Design of Enterprise Employee Training Platform Based on C4.5 Decision Tree

Xiaofeng Liu[1,*]

[1]School of Qingdao Ocean Shipping Crew Vocational College,Shandong,266404,Qingdao,China
yanernanfei1@163.com

Abstract

In view of the low efficiency of current employee training in enterprises, combined with artificial intelligence technology, a corporate employee training management system based on the improved C4.5 decision tree is designed. Firstly, based on the C4.5 decision tree algorithm, data preprocessing, empty branch shearing, cross-entropy, and other operations are carried out, and the C4.5 decision tree algorithm is improved. Then J2EE development tool is used to build an enterprise employee training management system, and the system is divided into resources and requirements, planning, activity management and statistical analysis and management of five modules. In addition, the improved C4.5 decision tree is applied to the system for specific design and implementation of each module. Finally, a database is designed to provide data reference for system training management. The results show that the improved algorithm can improve the training management efficiency of the system. The system can replace the traditional manual training management mechanism, reduce the workload of employees, and improve work efficiency, which has certain practical significance.

Keywords: *Artificial Intelligence; Enterprise Employees; Training Management; C4.5 Decision Tree; Database*

1.INTRODUCTION

With the rapid development of artificial intelligence and computer technology, basic computer operations have been widely popularized and applied. Under the background of the development of artificial intelligence, the office form of many enterprises has changed from traditional manual operation to computer operation, and it has become a common phenomenon for enterprises to use information systems as office platforms. With the development of various new technologies and new markets, traditional corporate employee training methods and platforms no longer meet the current efficient management needs. In terms of corporate employee management, many companies have begun to seek a more effective management system and method. How to improve the effectiveness and intelligence of enterprise employee training management has become the focus of current research in this field. Chen Song [1] put forward the strategy research and optimization thinking about the enterprise's online training in the enterprise employee training management, and carried out online training practice based on the Agricultural Bank of China, which improved the traditional offline training method and adopted Online training, regardless of time and place, effectively improves the efficiency of corporate training; Wang Jinjin [8]and others proposed a research on the construction of a knowledge management platform for postal education and training in the era of artificial intelligence, using intelligent information technology to build training The management platform reduces the workload of managers and the training effect is significant; Shen Mingye [7] aimed at electric power companies, proposed the construction and practice of a quantitative evaluation platform for safety performance of all employees, and adopted the method of employee performance evaluation to enhance the enthusiasm of employees. Realize the effective management of enterprise employee training. Based on this, combined with the research results of the above scholars, according to the actual needs of the company and the characteristics of corporate culture, a targeted corporate training management plan is proposed, and a corporate training management system is designed in combination with artificial intelligence technology, and the corporate training management mechanism is improved through

this system. The management level of enterprise management personnel improves the work efficiency of employees, standardizes the work process, and provides efficient and high-quality information and technical support for the company's employee management training.

2. BASIC ALGORITHM

2.1. C4.5 Algorithm

C4.5 is a type of algorithm in decision trees, which is often used to process data classification and management. The main purpose is to perform supervised learning, that is, to use one's own learning ability to search for the relationship between data attributes and categories. C4.5 is suitable for discrete and continuous data processing, and is improved based on the ID3 algorithm. C4.5 is solved by the information gain of the gain ratio [4].

Find the classification information as follows;

$$split\_info_A(D) = -\sum_{j=1}^{v} \frac{|D_j|}{D} \log_2\left(\frac{|D_j|}{D}\right) \tag{1}$$

Obtain the gain rate as formula (2):

$$gain\_ratio(A) = \frac{ratio(A)}{split\_info(A)} \tag{2}$$

In the formulas (1) and (2), D represents the division of data; A represents the attribute; $\inf oA(D)$ represents the expected division of the attribute A to D; $gain\_ratio(A)$ represents the information gain rate [9].

2.2. Improved C4.5 Algorithm

The traditional C4.5 algorithm has a simple process and fast calculation speed, and is the most used algorithm in the current decision tree algorithm. However, the algorithm has too much empty support and weak decision tree, which may cause repeated sorting and management of data, resulting in low algorithm efficiency and unable to meet the effective management needs of enterprise employees. Therefore, proposed to improve the C4.5 algorithm, the basic process is mainly divided into 6 aspects, the specific performance is:

(1) First, perform preprocessing operations on the data, delete missing values, etc.;

(2) Classify each attribute in the data and find its entropy;

(3) Calculate the average number of data entropy, then merge the entropy ≥ the average number to obtain the merged data set, and find its entropy value;

(4) Calculate the combined entropy and non-combined entropy, and find the new data gain [1][3] [6];

(5) Select the attribute with the highest gain as the current test attribute;

(6) Using the branch as the root node, calculate each node and branch result through the above steps.

