Recommendation Algorithm for Equilibrium of Teaching Resources in Physical Education Network Based on Trust Relationship

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Abstract

Aiming at the problems of poor balance of recommended resources in the recommendation of traditional physical education network teaching resources and low trust degree of recommended physical education network teaching resources, this paper proposes a balanced recommendation algorithm for physical education network teaching resources based on trust relationship. By SVM algorithm, the teaching resources of physical education network are classified, and then the invalid data of teaching resources of physical education network are deleted, and the remaining teaching resources of physical education network are taken as the extraction object to complete the extraction of teaching resources of physical education network. Through Kalman filtering method, the data of sports network teaching resources with noise are reduced, and then the data with high similarity are fused to complete the preprocessing of physical education network teaching resources data. By constructing the trust relationship model, the relationship attribute between the recommended physical education network teaching resources data is determined. The experimental results show that the highest degree of resource equilibrium recommended by the proposed method is about 96 and the recommended resource trust is high.

Keywords: Trust relationship, Physical education network teaching resources, Balance, Resource recommendation

1 Introduction

At home, educational informatization has entered a new stage of development, and is changing from digital education to intelligent education [1] supported by modern information technology such as big data analysis and artificial intelligence. The duplication of human intellectual techniques through machineries, predominantly PCs is said to be as artificial intelligence (AI). Expert systems, NLP, machine vision, speech recognition are samples of AI applications. It is the foundation for entire computer learning besides represents the future of whole sophisticated decision making. According to the 12th Five-Year Plan of the Ministry of Education, education informatization will upgrade the existing education network and campus network, and the new generation of education network will become the foundation of education informatization in the future. The Twelfth Five Year Plan was established with the goal of achieving quicker, more sustainable, as well as equitable growth. It intended to expand GDP at a quicker rate so that each stratum of society is a part of then contributes towards the progression, besides therefore promote an atmosphere of inclusive as well as sustainable development. Because of the characteristics of personality service, intelligent analysis, natural interaction, universal access and so on, intelligent education has become the trend of the development of education informatization in our country, and it is also an important measure to speed up the modernization of education in the report of the Nineteenth National Congress of the Party. In recent years, MOOC (Massive Open Online Courses) and online education has become a hot topic in the field of education. MOOCs, as opposed to online courses, place a greater emphasis on context. Good material is required for the creation of a MOOC, but what keeps it alive is the constant construction of context around the content. Online courses are limited in scope and include static information. A MOOC's material is not static. Various online learning platforms have accumulated massive teaching behavior data and knowledge resources. The analysis and mining of these two kinds of educational big data inject new impetus into the development of intelligent education. MOOCs incorporate social networking, easily accessible online resources, as well as are guided through experts in the subject of study. Most importantly, MOOCs are built on the involvement of learners who self-organize their participation depends on learning objectives, prior knowledge besides abilities, then shared interests. Such as good universities, schools online and other MOOC platforms to provide online curriculum education, learning and thinking, good rice and so on to provide online basic education, Aopeng and so on to provide self-examination distance education, more and more university educational administration system equipped with online learning function to provide more convenient services for students in schools, you can see that educational informatization has penetrated into basic education, higher education, online education in many environmental fields [2].

The popularization of wisdom education provides a more convenient and low-cost learning method, but the new educational environment also has similar or different problems with offline education, which are mainly reflected in four points: guidance, recommendation, answering questions and evaluation. How to deal with the problem of learning mystery and cognitive overload caused by knowledge fragmentation. Educational resources are complex and diverse, under the information education environment, the cost and threshold of learning are greatly reduced. In the face of a wide variety of and a large number of optional resources, learners are easily confused. Too much knowledge may lead to difficult to digest valuable content; how to eliminate the semantic gap between learners and resources in resource recommendation [3]. Semantic communication barriers are symbolic impediments

