Acta Technica *62* (2017), No. 6B, 1339–1350

Improved group decision making comparison method based on support vector machine and improved QPSO algorithm

Xiaoting Wang[1]

Abstract. In order to improve the effectiveness of the comparison of ideological and political education among colleges and universities, a comparative method for ideological and political education is proposed based on the optimal group decision of SVM of improved QPSO algorithm. Firstly, nonlinear regression forecasting is conducted for ideological and political education by using Support Vector Machine and at the same time improved QPSO algorithm is used to train the neural network and Support Vector Machine. Then, simulation is conducted on the computer with the forecast error smaller than 10%, which shows that the method in the Thesis is effective and feasible for the short-time ideological and political education, providing a reference for the practical application of ideological and political education forecasting. Finally, opinions and suggestions are proposed for the strengthening the ideological and political education in school.

Key words. Multi Factor Variable Weights; Optimizing Group Decision Making; ideological and political; SVM; political education.

1. Introduction

For students in colleges and universities, ideological and political education is a compulsory course. The course not only can help students build up right view of life and view of value, but also guide and regularize the moral behaviors and ideas of the students. For this reason, pragmaticality of ideological and political education of colleges and universities is an aspect that the teachers of colleges and universities show great concern and pay much attention to. As the computer technology develops continuously, internet culture has been much promoted and permeated. In all colleges and universities, complete coverage of internet has been achieved. It's a

[1]College of Cangzhou Vocational and Technical, Cangzhou, 061001, China

brand new cultural type influencing the value orientation, moral ideas, way of act and mentality of college students. However, in the complex internet environment which expands the horizon of college students, the college students are easily confused by words due to lacking of sufficient social experience and hence ideological and political education and teaching has been in a dilemma. For this reason, it's of great practical significance for the strengthening the pragmaticality of ideological and political education of colleges and universities.

The development of internet technology has brought revolutionary changes for the education field. Given the characteristics of convenience, diversity and interactivity, the internet has had a significant impact on ideological and political education and improved the level of ideological and political education to a great extent. Because of the internet, the information has undergone world-shaking change in the process of transmission, breaking the limitation of time and region brought by traditional way, and hence ideological and political education of colleges and universities are faced with more opportunities and challenges. Although the internet has brought more convenience to the ideological and political education of colleges and universities, it also will produce negative effects which influence the mentality and behaviors of the students and will distort the view of value of the students. For this reason, we need to bravely face the new challenges, make good use of internet advantages, seize the opportunity actively, prompt the internet to provide more services for the ideological and political education of colleges and universities and improve the level of ideological and political education fundamentally.

A comparative method for ideological and political education is proposed based on the optimal group decision of SVM of improved QPSO algorithm is proposed in the Thesis. Nonlinear regression forecasting is conducted for ideological and political education by using Support Vector Machine and at the same time improved QPSO algorithm is used to train the neural network and Support Vector Machine. The experimental result verifies the effectiveness of the algorithm.

2. Setting of evaluation index of the pragmaticality of internet-based ideological and political education

Scientific and effective setting of the evaluation index, on the one hand, provides parameter for the establishment of evaluation model. On the other hand, it's a rethinking of the launching of internet-based ideological and political education activity. The selecting of the index of the model will guide the subsequent launching of internet-based ideological and political education activity.

There are many evaluation indexes for the quality of teaching, but the evaluation of pragmaticality of internet-based ideological and political education should be combined with specific circumstances, so the launching of this education activity is different from general education activity because its objects of education, means of education and effectiveness evaluation of education are special. The objects of education of internet-based ideological and political education is college students who have multiple views of life, active in mind, broad horizon and extensive source of information, and their acceptability of internet-based ideological and political edu-

cation is easily affected by multiple aspects and hence the effectiveness of education is hard to guarantee; in addition, the principal part of internet-based ideological and political education is teacher who will unavoidably be distracted by external factors in implementing teaching activity; furthermore, there are many evaluation indexes at present, but there is no standard index specific to internet-based ideological and political education. In setting scientific and effective evaluation index, the overall should follow certain principles including scientificity, fairness, practicalness, comprehensiveness, reasonability and practicalness. In the content of the index, apart from the evaluation of teacher, evaluation of pragmaticality should also be conducted on the students. According to the requirements of syllabus of ideological and political education and the result of questionnaire survey, the set index of the evaluation of the pragmaticality of internet-based ideological and political education is shown in Table 1.