3. MANAGEMENT SYSTEM CONSTRUCTION

3.1. The Overall Framework of the System

In order to improve the management level and work efficiency of employees, combined with current artificial intelligence technology, based on the J2EE technology framework, the enterprise employee training management system is designed as shown in Figure 1. The system is mainly composed of technology platforms and application systems [2]. Technology platform A technology platform developed by a Web application system.
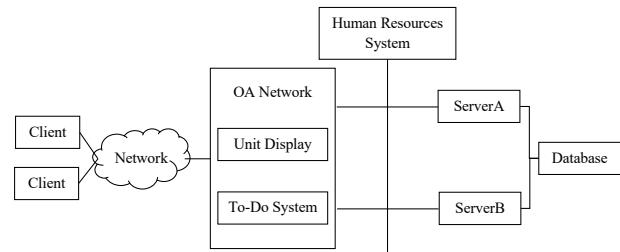

Figure 1. The overall architecture of the employee training management system

The system mainly includes five modules of training resources, requirements, plans, activities, and statistical analysis and management. After the management personnel enter the system through the OA network, the system will identify the personnel information. Then the managers use the training resource module in the system to select the employee information of the enterprise, and by inputting the information of different employees, they can obtain the corresponding employee information. Demand management is obtained through statistical analysis by corporate training professionals. When formulating the corresponding demand management system, use the system to send to the superiors for review; then the training plan is counted and archived. When employee training is required, you can log in this system directly obtains training plans

and materials to achieve targeted and standardized training. After the training is completed, the system will record the training information throughout the entire

process, conduct statistical analysis on the training situation of the employees of the enterprise, and conduct training scoring, so as to realize the correct evaluation of the training effect.
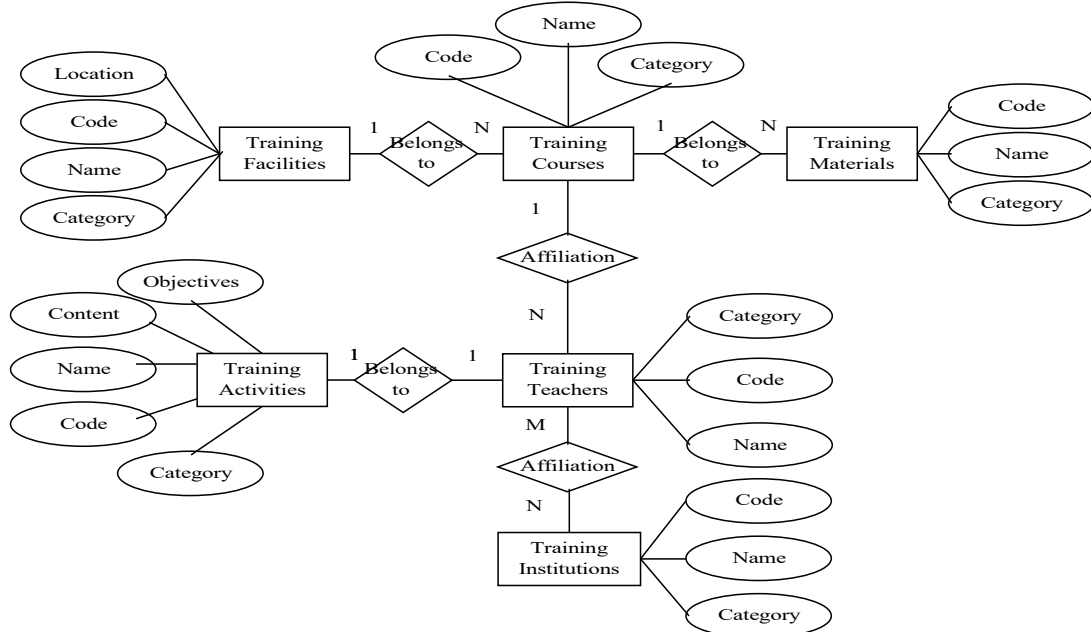
3.2. Database Design

In the employee training management system, the data provided by the database is inseparable. The information in the database mainly includes training materials, facilities, courses, activities, management personnel and institutional information [5]. The E-R diagram of the designed database is as follows.

