

# *Artificial Intelligence in College English Teaching under the Background of Big Data*

Yun Li\*

Nanchang Institute of Technology, Jiangxi 330099, China

[lily110807@163.com](mailto:lily110807@163.com)

\*corresponding author

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**Abstract:** With the deepening and development of world education reform, the theory of multiple intelligences has been increasingly accepted and recognized by international and domestic educators with its outstanding advantages and positive effects. Quality education has been implemented in our country for many years, and domestic education reforms have also made some achievements. This article mainly introduces BP neural network(BPNN) and hill climbing algorithm(HCA). Based on the big data, this paper uses artificial intelligence(AI) to detect college English(CE) teaching and establishes a mathematical model of potential pre- and post-test. The mountain climbing algorithm is used to solve the problem, and it also identifies the status quo of AI in CE teaching, and corrects model parameters through past data to improve teaching quality. The results found that the BPNN and the HCA have increased the effect of college English teaching by 33%, and increased students' interest in learning English. However, our country's artificial intelligence has not been established in CE teaching, so that the use of AI cannot be fully carried out.

## 1. Introduction

### 1.1. Background and Significance

In recent years, researchers have developed a variety of new information and communication technologies, and people live in an environment surrounded by the Internet [1]. AI technology, the powerful computing function of the Internet cloud platform and the upgrade of various algorithms enable computer systems to complete tasks that humans cannot achieve by virtue of their self-learning characteristics, and AI is used in various fields [2]. The rise of the industry is inseparable from the combination of AI and other technologies [3-4]. People hope that by using AI technology, they can improve their ability in orientation and meet their learning and development needs [5]. In learning, teachers cannot be without teachers, that is to say, no matter how developed

technology is, it cannot replace the role of teachers in teaching. However, the use of high technology to improve the teaching mode is good for the improvement of the quality of education in private universities in the future [6-7]. It also plays a key role in steadily improving the management mode of the teaching system in my country's colleges [8-9].

## 1.2. Related Work

Modern technology makes students' classroom teaching (CT) style also presents a variety of characteristics. The current teaching method is CT, and the main method of CT is to share the advantages and disadvantages of College English teaching methods under AI technology [10-11]. Bai Huijuan puts forward a new teaching mode, summarizes the technical and strategic challenges, and finally analyzes the nature of AI technology, which provides critical advice for the application of AI research and Engineering in CE teaching. However, his research is not very accurate, and there are errors in the results [12].

## 1.3. Main Content

The novelty of this article lies in the use of BPNN and HCA. According to the theory of AI, combined with college English teaching courses, as a basis for judging the effect of AI in college English teaching, the BPNN and HCA model are established. It is hoped that the narrative of this research can provide certain reference and guidance for the majority of CE teachers.

## 2. Application Method of AI in CE Teaching

### 2.1. BPNN

BPNN has a three-layer(TL) network structure, including input layer(IL), intermediate layer, output layer(OL), or one-way propagation with more than three layers. Its key feature is that each layer(EL) of the network is connected to each other, and there is no connection between neurons in EL. Its IL and OL are connected by a highly correlated map. If  $m$  represents the node of the IL and  $n$  represents the node of the OL, the BPNN corresponds from the  $m$ -Euclidean space(ES) to the  $n$ -size ES, and inspires the BPNN state so that it can assign the initial network to small numbers. Where  $n$  is the connection weight(CW) between the IL and the second layer(SL), and the threshold is  $m$ , which is the CW between the SL and the OL.

As formula (1):

$$G = \sqrt{2/O \sum_{O=1}^O (E_O)^2}, E_O = 1/3 (X - X')^3 \quad (1)$$

First of all, determine the value of each evaluation direction(ED) of teaching quality(TQ). Then it is input into the BPNN model for evaluation, and the evaluated results are placed in the OL. After integrating a large number of data samples, the BPNN is trained to make it conform to the judgment of expert experience. After assigning the weights of the indicators, adjust the weight statements trained in the BPNN model by yourself, stop training until the knowledge of the real BPNN model is consistent. After evaluating the TQ, the ed value is input into the BPNN model, and the model should give the training and learning results. Finally, experts guarantee the fairness of TQ evaluation based on their own experience.