Table 1. Index of the evaluation of the pragmaticality of internet-based ideological and political education

First grade index	Second grade index
Teaching idea	Modern educational thought and innovative ideas should be provided with (X1)
Objective and content of teaching	Objective of teaching should be clear and keeps to the requirements of syllabus (X2)Content setting of teaching should be reasonable where the important and difficult should be highlighted and should be well arranged and with excellent logic (X3) content of teaching is keep up with the social development rhythm and epochal character should be highlighted(X4)
Method and means of teaching	(X7) Modernized means of teaching should be comprehensively applied (X5) Multiple methods to foster the enthusiasm and innovative thinking of the students for study should be applied (X6) Means of teaching should be personalized, people oriented and with targeted tutorship (X7)
Organization and management of teaching	(X12)Teaching activity is implemented coherently according to the requirement of syllabus (X8) standard operation of teaching, learning and assessment (X9) Internet-based teaching system is complete with rich resources and good hardware support (X10) supportive work of internet-based ideological and political education should keep up with the teaching needs (X11) the teacher staffing is reasonable
Teaching accomplishment	Teachers are of high morality and strong professional ability (X13) Teacher has a proper altitude in teaching and is full of sprit and energy and presents high enthusiasm in teaching (X14) Teacher is good at guiding and mastering the rhythm and atmosphere of teaching
Effectiveness of Teaching	(X20) Students have high enthusiasm in learning and have keen interests in participation (X16) students have a proper altitude in learning and can finish the learning tasks as required (X17) Students should master the theoretical knowledge required in the syllabus (X18) the political accomplishment of the students should be improved (X19) the comprehensive quality and ability of the students should be improved (X20)

3. Principles of Forecasting Based on SVM

Support Vector Machine (Support Vector Machine, hereinafter referred to as SVM) is a research method based on statistical learning theory. Different from the minimum principle of empirical risk of general machine learning algorithm, SVM algorithm is based on the minimum principle of structural risk, so that it has strengths including small training sample, local optimization and strong generalization ability.

If the known sample: $\mathbf{T} = (\mathbf{x}_i, \mathbf{y}_i), \quad i = 1, 2, ..., m$, where $\mathbf{x}_i$ is the No. i n dimensional input vector and $\mathbf{y}_i$ is the corresponding output vector. Then the learning based on Support Vector Machine can be understood as finding the mapping relation $f(\cdot)$ between input value and output value to make $f(\mathbf{x}_i) = \mathbf{y}_i$ workable. Generally speaking, $f(\cdot)$ is expressed as:

$$f(\mathbf{x}) = \mathbf{w}\Phi(\mathbf{x}) + b\,, \tag{1}$$

The $\mathbf{w}$ in the Equation is called weight vector and b is called threshold value, $\Phi : \mathbf{x}^n \to \Omega$, which means mapping the n dimensional vector $\mathbf{x}^n$ to characteristic space. In order to improve the accuracy of the forecasting model, proper parameter should be selected to minimize the risk. The empirical risk function as Equation (2) is constructed:

$$R_{emp} = \frac{1}{m}\sum_{i=1}^{m} L(\mathbf{y}_i - f(\mathbf{x}_i))\,, \tag{2}$$

where L is called loss function. The expression of it is:

$$L(\cdot) = \begin{cases} 0 & if \quad |y_i - f(x_i)| < \varepsilon \\ |y_i - f(x_i)| - \varepsilon & else \end{cases} \tag{3}$$