Figure 2. Database E-R diagram

3.3. Application of Improved C4.5 Algorithm in Training Management System

Based on the above system and database information, the research applies the improved and improved C4.5 algorithm to the system for data management, and the decision tree is constructed as follows through the attributes and classification characteristics of the training information.
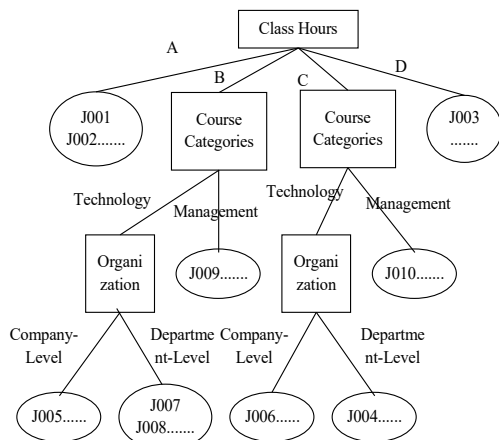

Figure 3 Decision tree generated by the improved C4.5 algorithm

Using the improved C4.5 algorithm to classify and manage training management data scientifically and

reasonably can help corporate managers to conduct training in an orderly manner, and also provide managers with corresponding data and technical support to improve management efficiency [6].

4.EXPERIMENTAL RESULTS AND ANALYSIS

4.1. Improved C4.5 Algorithm Performance Test

In order to verify whether the performance of the improved C4.5 algorithm has been improved, and the superiority of the algorithm performance. In this experiment, the C4.5 algorithm before and after the improvement was tested, and the training results of 1,200 employees of a certain company were selected for comparison and analysis. The comparison results are as follows.

Table 1: Comparison results of C4.5 algorithm and improved C4.5 algorithm

Group	number of records	average time used by C4.5 algorithm (ms)	average time used by improved C4.5 algorithm (ms)	accuracy of C4.5 algorithm (%)	accuracy of improved C4.5 algorithm (%)
1	400	340.6	330.4	72.3	73.2

2	500	347.2	332.5	73.1	76.4
3	600	358.2	336.7	74.8	80.3
4	800	362.4	341.7	76.1	84.6
5	1000	37X3	348.6	80.2	90.7
6	1200	391.8	355.4	85.7	98.8

It can be seen intuitively from Table 1 that in the training process of 1200 employees, the average training time of C4.5 algorithm before improvement is 391.8ms, while the average training time of C4.5 algorithm after improvement is only 355.4ms, which is 36.4ms lower than the training time of the algorithm before improvement. In terms of training effect, the accuracy of C4.5 algorithm before improvement is about 75% and the highest accuracy is only 85.7%, while the accuracy of C4.5 algorithm after improvement is above 85% and the highest accuracy is 98.8%, which is 13.1% higher than that of the C4.5 algorithm before improvement. Comprehensive analysis shows that the performance training effect of the improved algorithm is significantly improved and the algorithm performance is very superior, which further indicates that the improved algorithm can achieve better application effect in the training management system and has certain feasibility.

4.2. System Test

In order to test whether the enterprise employee training system is feasible, this experiment will test the training resource management module in the system. The training resource management module mainly uses the system's training resources to add, modify, delete and other functions. The training department commissioner modified the curriculum for testing, and the results are shown in Table 1.

Table 2: Test results of training resource management module

No	Test steps	Input data	Expected results	Confirm results(Yes/No)
1	Training department specialists enter the training management system	N/A	Enter the training management system interface	Yes
2	Click the course modification button in the training resource management module	N/A	Enter the training resource management module	Yes
3	Select the course name to be modified	Enter the course name, for example: Knowledge management	Knowledge management" Is displayed in the name of the course	Yes
4	Click the "Ok" button	N/A	Save successfully	Yes

Comprehensive analysis of Table 2 shows that the test results of the training resource management module of this system all meet the expected results, and users can go through the operation process of the system. This shows that the designed enterprise employee management training system can realize intelligent training management, which is feasible and effective.

5.CONCLUSIONS

In summary, the designed enterprise employee training system based on artificial intelligence technology can improve the training ability of training managers. After employee training is carried out through this system, the work efficiency of employees is significantly improved, and enterprise training resources can be operated in a reasonable and orderly manner. The corporate rules and regulations have been further improved. The test results show that the improved C4.5 decision tree has less application time in the system. Compared with the algorithm before the improvement, the accuracy of the improved algorithm is up to 98.8%, which has a better effect on system data classification. In terms of the system's resource management module, users can successfully complete the test, and the test results meet the expected requirements, indicating that the system can be vigorously promoted and applied in the field of corporate training. However, due to experimental conditions, although the overall design of the system was completed in this experiment, some more complex user requirements still need to be further improved. For example, there may be some usability problems in system functions and business processes. Due to time issues, it has not been carried out on a large scale. In the future, we will continue to expand the functions of the system, add more application modules according to the needs of enterprise users, optimize the system structure, improve system performance, and achieve the training goal of combining high efficiency and intelligence.

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