Application of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Universities

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Abstract. With the continuous innovation of artificial intelligence technology, the teaching level of mechanical education courses in colleges and universities is also constantly improving. In the context of the era of big data, the teaching of mechanical education courses in colleges and universities has become more intelligent and informatized. This article mainly introduces BP neural network method and hill climbing algorithm. This paper uses BP neural network method to analyze the application of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities, and establishes a potential mathematical model of BP neural network method. The model is solved by BP neural network method, and the current situation analysis and application status of the teaching mode of mechanical education courses in colleges and universities are analyzed, and the model is revised using historical data to improve the application research of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities. Accuracy. The experimental results of this paper show that the BP neural network method has increased the effect of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities by 33%. Finally, by comparing the value analysis of the application of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities, and the data analysis of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities, the system shows that artificial intelligence technology is used in mechanical education courses in universities. Application in teaching.

Keywords. Artificial Intelligence Technology, Mechanical Professional Education, Literature Reference Research Method, Analytic Hierarchy Process

1. Introduction

1.1 Background and Significance
In recent years, with the development of a new generation of information and communication technology, mobile Internet is everywhere [1]. The theory of artificial intelligence, the large-scale
computing power of the Internet cloud platform and continuous optimization and algorithm improvements enable computer systems to completely rely on deep learning to autonomously complete the most complex and meticulous tasks, and artificial intelligence has begun to be integrated into all walks of life [2]. The combination of artificial intelligence and other new technologies is also an important foundation for many developing industries [3-4]. The purpose of artificial intelligence is to develop abilities, improve learning, improve intelligence and meet everyone's needs [5]. However, artificial intelligence technology cannot replace teachers, but in big data, the use of teachers to change the type of education is essential for improving the quality of university education in the future [6-7]. Today, the teaching system of Chinese higher education institutions has been steadily increasing in terms of technology, education, scientific research and management.

1.2 Related Work
Breines MR provides a method that can evaluate related innovations with participation in a complex related environment to solve essential problems [8]. Based on the principle of common value creation, he proposed a research framework. This framework illustrates the application research process of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities. In this process, the relevant parties integrate their resources and capabilities to develop innovative BP neural network methods [9-10]. In order to evaluate this research framework, Breines MR collected multiple data in the research. This case also represents the significance of the application research and system realization of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities [11-12]. Due to the error in the experimental process of this paper, the result is not very consistent with the actual prediction.

1.3 Main Content
The innovation of this paper is the use of BP neural network and hill climbing algorithm. According to the theory of artificial intelligence, combined with the mechanical education courses of colleges and universities, as a basis for judging the application effect of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities, the BP neural network and mountain climbing algorithm models are established. Mechanical professional teachers provide certain reference and guidance.

2. Application Method of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Colleges and Universities

2.1 BP Neural Network
BP neural network is a multi-layer forward network with three layers, such as: input layer, middle layer, output layer, or more than three layers of unidirectional propagation. Its main feature is that the upper and lower layers are completely connected, and there is no connection between neurons in each layer. Its input and output relationship is a highly non-linear mapping relationship. If the number of input nodes is m and the number of output nodes is n, the BP network is a mapping from m-dimensional Euclidean space to n-dimensional Euclidean space. The neural network state is activated. Initial network setup with small random number, where n is the connection weight between the input layer and the second layer, and the threshold is m, which is the connection weight between the second layer and the output layer. The formula is as follows:

$$G = \sqrt{\frac{2}{O} \sum_{i=1}^{O} (E_i) ^2}$$

$$E_i = \frac{1}{3} (X - X_i)$$

Therefore, first standardize the value of each index used to evaluate teaching quality. Then use it as the input vector of the BP neural network model, use the evaluation result as the output vector, and use enough samples when training the network to adapt it to expert experience knowledge and judgment. Understand the index weight, so that the BP neural network model automatically adjusts the value of
the weight statement until it reaches the true internal knowledge model, and then adds the specific value of each indicator that has been evaluated by quality learning to the BP neural network model, and receives training to Accept the results of evaluating the quality of learning. Finally, the experience

and knowledge of experts are used for reference to ensure the objectivity of evaluating teaching quality.

2.2 Hill Climbing Algorithm

The hill climbing algorithm starts from the current node and compares it with the values of surrounding nodes. If the value of the current node is higher, return to that row. As the maximum value, if the surrounding nodes have a larger value, please change the current node to the maximum value node, and then change the value of the surrounding nodes, the hill climbing algorithm will end and the best solution will be obtained.

