Study on the evaluation system of websites of college ideological and political education based on RBF neural network

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ABSTRACT

Based on the characters and various index attributes of the websites of college ideological and political education, the multi-index hierarchical structure for evaluation on the competitiveness indexes of the websites of college ideological and political education was constructed by using expert grading method. The evaluation index system for competitiveness indexes of the websites of ideological and political education was built. Based on this, the competitiveness indexes of the websites of ideological and political education were measured and calculated to quantify the competitiveness level of the websites. Secondly, evaluation and study were carried out on the competitiveness indexes of the websites of ideological and political education by means of RBF neural network algorithm. The simulation results show that the method combining expert grading method and RBF neural network for measuring and calculating the competitiveness indexes of the websites of ideological and political education has high effectiveness and reliability.

KEYWORDS

INTRODUCTION

In the new era, the implementation of college ideological and political education cannot be separated from the utilization of network resource and its technology. In 2004, *CPC Central Committee and State Council's Opinion on Further Strengthening and Improving Ideological and Political Education for Undergraduates* explicitly pointed out: we need to take the initiative to occupy the new battlefield of internet for ideological and political education. Make some thematic educational websites or webpages integrating ideology, knowledge, enjoyment and service, so as to enable internet to become an important means for carrying forward the theme of the times and carrying out ideological and political education. As an important carrier and concentrated expression form of college ideological and political education through internet, thematic websites of ideological and political education play an important battlefield role in college ideological and political education [1-3].

Currently, we are short of internet culture products which the undergraduates are interested in, and we also lack of the information contents for carrying forward fine national culture and spirit of the time. Existing websites consider less about undergraduates' spiritual life demands in terms of ideological cultivation, morality guidance and character molding. There are very few contents related to ideological and political education compared with the overall information, the website standards are different and lack of distinct education characters and attraction. Providing timely information feedback for the education process of thematic websites and designing a scientific evaluation index system can improve the design, operation and management levels of the thematic websites to some extent. In doing so, we can provide correct basis for decision making and theoretical practice basis for thematic website construction. Moreover, thematic website construction can therefore walk on the sound development road which is normalized, scientific and theorized.

The evaluation index system for thematic website consists of multiple evaluation factors for evaluating websites of ideological and political education. It is a comprehensive evaluation system used for carrying out value judgment on thematic websites according to certain measuring hierarchy and weight by using evaluation methods such as measurement and statistical analysis etc. It plays a positive guiding role [3]. Currently, website evaluation is featured by serious randomness as well as insufficient systematicness and scientificity, in particularly insufficient and unapparent consideration of the guiding and educating role of the websites. Moreover, current thematic websites are universally short of a set of effective specific evaluation indexes. Given these facts, the objectives of the thematic websites were decomposed according to scientific evaluation theory and our years' practical experience in ideological and political education through internet, so that the abstract evaluation objectives could be transferred into measurable and operable indexes with an emphasis on development. Researchers tried to give full play to the sound guiding, motivating, diagnosing, regulating, normalizing, reinforcing and restraining role of evaluation on ideological and political education by building a set of evaluation index system suitable for thematic website construction.

COMPETITIVENESS INDEXES OF THE WEBSITES OF IDEOLOGICAL AND POLITICAL EDUCATION

Despite of the types of websites of ideological and political education, the main factors affecting the website operation effect and the competitiveness of the websites of ideological and political education are substantially identical. The combined effects of these main factors determine the overall level of the website of ideological and political education and have a huge influence on its function realization, which makes websites of ideological and political education show different competitiveness. Therefore, in this paper, the competitiveness index of websites of ideological and political education is put forward. It is the ability for measuring the comparison of websites of ideological and political education amid competition. This ability reflects the level to which the website of ideological and political education reaches in design and operation [4].

Based on existing famous survey studies on websites of ideological and political education, in this paper, researchers referenced the research achievements of other scholars [5] and some institutions. Given the development status and characteristics of websites of ideological and political education, researchers studied the competitiveness indexes of websites of ideological and political education based on the principles such as comprehensiveness, scientificity, operability, industrial representativeness and centering on contents. They tried to use a more optimized algorithm to simulate, measure and calculate the competitiveness indexes of a website of ideological and political education.