In the above Equation, ε is a decimal fraction greater than 0 and can be set according to actual requirement. Actually, if the learning sample is limited, it's inaccurate to use empirical value to replace the actual risk value, so generalization risk, which can be called as SRM criterion, is considered in SVM algorithm:

$$f(x) = \sum_{i=1}^{m} w_i \Phi_i(x) + b\,. \tag{4}$$

In order to minimize the real risk of Equation (5), the following optimal objective function is constructed:

$$\min \ \frac{1}{2}\|w\|^2 + C\sum_{i=1}^{m}(\xi_i + \xi_i^*)\,. \tag{5}$$

$$s.t \begin{cases} y_k - f(x_k) \le \varepsilon + \xi_i\,. \\ f(x_k) - y_k \le \varepsilon + \xi_i^*\,. \\ \xi_i \ge 0,\ \xi_i^* \ge 0\,. \end{cases} \tag{6}$$

ξ, ξ^* in the above Equation are two slack variables. C is called capacity factor.

Transform the above equation to the solution of Lagrange duality problem. The following can be obtained:

$$f(\mathbf{x}) = \sum (\alpha_i^* - \alpha_i) K(\mathbf{x}_i, \mathbf{x}) + b\,. \tag{7}$$

$$b = \sum_{SVS} (\alpha_i - \alpha_i^*)(K(x_j, x_i) + K(x_k, x_i))\,. \tag{8}$$

where α_i is Lagrange multiplier. $K(\cdot)$ is called kernel function which satisfies:

$$K(x_i, x_j) = (\Phi(x_i) \cdot \Phi(x_j))\,. \tag{9}$$

The dimensions and complexity of calculation can be lowered by inducting kernel function. After the corresponding relation is established between input value and output value, the corresponding output can be obtained according to the new input.

As a machine learning algorithm, learning it is very important in improving neural network, forecasting accuracy of SVM, robustness and generalization ability. An improved Particle Swarm Optimization algorithm is used in the Thesis to train SVM.

4. Improvement of Training Algorithm

Particle Swarm Optimization (PSO) algorithm is a swarm intelligent algorithm proposed by Kennedy and Eberhart enlightened by the foraging strategy of bird groups in 1995. The basic thought of the algorithm is to seek the optimal solution through the cooperation and competitiveness between particles of the crowd. In the practical application, each particle represents the possible solution of a value to be solved and each particle realizes optimization through the following rules:

$$\begin{cases} v_{i,j}^{k+1} = w v_{i,j}^k + c_1 r_{1,i}(p_{i,j} - x_{i,j}^k) + c_2 r_{2,i}(p_{g,j} - x_{i,j}^k)\,, \\ x_{i,j}^{k+1} = x_{i,j}^k + v_{i,j}^{k+1}\,. \end{cases} \tag{10}$$

Where $v_{i,j}^{k+1}$ the current speed of advance of particle is particle i of dimension j, $x_{i,j}^{k+1}$ is the current position of particle i of dimension j. $p_{i,j}, p_{g,j}$ respectively show the personal optimal position and the global optimal position of particle r is the random constant. c is learning factor. w is inertia weight.

When applied the Particle Swarm Optimization method to the training of RBF neural network, the purpose is to obtain the best neuronal number and the optimal weight and threshold value [5-6]. Then these particles can be considered as the magnitude of the central number, weight and threshold value of the undetermined neure. The current position of particle can be considered as the current value of these undetermined parameters which are:

$$x = (h_1, h_2 ... w_{1j}^1 ... w_{2k}^2 ... b_{11} ... b_{2n})\,. \tag{11}$$

We may as well regard it as group of vectors and the found optimal "position" is the optimal solution to the element of vector. It's also the best weight and threshold value of neural network.

The shortcomings of general Particle Swarm Optimization algorithm are prematurity of the evolutionary process and that the searching space can not cover the whole space of possible solutions. When RBF neural network is trained in such way, global optimal solution of relevant parameters hence can not be obtained. In order to use the advantages of Particle Swarm Optimization and avoid its typical shortcomings, AQPSO (Adaptive Quantum-behaved PSO) algorithm is adopted in the Thesis to train the network. Compared with PSO algorithm, the model of the algorithm is simpler and cooperative ability of the algorithm is stronger, which greatly increases the global searching ability [7-9]. AQPSO algorithm rejects the updated part of speed of traditional PSO algorithm and inducts the concept of p point on the basis of traditional Particle Swarm Optimization. p point shows the random point of convergence of each particle, which shows quantum behavior thought. Where:

$$p_i^k = (p_{i,1}^k, p_{i,2}^k, ..., p_{i,M}^k) \ , i = 1, 2, ..., N \, . \tag{12}$$