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that distort the conveyed message in ways other than intended, making the message difficult to interpret. Words, signs, in addition to symbols can have multiple meanings for different people, then the same term might have hundreds of distinct meanings. Recommendation is an essential part of teaching. When analyzing the data of educational platform, the data of learners and learning resources are very different in dimension and quantity. It will lead to the problem that resources and learners do not match; how to achieve large-scale online learners answer questions. After users log on to the education platform, most of them learn by watching teaching videos, courseware, etc [4]. Compared with the offline learning environment, the communication with teaching teachers and teaching assistants is obviously less. It is often difficult to get timely feedback through the problem feedback in the discussion area, and a large number of problems will also increase the burden on teachers and teaching assistants. Automatic online learning assistant is an effective solution to this problem, but the existing learning assistant function is relatively single, can not achieve intelligent customization ability, need to meet the characteristics and needs of learners, to achieve intelligent answer and mutual help matching [5]. Among them, the recommendation of network resources for physical education has also become focus of its attention. To this end, the relevant researchers have carried out a lot of research on resources, recommendations, and achieved certain results.

A new educational resource recommendation system based on multivariate mixed criterion fuzzy algorithm is designed [6] the literature. The core function module of the system is divided into retrieval module, database module and recommendation display module. A method that allows you to revise a piece of coursework that you have submitted and received a grade that is less than the minimal pass mark is termed as in-module retrieval (IMR). It is only accessible if you submit homework on your first attempt.

In Ignition, the Database Module includes H2, a fast, pure Java SQL database engine. In addition, the Database Editor offers a simple graphical user interface for creating, altering, and dropping database tables, as well as viewing, querying, besides editing information in database tables.

A framework that, depends on information analysis, offers products, services, as well as information to consumers is referred as recommendation module. Users are increasingly turning to recommendation systems to expose them towards the whole digital world via the prism of their experiences, behaviours, preferences, besides interests. After the user enters the retrieval information in the retrieval module, the retrieval module transmits the user retrieval instruction to the database module. The database module extracts the highest recommended educational information to the recommendation display module according to the user's preference through the multivariate mixed criterion fuzzy decision model. The application results show that the system can recommend educational information to users according to their preferences, and the accuracy and recall rate of users are higher. However, the relationship of user trust is not considered too much in the design of the system, and there are some limitations. Literature [7] proposes a recommendation algorithm that combines collaborative filtering and XG Boost. Recommender framework employ a method named as collaborative filtering (CF). It is a way of producing automatic predictions (filtering) about a user’s interests through gathering preferences else taste information as of numerous users in a newer, narrower meaning (collaborating). A library for creating high-performance gradient boosting tree models in a short amount of time is termed as XG Boost. It outperforms the competition on a variety of tough machine learning tasks. The stated library may be utilized from the command line, Python, besides R, in addition how to get initiated. This algorithm is aimed at the problem of data sparsity in data processing of collaborative filtering, which affects the accuracy of recommendation algorithm. According to the user's evaluation of the project and the characteristics of the project itself, the potential relationship between the project and the user is excavated to improve the recommendation accuracy of the algorithm. Using Baidu deep learning framework PaddlePaddle the experiment is carried out on the Book-Crossings data set. The experimental results show that the accuracy of the proposed algorithm is significantly improved compared with the two algorithms in the literature. However, less consideration is given to data extraction and preprocessing, and there is a problem of low trust in recommended data resources.

Based on the shortcomings of the above methods, this paper proposes a balanced recommendation algorithm for physical education network teaching resources based on trust relationship. A mutual supervised learning technique that might through utilized towards resolve together classification as well as regression issues is termed as SVM. Nevertheless, it is habitually utilized in machine learning aimed at classification issues. A linear model for classification and regression issues is the Support Vector Machine. It can handle both linear as well as nonlinear problems, in addition to, it is useful for a wide range of applications. By SVM algorithm, the teaching resources of physical education network are classified, and then the invalid data of teaching resources of physical education network are deleted, and the remaining teaching resources of physical education network are taken as the extraction object to complete the extraction of teaching resources of physical education network. An algorithm that utilizes a sequence of observed capacities over duration is termed as Kalman filtering which contains statistical noise as well as supplementary imprecisions then generates for evaluations of unidentified factors, the mentioned estimates are often further precise as compared to depends on a single dimension through evaluating the joint probability distribution of the variables at every time period in statistics besides control theory. It is otherwise called as linear quadratic estimation (LQE). The benefit is very light in memory (other than the previous state, they do not need to save any history) as well as very fast, which makes them very suitable for real-time issues besides embedded frameworks. Through Kalman filtering method, the data of sports network teaching resources with noise are reduced, and then the data with high similarity are fused to complete the preprocessing of physical education network teaching resources data [8]. By constructing the trust relationship model, the relationship attribute between the recommended physical education network teaching resources data is determined. A relationship formed at the request of an individual in which one or more people retain the individual's property under specific obligations to utilize as well as safeguard it for the benefit of others. There are several sorts of trusts, each with its own set of goals. A trust can be established to advantage the creator of the trust, a surviving spouse else minor child, otherwise a charity organization. The technical route of this paper is as follows [9]:

(1) The teaching resources of physical education network are classified by SVM algorithm, and then the invalid data of

teaching resources of physical education network are deleted.

(2) Using Kalman filter method, the data of physical education network teaching resources with noise are de-noised, and then the data with high similarity are fused to complete the preprocessing of physical education network teaching resources data;

(3) By constructing the trust relationship model, the relationship attribute between the recommended PE network teaching resource data is determined, and the resource balance recommendation algorithm is determined according to the directed graph to complete the PE network teaching resource balance recommendation.

(4) Experimental analysis. The effectiveness of this method is highlighted by contrast.

2 Extraction and Pretreatment of Teaching Resources in Physical Education Network

The data of teaching resources exist in the network, among which the teaching resources of physical education network are innumerable. In the face of such a huge amount of data, in order to realize the effectiveness of balanced recommendation of physical education network teaching resources, it is necessary to extract and preprocess the effective data of sports network resources, so as to provide data support for subsequent recommendations.

2.1 Extraction of Teaching Resources from PE Network

It is difficult to extract the teaching resource data of physical education network. Because of the existence of massive network data and interference data, it can not be extracted simply. Therefore, the network resources of physical education teaching will be classified first, and the network resources will be divided into effective physical education teaching resources and invalid physical education teaching resources, and then the next step will be extracted. Firstly, the SVM algorithm is used to classify and [10] the teaching resources of physical education network. The algorithm is an artificial intelligence classification method, which can determine the target data in limited data. First, the physical education network teaching resource data is placed in the hyperplane of the SVM, as shown in Figure 1:

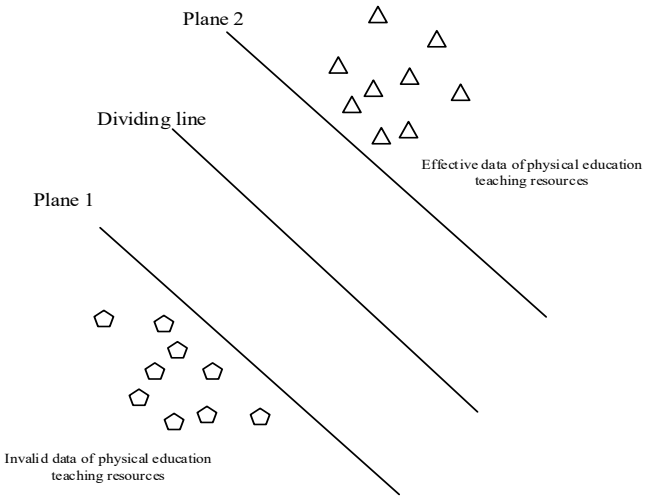

Figure 1. Superplan of data classification of teaching resources in physical education network

In Figure 1, the triangle represents the effective data of the teaching resources of the physical education network, and the pentagonal represents the invalid data of the teaching resources of the physical education network. In the hyperplane classification, the accuracy of the data classification of the teaching resources of the physical education network can be improved. In an n-dimensional Euclidean space, a hyperplane is a flat, n-1-dimensional subset that divides the space into two unconnected pieces. The point has no dimensions, but the line has one. Internal-only, restricted, secret as well as public are the four categories usually divided by data.