THE INDEX SYSTEM FOR MEASURING AND CALCULATING THE COMPETITIVENESS INDEXES OF THE WEBSITES OF IDEOLOGICAL AND POLITICAL EDUCATION

Indexes are the contents and basis for evaluating the evaluation object. Index system refers to the distribution of the target structure and specific contents. With special combination mode and hierarchical characteristics, it reflects the unification of systematicness, hierarchy and relative independency. Based on the reality in colleges and internet characteristics, the evaluation index system of thematic websites are divided into three hierarchies, and all the evaluation index systems consist of 90 items [6]. The first hierarchy is used for examining the overall level of the thematic websites. It is composed of 5 first-level indexes of content construction, style design, technical support, management and operation as well as educational function. The second hierarchy is the "element hierarchy" for the construction and application of thematic websites. In the second hierarchy, the 5 first-level indexes are subdivided into 22 systems of core elements according to the core elements involved in construction and application of thematic websites, so as to evaluate them respectively. The third hierarchy is "discriminating hierarchy" for the construction and application of thematic websites. In the third hierarchy, the elements are further subdivided into 65 third-level indexes based on the 22 second-level indexes.

Table 1 Evaluation index system and weight of websites of ideological and political education

First-level index	Second-level index	Third-level index
Content construction 0.2592	Selection of subject contents of ideology and politics 0.31	Explicit guidance thought 0.40, subjects of ideological and political education 0.30, highlighted thought guidance property 0.30
	Suitability degree of content setting 0.23	Easily accepted by the mass teachers and students 0.31, convenient for teachers and students to use 0.23, suitable for implementing ideological and political education task, conducive to improving the level of ideological and political education 0.23
	Evaluation on website information 0.23	Distinct themes 0.28, abundant information 0.28, strong sense of the time 0.22, authoritative information 0.22
	Reasonability degree of overall allocation 0.23	
Style design 0.1497	Suitability degree of style and website positioning 0.18	Emphasizing the seriousness of the theme of ideological and political education 0.33; paying attention to vividness 0.33; organic coordination of seriousness and vividness 0.34
	Coordination degree of color application 0.18	Explicit dominant hue 0.33; reasonable color matching 0.33; natural color transition 0.34
	Humanization design degree 0.18	According with visitors' habits of internet surfing 0.33; easy to understand and operate 0.33; suiting popular psychological feelings 0.34
	Exquisite workmanship degree 0.23	Detail disposal 0.33; design skills 0.33; reasonable pictures 0.34
Technical support 0.1970	Reasonability of database design 0.23	The data sheets can meet the functional requirement 0.25; standardly designed data sheets and fields 0.25; avoiding redundant data 0.25; correlation of data sheets 0.25
	Standardization of website files 0.23	Standard naming 0.33; standard code using 0.33; standard files 0.34
	Safety protection level of the website 0.31	Whether the account management is rigorous 0.21; whether there is any safety loophole in the programs 0.21; safety of the server 0.21; the ability in coping with emergencies 0.21; data backup 0.16
	Independent development ability 0.23	Technical strength of the websites 0.40; design and development work 0.30; proprietary intellectual property rights 0.30
Management and operation 0.1970	Management mechanism building 0.27	Explicit management organizations 0.33; reasonable management regulation 0.33; standard management system 0.34
	Management team construction 0.27	Reasonable personnel allocation 0.22; ordered division of labor in the team 0.22; talent training 0.28; spiritual outlook of the team 0.28
	Management and operation level of the website 0.27	Obvious management effects 0.23; frequency of information updating 0.23; sufficient capital source 0.31; on-line and off-line interaction 0.23
	Information monitoring and feedback mechanism 0.20	Information monitoring control 0.27; timely disposing the messages left and feeding the disposing results back 0.27; ability in disposing and guiding the information crisis 0.27; visitors' evaluations on the feedback results 0.19
Educational function 0.1970	Page view and attention degree of users 0.36	Number of external links 0.37; users' page view 0.63
	External influence of the website 0.28	Media's attention to this website 0.50; communication frequency among inter-regional websites 0.50
	Interaction and guidance 0.36	Complete interaction function 0.43; sufficient thought guidance 0.57

After quantifying the indexes, the rating of each website is determined according to the statistical results. The websites with higher scores have better comprehensive quality.