At the same time, define the following:

$$g = \arg \min_{1 \le i \le N} \left\{ f(p_i^k) \right\} \, . \tag{13}$$

$$P_{i,j}^k = a p_{i,j}^k + (1 - a) p_{g,j}^k \, . \tag{14}$$

$$p_{i,j}^k = \begin{cases} x_{i,j}^k & f(x_{i,j}^k) < f(p_{i,j}^{k-1}) \\ p_{i,j}^{k-1} & f(x_{i,j}^k) \ge f(p_{i,j}^{k-1}) \end{cases} \tag{15}$$

where $p_{i,j}$ indicates the personal best position. The subscript of global best position p_g is g of Equation (17). a is the random coefficient between 0-1. $f(\cdot)$ is the function of objective function outputting performance under optimization of representation. Combined with the needs for forecasting of ideological and political education, we define the advantages and disadvantages of mapping ability of neural network of representation of $f(\cdot)$. It's:

$$f(\mathbf{x}) = \frac{1}{N} \sum_{i=1}^{N} \sqrt{(y_i(\mathbf{x}) - \bar{y}_i(\mathbf{x}))^2} \, . \tag{16}$$

It means the departure between the actual output and theoretical input of the neural network corresponding to the parameter $\mathbf{x}$ to be optimized. At this time, the expression form of the particle position is:

$$x_{i,j}^{k+1} = P_{i,j}^k \pm \beta \left| \bar{p}_{best}^k - x_{i,j}^k \right| \ln(1/u) \, . \tag{17}$$

$$\bar{p}_{best}^{k} = \frac{1}{M}\sum_{i=1}^{M} p_i^k \,. \tag{18}$$

Where u is the random number between 0-1. When $u \geq 0.5$, — of the symbol $\pm$ is selected, or $+$ of the symbol $\pm$ is selected. $\bar{p}_{best}^{k}$ shows the average optimal position of the current particle swarm. β is the speed coefficient. In the practical application, we find that coefficient β will influence the convergence performance of particle swarm. For this reason, we select β as the adaptive variable [8-9] which is:

$$\beta = \frac{0.3(k_{\max} + k)}{k_{\max}} + 0.3 \,. \tag{19}$$

where $k_{\max}$ shows the maximum number of iteration. At the same time, we improve the Equation (19) to:

$$\bar{p}_{best}^{k} = \frac{1}{M}(\sum_{i=1}^{M} p_{i1}^k + \sum_{i=1}^{M} p_{i2}^k + ... + \sum_{i=1}^{M} p_{iM}^k) \,. \tag{20}$$

Then, after selecting the sample and defining error function, AQPSO algorithm can be used to train the neural network, which is that input the training sample successively and find the optimal solution of all undermined parameters through optimization rules. The flow is shown in Fig. 1.

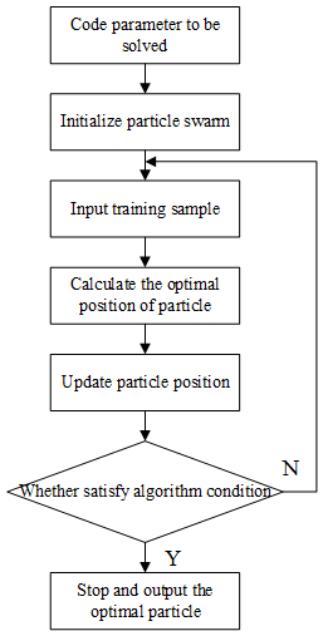

Fig. 1. the realization process of optimization based on QPSO algorithm

The training method of SVM is the same as that of RBF neural network. From the above derivation process, we can easily know the working principle of RBF neural network and SVM is that a mapping relation from input vector to output vector is formed during reasonable training. Taken the corresponding data between influence factors of ideological and political education and actual ideological and political education as sample, after optimization training is conducted on neural network and SVM, corresponding ideological and political education can be forecasted according to the new influence factors.