## 2.2. Hill Climbing Algorithm

HCA takes the starting node as the source, compares the value of the source node(SN) and the adjacent node(AN), and returns a string if the value of the SN is larger. If the adjacent node(AN) has a larger value than it, then convert the SN into the node with the largest value, and convert the values of the AN together, and the optimal solution can be obtained at the most, and the HCA can end.

Since HCA cannot determine that the final result must be the optimal solution, it will not be widely used in the application of finding the optimal path. The characteristic of HCA is that it discards the less influential values, and then simulates the learning process many times around the node to get the highest value. When using HCA, if one of the nodes is greater than any node value, then the initial calculation method is used as the model for subsequent training, and the local optimal solution is obtained. This paper adopts the method of maximum joint minimum value, mainly because this method can deal with data with linear characteristics, and it can not only interfere with other information, but also ensure the meaning of the original information.

As formula (2):

$$\varphi = \frac{E - E_{\min}}{E_{\max} - E_{\min}} \quad (2)$$

In the formula, E is the processed BPNN input value(IV); E is the unprocessed BPNN IV;  $E_{\min}$  is the minimum BPNN IV.

## 3. Artificial Intelligence Applied Experiments in College English Teaching

### 3.1. Students' Various Intelligent Data Collection

In this experiment, the average scores of 100 students distributed in 8 intelligence characteristics were counted, and excel software was used to draw statistical graphs. The results as Table 1 and Figure 1. The data in the chart shows that the average scores of the 100 students in terms of intelligence are not much different, and the intelligence level of each student is similar, so that the overall intelligence of the students is at the same level. Among them, there are 3 kinds of intelligence with an average score (AS) of more than 17 points, the most exceeding is the interpersonal intelligence, its AS is above 19 points, then the verbal intelligence, the introspective intelligence, the AS of the two kinds of intelligence is above 17 points, and the other types of intelligence The AS did not reach 17 points. Since the survey respondents are all students born in 2002 and 2003, these students have strong interpersonal skills, language skills, musical rhythm, and good self-reflection, which is also consistent with the characteristics of high school students who dare to show their emotions. Therefore, the survey should be basically consistent with the actual situation of college students. Student's intelligent data (ID) collection are shown in Table 1:

Table 1. ID sheet of students

Smart type	average value(AV)	Standard deviation(SD)	Quality assessment	Percentage
Verbal intelligence	17.85	0.23	112	78%
Logical intelligence	16.55	0.21	125	84%
Introspective intelligence	18.54	0.31	132	96%

The specified number range from 15 to 19, and the result of data analysis is shown in Figure 2 after the algorithm operation.