Table 2 Descriptions of the scores for website evaluation rating

Rating	Scores
Excellent	0.9 score and above
Good	0. 75-0. 89 scores
Comparatively good	0. 65-0. 74 scores
Comparatively bad	0. 55-0. 64 scores
Very bad	0.54 scores and below

The websites are divided into 5 ratings of excellent, good, comparatively good, comparatively bad and very bad according to different scores. The descriptions for the scores of each rating are as shown in Table 2.

RBF NEURAL NETWORK

The most fundamental RBF neural network consists of three layers: input layer, hidden layer (middle layer) and output layer [1]. Assume that the number of nerve cells at hidden layer and output layer are M and Q respectively, the input pattern is X, $X = [x_1, x_2, \cdots, x_R]^T$, and output is Y, $Y = [y_1, y_2, \cdots, y_Q]^T$. The radial basis function in this paper is Gauss function, then the output of hidden unit is [7-8]:

$$z_j = \exp\left(-\left\| \frac{\|X - C_j\|^2}{\sigma_j} \right\| \right) \quad j = 1, 2, \cdots, M \quad (1)$$

Where: z_j is the output value of the jth nerve cell at the hidden layer, C_j is the center of the jth nerve cell at hidden layer; the jth nerve cell at the hidden layer corresponds to the center components of all nerve cells at input layer to form $C_j = \left[c_{j1}, c_{j2}, \cdots, c_{jR} \right]^T$; σ_j is the width of the jth nerve cell at the hidden layer, it corresponds with C_j; $\|\bullet\|$ is Euclid norm.

The expression of the input and output relationship of nerve cells at output layer is:

$$y_k = \sum_{j=1}^{M} w_{kj} z_j \quad k = 1, 2, \cdots, Q \quad (2)$$

Where: y_k is the output value of the jth nerve cell at output layer, w_{kj} is the weight between the kth nerve cell at the output layer and the jth nerve cell at the hidden layer. Here, the parameters of RBF neural network mainly refer to the center, width and regulation weight of the network [9].
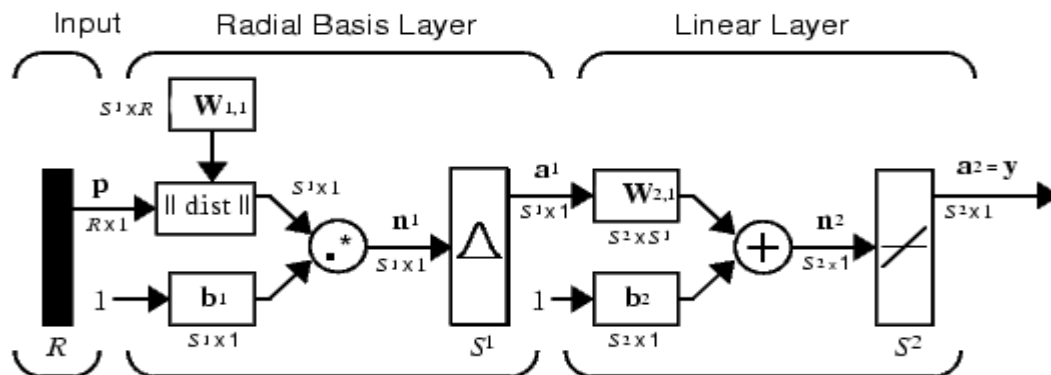

Fig. 1 Structure chart of RBF neural network

EVALUATION ON WEBSITES OF IDEOLOGICAL AND POLITICAL EDUCATION BASED ON RBF NEURAL NETWORK ALGORITHM

The order of evaluation on websites by using RBF neural network is: firstly, with the data of built evaluation index system for websites of ideological and political education as the input sample, build a model of RBF neural network to train

the network [10-12]. Secondly, test the evaluation network model built according to the training and learning results. Finally, summarize and analyze the network learning and training results.