5. Filtering processing

Because the formed corresponding relation in SVM can not completely approach the relation between input value and output value, then we think that there is system error. So the result each time is also erroneous and error magnitude will certainly fluctuate around truth-value. In order to improve the accuracy of forecasting, Kalman filtering algorithm is used in the Thesis to fuse the filtering of the forecasting data of the two methods hoping to obtain a forecasting value that is more close to the truth value.

Kalman filtering is a state estimation algorithm based on the minimum variance principle. It's obvious that the problem of forecasting of ideological and political education is a typical problem of discrete system. For discrete system, the general principle of Kalman filtering is:

$$\begin{cases} X_k = \Phi_{k,k-1} X_{k-1} + V_{k-1}\,. \\ Y_k = H_k X_k + D_k\,. \end{cases} \tag{21}$$

In the equation, Y_k is observed value and is the obtained value forecasted by SVM in the Thesis. Use Y_k to repeatedly correct X_k which is status value. Φ is state transition matrix. V_{k-1} is input noise and D_k is observed noise. The error of forecasted data is though to be from system error and random error. Then the filtering formula can be obtained (state forecasting) through back stepping:

$$\hat{X}_k = \hat{X}_{k/k-1} + K_k(Y_k - H_k \hat{X}_{k/k-1})\,. \tag{22}$$

The seeking method of relevant parameters in the above equation is: $K_k = P_k H_k^T Q_k^{-1}$; $P_k = (I - K_k H_k) P_{k/k-1}$; $\hat{X}_{k/k-1} = \Phi_{k,k-1} \hat{X}_{k-1}$, $P_{k/k-1} = E((\hat{x}_{k/k-1} - x_k)(\hat{x}_{k/k-1} - x_k)^T)$.

6. Test and Result Analyzes

6.1. Test design

The proposed modified fuzzy Support Vector Machine of even degree and subordinating degree function based on sample is use in the comparative diagnosis of ideological and political education. A training mode that is completely the same as

the "one-to-one" method is adopted in the algorithm of the Thesis. If there is class k in the training set, then $\frac{k(k-1)}{2}$ support vector machines in all need to be trained in the algorithm of the Thesis. The decision function of the algorithm of the Thesis is constructed based on $\frac{k(k-1)}{2}$ decision functions. The decision function of single SVM is [5]

$$f(x) = \sum_{i=1}^{n} a_i y_i K(x_i, x) + b\,. \tag{23}$$

When Fuzzy Support Vector Machine is adopted for classification, apart from the characteristic of the sample and class identifier, subordinating degree is also added to each sample. The characteristic of each sample is shown as x_i. Class identifier is $y_i \in \{-1, 1\}$. Subordinating degree item is $0 < \mu(x_i) \leq 1$. ξ_i is classification error item of the objective function of Support Vector Machine and then $\mu(x_i)\xi_i$ is weighted error item[6]. Plug in the $\mu(x_i)$ in Equation (3) and the optimal solution of the optimal classification face as the following objective function:

$$\varphi(w, \xi) = \frac{1}{2}\|w\|^2 + C\left[\sum_{i=1}^{n} \mu_S(x_i : a, b, c) \bullet \mu_E(x_i)\xi_i\right]. \tag{24}$$

The constraint condition is:

$$\begin{array}{l} y_i[(\omega^T \cdot Z_i) + b] - 1 + \xi_i \geq 0 \\ i = 1, \cdots \quad \cdots, n \quad \xi_i \geq 0, i = 1, \cdots \quad \cdots, n \end{array} \tag{25}$$

When is very small, the influence of ξ_i in objective function is reduced so that the corresponding is regarded as unimportant sample. If all subordinating degree $\mu(x_i) = 1$, then it's the same as the general Support Vector Machine. In the method of Fuzzy Support Vector Machine, different degrees of punitive effect adopted in different samples can be achieved through giving different degree $\mu(x_i)$ to different samples.

Select 100 samples from the data of ideological and political education as the testing sample number of the training sample. There are 100 samples per group and 300 testing samples in all. Select contrast algorithm.