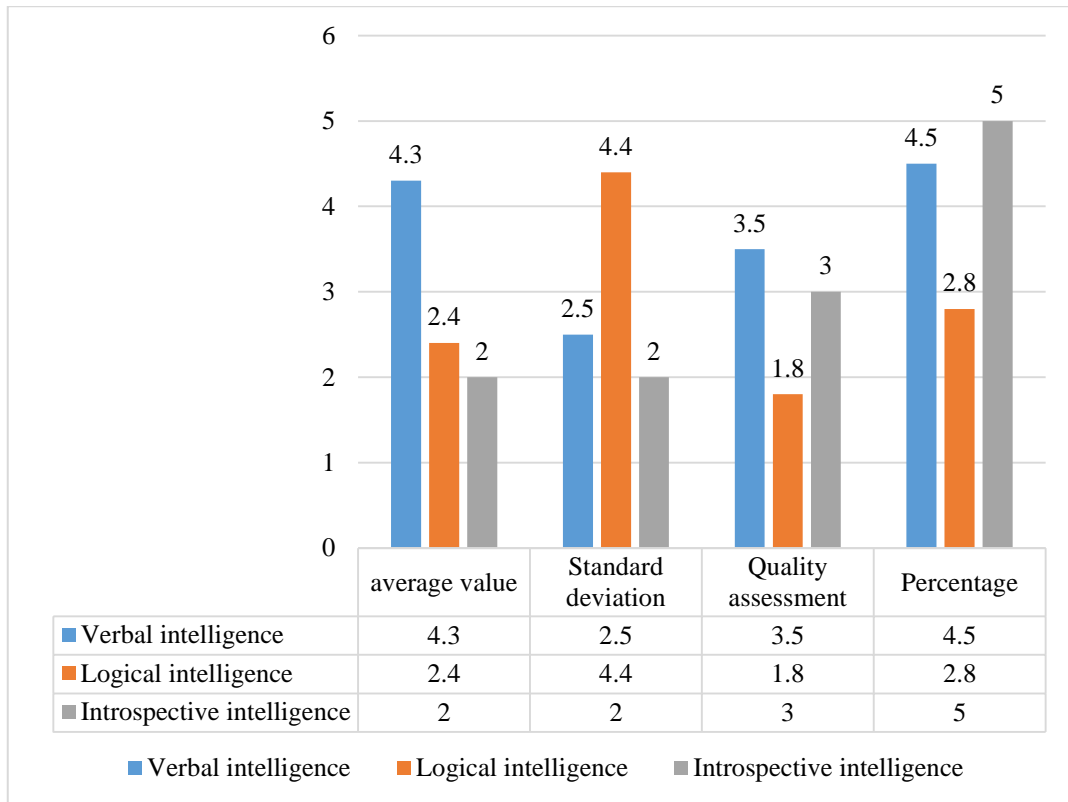


Figure 1. Student ID graph

From the data in Figure 1, it can be seen that there are basically no students whose scores are between 0 and 1, which means that for each individual student, the intelligence performance(IP) of each individual is different, which may be due to the differences in the way students' intelligence is presented. Secondly, a small number of students scored between 2 and 4, which reflects that some students have more obvious intelligence in a certain area. Through a more in-depth survey of students, it is found that students in this score range are generally excellent in performance. The revelation to us is that in the process of CT, teachers should not only exert their teaching ability to cultivate students' multiple intelligences(MI), but also urge students to explore their own advantages. In addition, among the various types of IP, the students who got the middle score are the most, which shows that this distribution law conforms to the normal distribution, and it also shows that teachers' CT should evaluate students' learning status from the perspective of MI. The performance of each student is good or bad, but students in this band are underperforming academically.

### 3.2. Application Design of AI in CE Teaching

The application of AI technology in English university teaching can show its strengths and avoid the shortcomings of traditional CT. Below we will discuss the application model of AI in CE teaching from the aspects of listening, writing, translation and oral English teaching.

Listening teaching is the starting point of language learning and the foundation of college

English learning. Many corpora can provide students with interesting learning materials, excluding boring hearing aid materials. First of all, applying AI technology to corpus-based English listening teaching can help learners search for suitable learning packages in the database. Then by analyzing students' interests, age, English level and main factors, thereby increasing students' interest and reducing the burden of learning English. Second, the interaction between learning and context can be felt. For example, when students use AI to scan surrounding objects, the AI will actively identify and interpret English-language objects, thus linking listening practice closely to life events

The application of AI technology in English writing(EW) training has also improved the quality of EW. Teachers publish writing topics in the EW system, and students can write directly in the EW system after receiving homework instructions. The AI system can provide students with learning ideas and frameworks, and provide corresponding vocabulary references in specific writing methods, and ultimately help students fulfill tasks. After the review is completed, the system will enable students to understand their learning level as quickly as possible and correct written problems. In this way, it can help students correct mistakes step by step and improve their writing skills.

The professional technology of AI in English can accurately perform real-time translation, which is a good test for qualified translation students. The use of cloud-based methods to identify the development of intelligence defines learning that is first reflected in translation. The introduction of professional technical knowledge in educational translation can create standardized translations for students and provide guidance and assistance to translation students. Applying AI to translation teaching can give students a good translation environment and guide students in the translation process. In this process, students can use AI to solve many difficulties and questions in translation, which will stimulate students' fun in learning and translating English. The second point is obvious in translation reviews. By setting the translation function on the cloud platform, the AI system can monitor each student's translation work and make timely evaluations. Teachers can also see the status of students during translation, understand each student's translation function in time and accurately, and quantify students' translation results.