In order to realize the more accurate classification of the data defines the hyperplane of data classification of physical education network teaching resources, namely:

$$\begin{cases} cx_i + d \geq 1, o = 1 \\ cy_i + d \leq -1, 0 = -1 \end{cases} \quad (1)$$

In the formula, x_i represent the effective data of PE network teaching resources, y_i on behalf of the physical education network teaching resources invalid data, c represents the proportion of classifications, d represents a fixed classification specific gravity.

According to the classification results of the above-mentioned PE network teaching resources data, the effective data of PE network teaching resources are taken as the key data recommended in this paper, and the invalid data of PE network teaching resources are deleted [11], and deleted by formula (2) Get:

$$y_i' = \frac{\sum(Q - \bar{U})}{(n-1)d} \quad (2)$$

In the formula, y_i' representative deleted invalid data of

PE network teaching resources, $\bar{U}$ represents the mean value of invalid data deletion of physical education network teaching resources, Q represents the subordinate direct relation of the mean.

After deleting the invalid data of the above-mentioned PE network teaching resources, the valid data of the remaining PE network teaching resources are extracted and obtained [12]:

$$h = \begin{pmatrix} h_{11} & h_{12} & h_{1n} \\ h_{21} & h_{22} & h_{2n} \\ \ldots & \ldots & \ldots \end{pmatrix} \quad (3)$$

In the formula, h represents the state matrix of physical education network teaching resources.

During the data extraction of physical education network teaching resources, the physical education network teaching resources are classified by SVM algorithm, and then the invalid data of physical education network teaching resources are deleted, and the remaining physical education network teaching resources are taken as the extraction object. Complete the extraction of physical education network teaching resources.

2.2 Pretreatment of teaching resources in PE network

Among the effective data of physical education network teaching resources extracted above, due to the problems of high similarity and high noise in the effective resource data, in order to realize the effective recommendation of physical education network teaching resource data. According to the findings, the primary challenges were low salaries, insecure infrastructure, besides a shortage of resources. Physical education is undervalued, the space available is insufficient, then it is regarded as merely recreational. Teachers chastised their colleagues who worked without preparation for their lack of dedication. Further preprocessing is needed to provide more pure data [13] for subsequent recommendations.

In this paper, the data of physical education network teaching resources with noise are reduced by Kalman filter method, and then the data with high similarity are fused to complete the preprocessing of physical education network teaching resources data.

Suppose the g_i represents the form of the physical education network teaching resource data in the i time period, sets the g_{i+1} as the state value of the recommended resource data in another stage, and z_x represents the noise value in the process of recommending the physical education network teaching resource data. The recommended data form can be expressed as:

$$g_{i+1} = \delta_i g_i + z_x \quad (4)$$

In the formula, δ_i represents the transfer matrix of physical education network teaching resource data.

On the basis of the number of layers in the above PE network teaching resource data, it is assumed that the v_x represents the amount of noise that needs to be processed in the PE network teaching resource data in the x time period, m_x is the state of the PE network teaching resource data at this time. The technique of eliminating noise as of a signal is said to be as noise reduction. Audio as well as picture noise reduction methods are accessible. The signal might be distorted towards certain level through noise reduction techniques. Together analogue besides digital signal processing systems have features that make them sensitive to noise. The formula of noise reduction [14] is:

$$v_x = m_x J(t) + D_x \quad (5)$$

In the formula, v_x represents the state of data reduction of physical education network teaching resources, D_x represents noise reduction interference factor.

After the above mentioned PE network teaching resource data is reduced, the similar data can be effectively analyzed and the similar degree data can be fused, that is [15]:

$$v_{x+1} = [\mu(\delta_i d_x + m_x)(\delta_i d_x m_x)^T)] \quad (6)$$

In the formula, v_{x+1} represents the integrated physical education network teaching resources data.

3 Implementation of Balanced Recommendation of Teaching Resources in Physical Education Network Based on Trust Relationship

On the basis of data extraction and preprocessing of physical education network teaching resources, an effective balanced recommendation is made. Based on the trust relationship model, this paper determines the relationship attributes between the recommended physical education network teaching resources data, so as to complete the research [16] of the balanced recommendation algorithm of the data. A balanced recommender framework combines an implicit, collective as well as behavioral data-based recommender algorithm with a user's explicit, particular user model as well as user-centric. To modify, enhance besides fine tune the final recommendation, the framework employs additional tools as well as approaches.

