructed. Because the data analysis speed of the neural network algorithm is slow and the analysis ability is poor, it may be trapped in the local minimum value. Therefore, this research optimizes the neural network algorithm by using distributed algorithms and uses meta heuristics to optimize the algorithm. The algorithm solves global and local data by imitating the colony behavior of dragonflies, and optimizes the data through five different behavior modes of dragonflies: separation, alignment, gathering, foraging and avoiding enemies [10]. The separation behavior in the distributed algorithm is as follows (L):

$$S_i = \sum_{j=1}^{n} w_{ji} x_j - \theta_i \tag{1}$$

where, s represents the degree of separation between Dragonfly I and surrounding dragonflies. In this study, dragonflies represent medical education data information elements; 10. It represents the coordinates of dragonfly J in space and can display the distribution position of medical education data information elements in a spatial range. There are n dragonflies in the algorithm, that is, the medical education data information unit is n. by calculating the sum of the distances between Dragonfly I and each Dragonfly around, that is, the sum of the distances between the medical education data information element and the surrounding data information element, the separation degree of dragonflies can be obtained, that is, the association degree between the output medical education data information elements. The alignment speed between dragonflies is the convergence speed between information elements of medical education data.

It can effectively improve the optimal solution in the information element solution algorithm of medical education data. The operation flow diagram of the neural network algorithm is shown in Fig. 3.

In Fig. 3, the optimized neural network algorithm designed in this study uses Da algorithm to search for the global optimal solution for the weights of the neural network algorithm, and finally obtains the optimal initialization weights. The steps are as follows: first, the initial parameters are set, and the fitness function value of each medical education data information element is calculated. The position of the medical education data information element is the direct source of the students' demand for English data information. The position with the worst fitness is designed to be the position where the medical education data information element is interfered by external information (such as noise, clutter, data use environment, etc.). Based on this, the line vector of the neural network algorithm is established, and the weight coefficient is updated through the European distance function, By using the iterative function to update the position and step size of the medical education data information element, the search for the optimal weight of the neural network algorithm is realized through the continuous iterative optimization process.

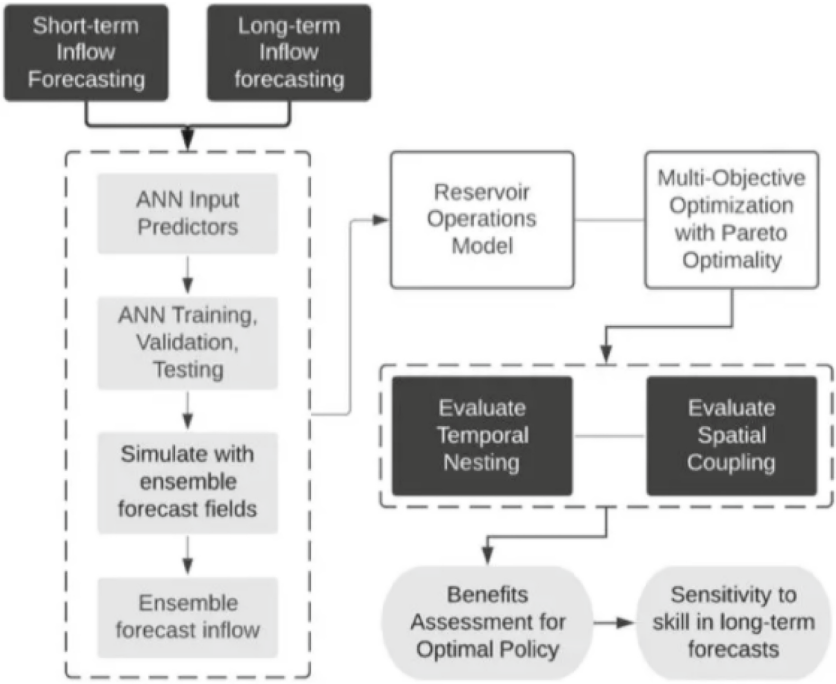

Fig. 3. Operation flow of Da Optimized BP neural network algorithm

5 Conclusion

In the research on the analysis method of medical education data, this research designs teaching plans for different needs by taking advantage of different demands of different posts for knowledge and skills, trains the collected teaching data by using neural network algorithm, solves the teaching quality value, and optimizes the neural network algorithm by using distributed algorithm. This study analyzes the calculation results of the algorithm and the actual degree, and studies the operation efficiency of the algorithm under different frameworks.

References

1. Liang, M.: Optimization of quantitative financial data analysis system based on deep learning. Complexity **2021**(1), 1–11 (2021)
2. Duan, X.X., Duan, P.: Research on Pattern Recognition Method of Online English Education Based on Feature Self Learning (2021)
3. Zhang, H., Cao, H., Liu, Z., et al.: Research on multi-angle face detection method based on improved YOLOV2 algorithm. J. Phys. Conf. Ser. **1848**(1), 012024 (7pp) (2021)
4. Hu, L.: Research on english achievement analysis based on improved CARMA algorithm. Comput. Intell. Neurosci. (2022)
5. Lu, H., Li, M., Zhang, Y.: Research on optimization method of computer network service quality based on feature matching algorithm. J. Phys. Conf. Ser. **1982**(1), 012005 (2021)

6. Ruan, Y.: Design of intelligent recognition english translation model based on deep learning. J. Math. (2022)
7. Liu, H., Ko, Y.C.: Cross-media intelligent perception and retrieval analysis application technology based on deep learning education. Int. J. Pattern Recognit. Artif. Intell. (2021)
8. Liu, W., Kou, F., Huang, H.: Research on Deep Learning Algorithm in Cultural and Creative Product Design. Hindawi Limited (2021)
9. Jiang, Y., Li, C., Zhang, Y., et al.: Data-driven method based on deep learning algorithm for detecting fat, oil, and grease (FOG) of sewer networks in urban commercial areas. Water Res. **207**, 117797 (2021)
10. Zhou, J., Hu, L., Jiang, Y., et al.: A correlation analysis between SNPs and ROIs of Alzheimer's disease based on deep learning. Biomed. Res. Int. **2021**, 1–13 (2021)