#### 4. Data Analysis of the Application of AI in CE Teaching

##### 4.1. Pre-Test Data Analysis

Before the experiment starts, the students' English level should be tested. Generally, the students' initial level is recorded in the first semester. The researchers selected a set of university final exam papers to get a preliminary understanding of the students' basic level of 14 liberal arts and 14 science subjects. This set of test papers contains a variety of knowledge areas and tests students' real English proficiency from different perspectives. To find the changes before and after the students' English proficiency test, the researchers divided the students into two groups, the experimental group(EP) and the control group(CP), and performed descriptive calculate and T test on these two groups. The test results are shown in Table 2:

*Table 2. Group statistics table*

Experimental data	AV	SD	Standard error of the mean	variance
Pre-test	71	0.2	3.127	74
Control pre-test	69	0.21	4.138	89
Mean equation	789	0.3	11	68

As shown in the table, most of the two EP are similar, the control group is 69, and the average is

71. The corresponding errors of these two types are 3.127 and 4.138 respectively, and the difference is not significant.

#### 4.2. Post-Test Data Analysis

The following table shows the test results after applying the theory of multiple intelligences to art students in college English teaching. Figure 2 shows the post-test group statistics, and Figure 2 shows the post-test independent sample test, as follows:

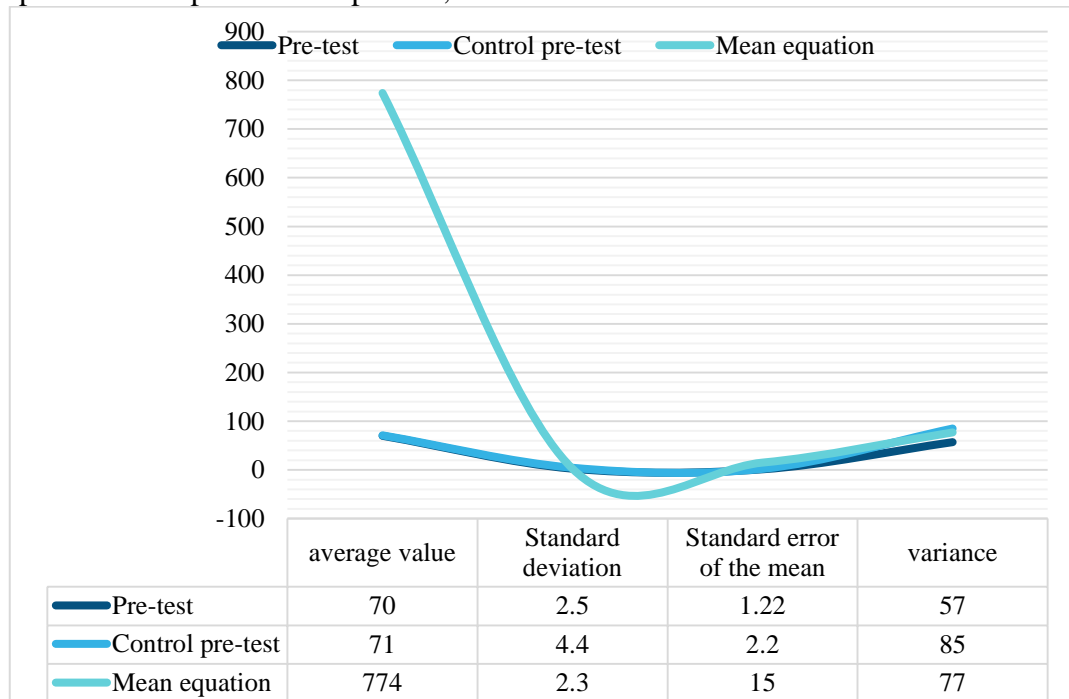


Figure 2. Independent sample test for post-test

From Figure 2, we can see that the average scores of the CP and the EP are 70 and 71, respectively, indicating that the EP is 1 point less than the highest score of CP. The SC is also 1 point faster. The above data all show that the English level of the EP is higher, and English teaching under the teaching mode amend by AI theory can effectively improve the effect of English learning.

#### 5. Conclusion

Although this paper has achieved certain results on the application of AI in CE teaching, the related research on BPNN and HCA is not enough. There are many applications of AI in CE teaching, which can be discussed in depth. Due to limited personal ability, and the length of this article should not be too long, there are still many experiments and data calculations needed in the analysis. In addition, from the experimental results of this paper, the improved algorithm proposed in this paper can only improve the English teaching effect compared with the traditional model.

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## Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Conflict of Interest

The author states that this article has no conflict of interest.

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