Survey and analysis were carried out on the 106 collected websites of ideological and political education during June to July in 2014. Finally, 20 second-level indexes were selected as the evaluation objects. They were graded by experts. The data acquired were subject to uniform processing. The first 76 groups of data were used for testing, and the remained 30 groups of data were tested.

The parameters of RBF neural network are set as: error goal as goal=0.0001, spread constant as spread=1, maximum number of nerve cells at hidden layer as mn=20, the display frequency of the training process as df=1. The training results are as shown in Fig 2:
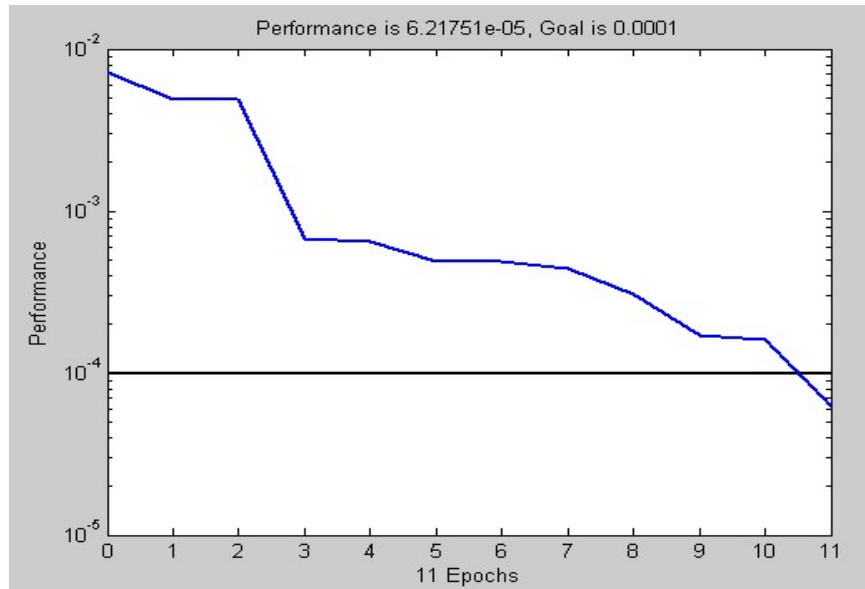

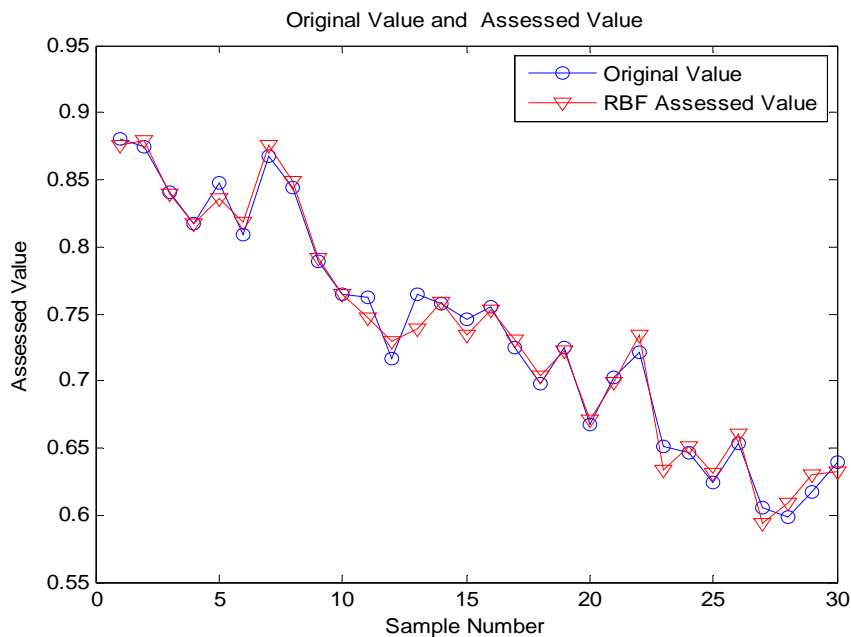Fig. 2 Diagram of training process of RBF neural network