The establishment of trust relationship depends on the interaction behavior between users. The active users of online education platform are mainly divided into two groups: learners and teachers. Because the core purpose of the platform is knowledge learning, online education platforms at home and abroad, such as school online, Coursera and so on, are generally weak in social construction. An online education platform that gives MOOCs (Massive Open Online Courses) from leading institutions besides businesses across the world is termed as Coursera. The scene of user interaction is mainly focused on the discussion area, comment area, and mutual attention between the courses. Therefore, in the recommendation of physical education teaching resources, this paper involves the trust relationship. By constructing the trust relationship model between the user and the network, the actual data [17] required by the user is determined, and then it is effectively recommended.

User set V, $v_i, j_i \epsilon V$, The interaction between user v_i and user j_i is defined as teraction $\text{teraction}_e \epsilon P$. Among them P the representatives concerned, discussed the support of the district, discussed the opposition of the district, reported and other factors, and $\text{trust}i\epsilon[0,1]$. When the degree of trust is positive, it means trust, and when it is negative, the greater the absolute value is, the higher the degree of trust or distrust. Once we have related information such as your moral

convictions, psychology else character disposition, or else understanding of our interests like information determines our level of trust else distrust. The trustor's knowledge about the trusted is linked towards the degrees of trust.

The trust values of the four interactions between users satisfy the following relationships:

$$-1 \le f_t < f_i < 0 < f_b \le 1 \quad (7)$$

In the formula, f_t representatives report, f_i f i representatives discuss objections, f_b representative discussion area support [18].

Specific trust will be obtained in training. Because the user may interact with other users at any time, the data set, the interaction behavior between the same users may be more than one, considering that the closer the interaction relationship is, the more important it is to judge the trust relationship between the two, Therefore, the formula of trust is:

$$trust_{i,j} = \frac{trust_{i,j}+f_t}{2} \quad (8)$$

In the formula, $trust_{i,j}$ represents trust.

Based on the degree of trust relationship between the users obtained above, the network of teaching resources recommendation of physical education network is constructed to realize the recommendation of teaching resources data of physical education network [19-20]. Among them, recommendation summary is prone to data congestion when recommending, so it is necessary to consider balanced recommendation. In this paper, the balanced calculation of resource recommendation is carried out by means of trust relationship directed graph. A graph consisting of a group of linked objects (known as vertices else nodes) with all connections pointing from one vertex towards the next is termed as directed graph. It is otherwise known as directed network else a digraph. There are 10 vertices (else nodes) besides 13 edges in the directed graph. The primary distinction between a directed as well as an undirected graph is that a directed graph has an arranged group of vertices whereas an undirected graph has unordered group. A graph is a nonlinear information structure that depicts the visual structure of a collection of items linked through connections. The resource is effectively evacuated and the load is effectively recommended [21-22]. In the balanced calculation of resource recommendation, the directed graph is set to $G(V, E, W)$, The V represents the node set in the directed graph, represents all the physical education network resource data, E represents the edge set, and represents the relationship between the data and the user. For calculating equilibrium, the following things are to be followed such as to determine which direction the reaction will take to attain equilibrium, construct an ICE table, determine the variations in concentration then finally, the equilibrium concentrations, besides verify the equilibrium concentrations that were estimated. The equilibrium

By constructing the trust relationship model, the relationship attributes between the recommended physical education network teaching resources data are determined, and the resource equalization recommendation algorithm is determined according to the directed graph to complete the effective recommendation of the resources.

4 Experimental Analysis

calculation formula is as follows:

$$G(V, E, W) = \frac{E}{v_i e_j} \varepsilon \left(\frac{E_i}{V_i}\right) \varepsilon \left\| \frac{V_i}{E} \right\| \quad (9)$$

According to the weight of the recommended balanced data, the recommendation of the data of the resource [23] is completed, namely:

$$Q_{ij} = \frac{\sum G(V,E,W)[V_i]}{\sum G(V,E,W)[V_i]\beta} \quad (10)$$

In the formula, Q_{ij} on behalf of the physical education resources network recommended results, β represents the weight factor of the final recommended data.