Since the hill climbing algorithm cannot guarantee the optimal solution, it is not suitable for finding the optimal path in mobile applications. The advantage of the hill climbing algorithm is that it discards smaller values and then loops around nodes. After many times, the highest point can be obtained. When using the hill-climbing algorithm, when the value of a node is greater than half a node, the depth of the first search will be refined to use the manual search method to optimize the search to the best local solution. This article uses the maximum-minimum method because the data processing performed by this method is a linear transformation, which can better retain its original meaning without generating information.

The formula is as follows:

\[ \varphi = \frac{E - E_{\min}}{E_{\max} - E_{\min}} \]  

(2)

In the formula, \( E \) is the processed neural network input value; \( E \) is the unprocessed neural network input value; is the minimum neural network input value.

3. Application Experiment of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Colleges and Universities

3.1 Application Design of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Colleges and Universities

At present, every classroom in colleges and universities is equipped with advanced multimedia teaching equipment, and the campus network has been updated, and a computer-assisted information unit has been established to meet the needs of one person and one computer according to the requirements of mechanical information teaching. In addition, mechanical training includes various CNC equipment, industrial production equipment, etc. Therefore, colleges and universities equipped CNC lathes and machining centers with the industrial operating system i50S, opened API interfaces to all users, created industrial apps, and communicated directly between smart terminals and the cloud, in order to promote the integration of mechanical engineering and information technology. At the same time, the structure of the software environment cannot be ignored.

Universities need to establish a distance online education system to meet the needs of online communication between teachers and students. According to the demand for product information, it is also equipped with various tools and software related to this profession. In teaching, teachers need to focus on teaching problems and provide extracurricular teaching resources for students according to their learning level and development needs. In addition, it is necessary to fully demonstrate the strength of the teaching and research team, jointly develop teaching materials, and incorporate public courses, case studies, classic courses and learning results, and school learning content into the electronic resource database, electronic curriculum database, course resource database, test question database and documents. In the library, resources are aggregated using information technology. In the
classroom, the integration of information technology and the classroom is mainly reflected in the integration of teaching methods, teaching materials and teaching processes.

3.2 Data Collection of Students’ Various Skills

This article conducts an experimental design on 100 students and randomly divides them into two groups of 50 people each, an experimental group and a control group. The variables of the experimental group are the combination of traditional teaching methods and artificial intelligence technology, while the control group only uses traditional methods. The subjects of the test are the students’ four intelligences. These four intelligences are selected from the eight intelligences proposed by the American psychologist Gardner. They are interpersonal intelligence, introspective intelligence, and Spatial intelligence and language intelligence use experimental methods to obtain experimental data.

By counting the average scores of 100 students in the four intelligent feature parts, and using the excel software to draw the following figure. Therefore, it can be clearly seen from Table 1 that the average scores of the scores obtained by 100 students in each intelligence are approximately equal, indicating that each intelligence is reflected in all students, and the overall level is maintained. The average score of the four types of intelligence in the experimental group exceeded 80 points. Among them, the outstanding performance was verbal intelligence with an average score of 91 points, followed by spatial intelligence and interpersonal intelligence with average scores of 90 and 89 points, respectively. There is a big difference between the average score of four kinds of intelligence and the average score of the four kinds of intelligence in the experimental group, and the difference of space intelligence is 29 points. Because the subjects of the survey are mainly students born in 2002 and 2003, they are more prominent in interpersonal communication, language expression, spatial imagination and introspective ability, which is in line with the characteristics of contemporary college students who dare to discover and express themselves. In this respect, the results of the questionnaire survey are roughly in line with the actual situation of the students. The results of the students’ smart data collection are shown in Table 1:

Table 1. Smart data sheet of students

| Group         | Interpersonal intelligence | Introspective intelligence | Spatial intelligence | Linguistic intelligence |
|---------------|---------------------------|----------------------------|----------------------|-------------------------|
| test group    | 89                        | 88                         | 90                   | 91                      |
| Control group | 71                        | 76                         | 61                   | 78                      |

Set the number range from 1 to 100, and the result of data analysis after the algorithm operation is shown in Figure 1.