Fig. 3 Comparison diagram of RBF prediction results and original values

According to Fig. 3 comparison diagram of prediction results and original data, evaluation on websites of ideological and political education by using RBF neural network has good effects. The diagram of absolute error and diagram of relative error of the evaluation are as shown in Fig. 4 and Fig. 5 respectively.
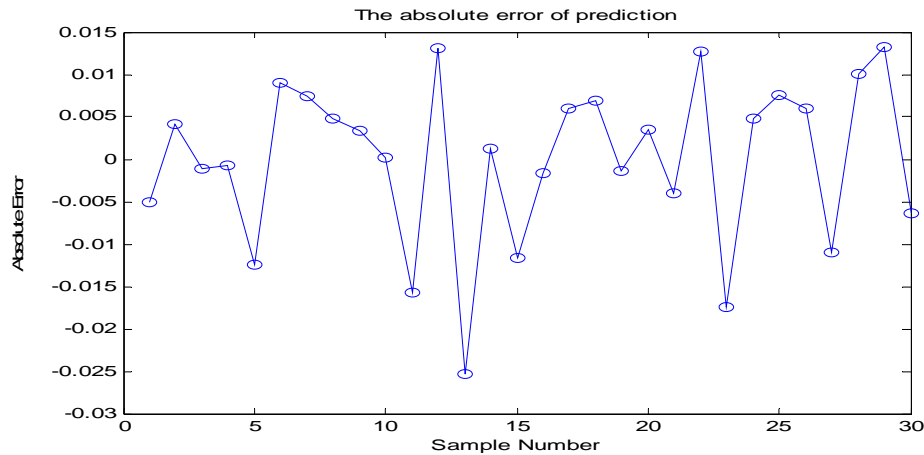
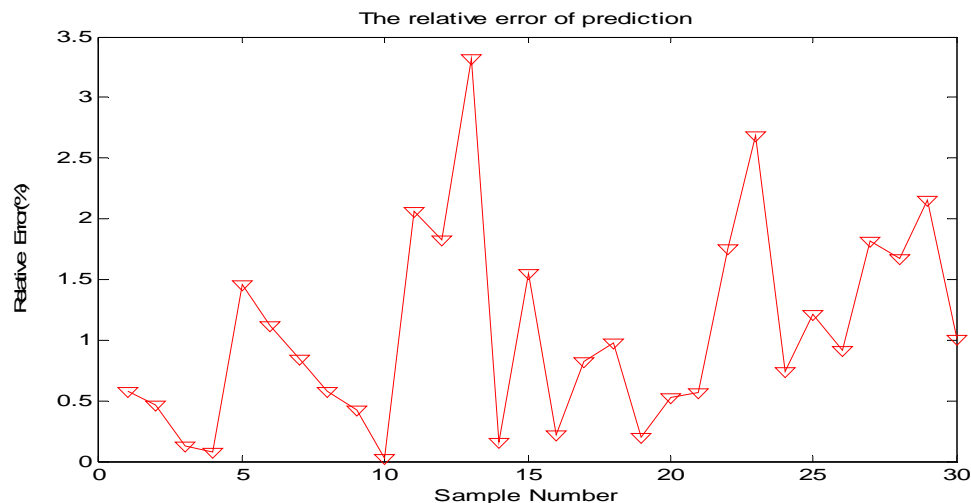Fig. 4 Diagram of absolute error of RBF prediction

Fig. 5 Diagram of relative error of RBF prediction

According to Fig. 5, the average value of the relative error of evaluation on websites of ideological and political education by using RBF neural network is 2.5%, which shows good effects.

CONCLUSION

In this paper, firstly, the multi-index hierarchical structure for evaluation on the competitiveness indexes of the websites of college ideological and political education was constructed by using expert grading method. The evaluation index system for competitiveness indexes of the websites of ideological and political education was built. Based on this, the competitiveness indexes of the websites of ideological and political education were measured and calculated to quantify the competitiveness level of the websites. Secondly, evaluation was carried out on the competitiveness indexes of the websites of ideological and political education by using RBF neural network. The simulation results show that the method combining expert grading method and RBF neural network for measuring and calculating the competitiveness indexes of the websites of ideological and political education has high effectiveness and reliability. This method can be promoted and applied.

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