Analysis of Vocational Education Management Data Based on Immune RBF Network Model

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Abstract. In order to solve the problem that teachers cannot communicate with students "face to face" in the process of online open course teaching, so they cannot intuitively grasp the students' learning situation. An analysis method of vocational education management data based on immune RBF network model is proposed. In this paper, the immune RBF network is used to establish a student learning data management model. After the online user data is modelled, the model can be used to predict the attention of corresponding students, so as to help teachers develop targeted teaching plans and improve the teaching effect of online courses. Through the verification of actual teaching data, the evaluation system of the data management model proposed in this paper is objective and scientific, and the prediction accuracy rate can reach more than 80%. By using the student data management model proposed in this paper, teachers can carry out teaching according to the characteristics of students, and achieve teaching according to their aptitude in a real sense, which is of great significance to teaching reform and teaching effect.

Keywords: data management · Artificial immunity · RBF network · vocational education

1 Introduction

In recent years, most schools and educational management departments at all levels have accumulated considerable database resources in the development and utilization of operational information systems. However, when analyzing system requirements, the main consideration is to reduce labor intensity and improve work efficiency. The developed management information system is basically a decentralized database for departmental transaction processing, which processes their respective businesses. The data of each department is organized according to their own business needs, and there is a lack of consideration from the perspective of education management decision-making to adapt to the changing competitive environment, resulting in fragmented and disordered information resources Due to poor timeliness and difficulty in sharing, it is difficult to conduct global analysis and comprehensive decision-making on data between business departments, schools, and education departments at all levels. However, if data integration is carried out on the basis of operational level business database systems, and a data warehouse system is created, timely and accurate management information analysis and auxiliary decision-making support can be provided for schools and education departments [1, 2].

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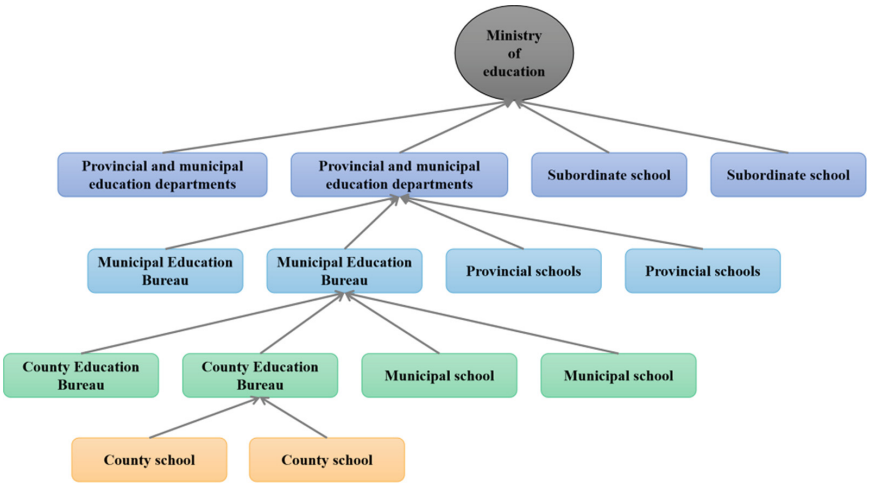

Fig. 1. Schematic diagram of educational management system structure

2 Vocational Education Management Data Analysis

2.1 Education Management Data Warehouse System Architecture

The architecture of education management data warehouse system is closely related to education management system. China's current education administration system is mainly classified according to administrative regions, from the Ministry of Education to county education bureaus, which can be expressed as a tree structure as shown in Fig. 1. The middle node of the tree is the education management department, and the leaf node of the tree is the hierarchical structure of the school education management tree as shown in Fig. 1. The education management data warehouse system can be a hierarchical structure [3].

2.2 Vocational Education Management Data Attribute Network Model

Radial basis function (RBF) neural network (RBF) is a network model with excellent nonlinear approximation performance. The network topology has three layers, namely, input layer, hidden layer and output layer. The process of establishing the network is actually the process of determining the parameters of each layer. The artificial immune algorithm is used to establish the topological structure of RBF network. This method first calculates and determines the number of neurons in the hidden layer of RBF network, and then injects the number of neurons as vaccines, thus greatly simplifying the network training process and improving the training accuracy of the network [4, 5].

The eigenvalues of students' gender, classroom activity, forum activity, homework quality and autonomous learning degree are taken as the input of RBF network, and the attention students deserve is taken as the output of RBF network. The input neuron of the network is 5, the output neuron is 1, and the number of hidden neurons is h [6].

3 Realization of Immune RBF Network

Taking the user data of an online open course in a vocational and technical college as a sample, the above-mentioned network model is established. In this paper, 600 students' data are randomly selected, and 500 of the 600 groups of data are used for network establishment training, and the network construction is realized by using the immune three-level algorithm: the number of neurons in the hidden layer of the network is determined to be h = 18 by the first-level vaccine extraction; In the second stage, the parameters of the hidden layer of the network are determined by immune algorithm, and the network is constructed by combining the parameters of the output layer determined in the third stage. Figure 2 shows the evolution of error variance from generation to generation in the process of immune three-level algorithm training network [7–9].

The remaining 100 groups of data are used to verify the correctness of the established network. Specifically, the input eigenvalue sequence of the verification data is used as the input of the above network to obtain the network output result, and then the network output result is compared with the actual output of the verification data, that is, the actual attention degree of the corresponding students. See Fig. 3 for the comparison result.

As can be seen from Fig. 3, after testing, the output value of RBF network established in this paper is in good agreement with the actual value, and more than 80% of the network output results are in agreement with the actual value, indicating that the network prediction effect is good [10].

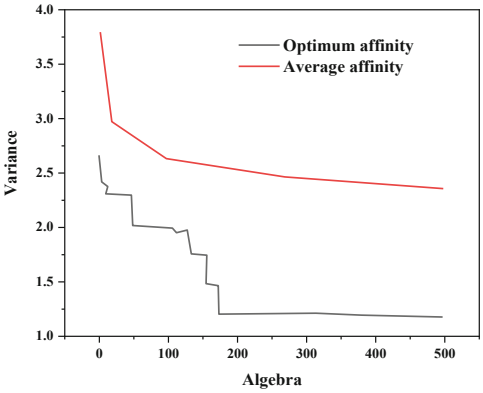

Fig. 2. Training process of students' attribute immune RBF network

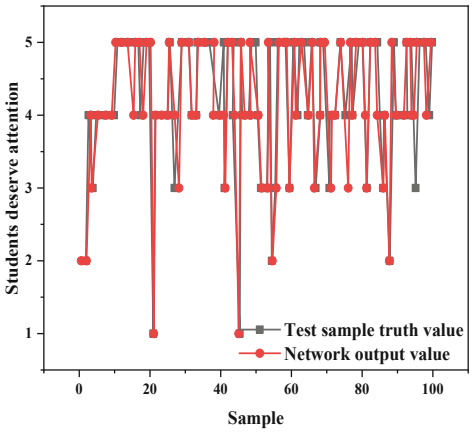

Fig. 3. Comparison between Output and Actual Value of Student Attribute Immune RBF Network

4 Conclusion

The student data management model of online open courses based on immune RBF network proposed in this paper has the following significance: it solves the problem that teachers can't objectively evaluate students' learning state in online education, and uses immune neural network learning method to evaluate students' learning state, and the evaluation system is objective and scientific, which can obtain students' learning state more accurately. By applying the student data management model proposed in this paper, teachers can carry out teaching according to students' characteristics, so as to teach students in accordance with their aptitude in a real sense, which is of great significance to teaching reform and teaching effect.

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