![Figure 1](image_url)

**Figure 1.** A graph of student intelligence data

It can be seen from Figure 1 that there are almost no students with a score of 0-1, that is, for individuals, each intelligence has its performance, but the possible performance methods are different. Secondly, the proportion of people in the score range of 2-4 is also small, indicating that there are also
a small number of students who are more prominent in a certain intelligence, and through understanding, it is found that these students with more outstanding performance are more or less good in learning. Something has been shown, so in the classroom teaching process, on the one hand, we must cultivate students' multiple intelligences, and on the other hand, we must encourage students to cultivate their own intellectual advantages. In addition, the proportion of students in the middle score segment is more prominent in the various intelligences, indicating that this distribution law is closer to the normal distribution in mathematics, and it also reflects the evaluation of students from the perspective of multiple intelligences. There are good and bad points, but they can't perform well in learning.

4. Application Analysis of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Colleges and Universities

4.1 Application Value Analysis of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Universities

Thanks to the latest developments in artificial intelligence technology, today's labor market has changed. The impact of technological change can be reformed in two ways. First of all, most automated operations will replace workers, which will reduce the number of jobs in the market, the loss of job opportunities, and the company has fewer employees engaged in low-skilled jobs. However, these phenomena bring inefficiency and cost reductions. And ultimately stimulate the growth of wealth and employment opportunities. Another phenomenon is that the results of the development of science and technology have changed the rules of the market. It is precisely because of this indirect effect that ultimately makes the traders and enterprises in the market reorganize and reconstruct their operating methods. Improvements in market processes and organizational changes will result in the loss of many repetitive tasks and well-trained personnel. For the mechanical education field of colleges and universities, they are also facing the same problem, but fortunately, like other science and technology, artificial intelligence technology will gradually eliminate university mechanical training teachers in the market, thereby regulating the mechanical education market of colleges and universities.

Artificial intelligence technology will help improve teaching quality and efficiency. In the teaching process, most teachers are "students", and they should respect the individuality of students. Demonstrate teaching, training and curriculum plans based on the understanding of students' psychological development. If teachers cannot understand students well, or violate the laws of students' physical and mental development and students' personality, they will not be able to achieve good results in the teaching process. Obviously, this is not suitable for students' own development and psychological maturity. When a teacher encounters a new student or a new class in the classroom, the teacher can use artificial intelligence technology to perform big data analysis, so that the teacher can accurately understand the student's learning background, learning process, and the strengths and weaknesses of the students in a short time. In this way, teachers can quickly assume the role of education and organize teaching content in a reasonable way.

4.2 Pre- and Post-Test Data Analysis of Artificial Intelligence Technology in the Teaching of Mechanical Education Courses in Colleges and Universities

In the experiment, 200 contemporary college students were randomly selected for grouping and divided into two groups. The pre-test was conducted in the first semester and the post-test was conducted at the end of the semester. The researchers used a set of midterm exam assignments from the university to conduct preliminary exams on 14 mechanical majors. This set of test assignments can check students' mechanical professional skills from different angles. In order to describe the changes before and after the test subjects' mechanical expertise, the researchers performed descriptive statistics and independent test T tests on the experimental group and the control group. The test data are shown in Table 2:
Table 2. Data table before and after testing

| Group test                  | The average score | Standard deviation | Variance |
|-----------------------------|-------------------|--------------------|----------|
| Pre-test of experimental group | 65                | 0.2                | 0.0400   |
| Control group pre-test      | 63                | 0.21               | 0.0441   |
| Experimental group posttest | 91                | 0.12               | 0.0144   |
| Control group post-test     | 78                | 0.22               | 0.0484   |

As shown in Table 2, under the same conditions, the experimental group and the control group had similar pre-test average scores, standard deviations and variances. However, the post-test average score of the experimental group was 13 points higher than the average score of the control group. At the same time, the corresponding standard deviations of the two categories were 0.12 and 0.22 respectively. The difference was significant. This shows that the artificial intelligence technology is applied to the mechanical specialty. It can improve the teaching effect of mechanical education courses in colleges and universities. In order to be able to see the relationship between the two more clearly, we analyzed the data in Table 2, and the analysis results are shown in Figure 2:

Figure 2. Independent sample test for before and after testing

From Figure 2, we can see that. The standard score difference is also nearly one point away. The above data all show that under the teaching mode guided by artificial intelligence theory. During the teaching experiment, compared with the class implementing the new teaching model, the mechanical professional level of the two classes actually at the same level has been significantly improved.

5. Conclusion
Although this article has made some achievements in the application of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities, there are still shortcomings on the basis of BP neural network and hill climbing algorithm. There are still many methods that can be studied in depth in the application research of artificial intelligence technology in the teaching of mechanical education courses in colleges and universities. Due to space and personal skills, there are many steps in the research process that have not been involved. In addition, from the perspective of theory and simulation, the actual application effect of the improved algorithm can only be compared with traditional models.

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