Classifier is made up of 3 support vector machines (SVM1,SWM2,SVM3). Firstly, train the Support Vector Machine by using the selected sample.

6.2. Result analyzes

In the above selected data of ideological and political education, three different types of SVM algorithm are applied for contrastive analysis. They are respectively Literature [8], Literature [9] and the algorithm of the Thesis. The MATLAB experimental results of the three algorithms are shown in Fig. 2-Fig. 4.

From Fig. 2-Fig. 4, we can see that every method can separate any of the algorithms from other two algorithms. The problem of unclassifiable region that can not be solved by general classification method is well solved by the method of the Thesis.

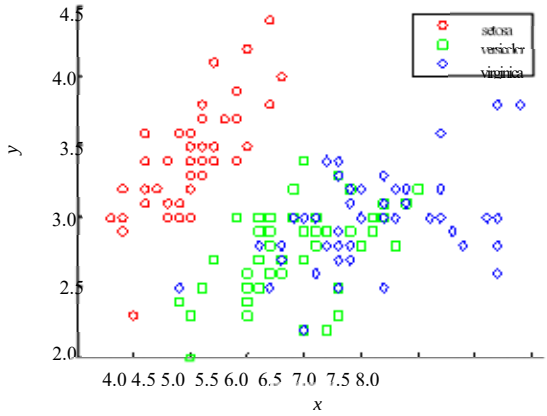

Fig. 2. The classification result of Literature [8]

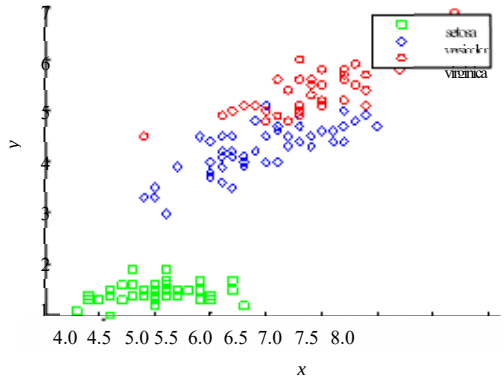

Fig. 3. The classification result of Literature [9]

7. Conclusions

Campus material culture not only includes campus building, campus environment, campus library, office facilities and teaching and scientific researching devices etc., bur also includes factors such as the surroundings, human landscape and regional culture of college. All study, life and work of all teachers and students of colleges and universities should proceed under the influence of material culture. Therefore, strengthening the campus material cultural construction and creating a beautiful and positive environment are important means to guarantee that the teachers and students of colleges and universities can grow healthily and make progress.

First, campus material cultural construction should pay attention to creating beautiful campus environment. After every professional college student comes to campus, the first that he comes into contact with is the campus material environment. From student dormitory, student restaurant, teaching building, library to medical room, psychological clinic, even a lawn and an artificial lake all are the first

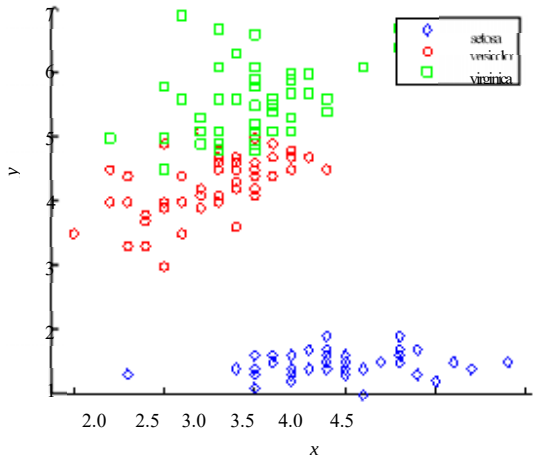

Fig. 4. The classification result of the algorithm of the Thesis

that the students come into contact with and are the first impression of the students. Therefore, campus material cultural construction should pay attention to creating beautiful campus environment.

Secondly, the campus material cultural construction should pay attention to the construction of library. In college and universities, library is not only a demonstration of the school running strength of the school, bur also is where the school sprit is. Campus library with a variety of book can not only expand the students' horizon and increase the character of the students, but also can open the mind of the students and perfect the character of the students. Therefore, I the college and universities should pay attention to the construction of library and give full play to it to satisfy different needs of all teacher and students. The attraction of library to the teachers and students should be increased to take full advantage of the library.

Thirdly, swinging campus cultural activity should be carried out. The colleges and universities should meticulously design the campus cultural activity that is in line with the features of the mental development and hobbies and interest of professional college students. The ideological and political education should be integrated into the campus cultural activity. The enthusiasm of organization, participation, planning and implementation of the students should be aroused to give full play to the intelligence and wisdom of the students and make the talent of the students most fully demonstrated so that the function of the ideological and political education of the campus cultural activity can be guaranteed to play its practical role and be effective.

8. Acknowledgement

Hebei province higher education humanities and social science research project, Project Number: SZ17097.

References

[1] Huang J P: (2007) *On the Function and Optimization of Internet-based Ideological and Political Education Environment*[J]. Journal of University of Electronic Science & Technology of China.

[2] Danilewsky A, Wittge J, Hess A, et al.: (2013) *On the Integration and Optimization of College Ideological and Political Education Resources*[J]. Journal of Yangzhou University, 103(6):066402-066402.

[3] Sun X S: (2012) *Exploitation and optimization of the ways of ideological and political education based on the acceptable angle of view*[J]. Journal of Shenyang Institute of Engineering.

[4] Xiao Z L: (2008) *On Optimizing Students'Ideological and Political Education in Institution of Higher Education*[J]. Journal of Jiangxi Agricultural University.

[5] Xie M, Department M L: (2016) *Discussion on the Optimizing and Docking Methods of Employment Guidance and Ideological and Political Education in Higher Vocational Colleges*[J]. Times Agricultural Machinery.

[6] Wang Z G, Wang W, Marxism S O, et al.: (2016) *On Cultural Ecology of Ideological and Political Education andIts Optimization*[J]. Journal of Guangxi Normal University.

[7] Fan Y G, Zheng X B: (2013) *On the Optimization of Web-based Ideological and Political Education to Students*[J]. Journal of Anhui University of Technology.

[8] De-Quan L I: (2009) *Some conceptions of optimization for ideological and political education of undergraduates*[J]. Journal of Higher Education.

[9] Jing L I: (2016) *Research on Quality Optimization of University Ideological and Political Education Teachers*[J]. Teacher Education Forum.

[10] Yang W, Jiang H L: (2015) *A Study on the Path of Optimizing Ideological and Political Education Environment Of Colleges for Nationalities*[J]. Yinshan Academic Journal.

[11] Tong Z: (2013) *On Optimization of College Students' Dormitory Ideological and Political Education Group Culture Carrier*[J]. Guide of Science & Education.

[12] Lv, Z., Halawani, A., Feng, S., Li, H., & Réhman, S. U.: (2014). *Multimodal hand and foot gesture interaction for handheld devices.* ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM), 11(1s), 10.

[13] Weisen Pan, Shizhan Chen, Zhiyong Feng: (2013) *Automatic Clustering of Social Tag using Community Detection.* Applied Mathematics & Information Sciences, 7(2): 675-681.

[14] Yingyue Zhang, Jennifer W. Chan, Alysha Moretti, and Kathryn E. Uhrich: (2015) *Designing Polymers with Sugar-based Advantages for Bioactive Delivery Applications*, Journal of Controlled Release, 219, 355-368.

[15] Yingyue Zhang, Qi Li, William J. Welsh, Prabhas V. Moghe, and Kathryn E. Uhrich: (2016) *Micellar and Structural Stability of Nanoscale Amphiphilic Polymers: Implications for Anti-atherosclerotic Bioactivity*, Biomaterials, 84, 230-240.

[16] Jennifer W. Chan, Yingyue Zhang, and Kathryn E. Uhrich: (2015) *Amphiphilic Macromolecule Self-Assembled Monolayers Suppress Smooth Muscle Cell Proliferation*, Bioconjugate Chemistry, 26(7), 1359-1369.

Received May 7, 2017