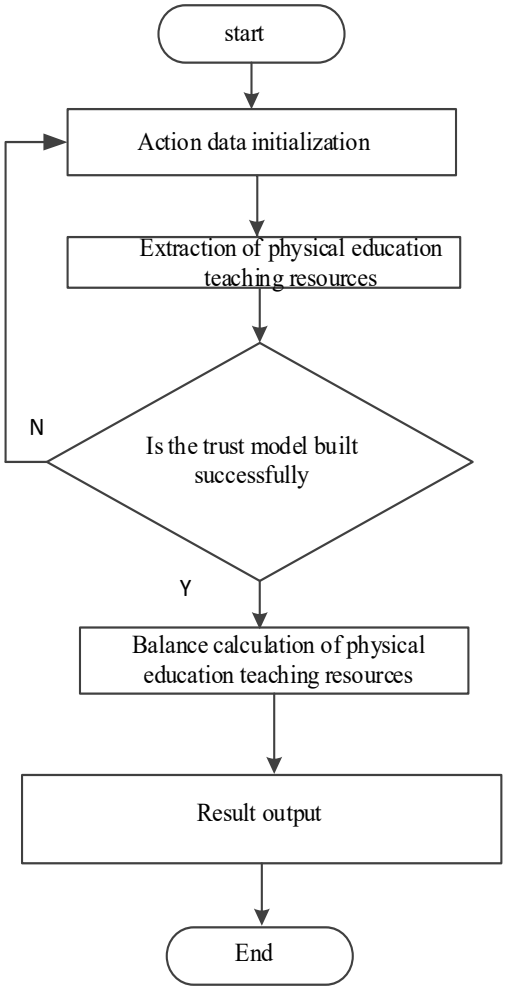

Figure 2. A balanced recommendation process of teaching resources in physical education network based on trust relationship

4.1 Experimental Scheme

In order to verify the effectiveness of the proposed method, simulation experiments are carried out. The experimental data is placed on the MATLAB platform. A programming language that has long been utilized in education to help students apply, assess, as well as explore their comprehension of course ideas is named as MATLAB. Self-paced courses, MATLAB apps, in addition to interactive programming with live scripts enable

students to take control of their own learning. The experimental operating system is a WINDOWS XP system with 16 GB. of memory in the experiment, the recommended data of physical education network teaching resources are set to 1000, including 200 invalid data, and the remaining data is valid data.

4.2 Experimental Design

In the experiment, the balance degree and trust degree of the sample physical education network teaching resources are taken as the experimental indexes, in which the higher the balance degree, the less congestion the recommended resources, and the higher the trust degree, the more effective the recommended resource data. The experiment is carried out in the form of comparison method, literature [6] method and literature [7] method, and the obtained result data are processed by mean value to ensure the accuracy of the experiment.

4.3 Result

This paper first compares the method of this paper, the method of literature [6] and the method of literature [7] to carry on the experiment to the equilibrium degree of the sample data recommendation, the experiment carries on 100 iterations, the result is all effective. To control the information overload issue as well as to propose the things that the user is interested in from the dynamically created information, the recommender system utilizes 3 data filtering techniques: collaborative-based filtering, content-based filtering as well as hybrid approach. The results are shown in Table 1:

Table 1. Analysis of equilibrium of recommended teaching resources of physical education network (%) different methods

Number of iterations/times	Methods of this paper	Document [4] methodology	Document [5] methodology
10	95	78	89
20	95	78	87
30	94	84	85
40	96	87	86
50	95	89	85
60	94	85	86
70	96	78	87
80	95	87	79
90	94	85	78
100	94	84	82

As can be seen from the data in table 1, In the same experimental environment, there are some differences in the equilibrium degree of sample data recommendation by three methods. When the number of iterations is 40, the proposed method recommends an equilibrium of about 96% for the sample data, About 87% of the sample data recommended by the literature [6] method, About 86% of sample data recommended by literature [7] method; . When the number of iterations is 80, the proposed method recommends an equilibrium of about 95% for the sample data, About 87% of the sample data recommended by the literature [6] method, About 79% of sample data recommended by literature [7] method; . When the number of iterations is 100, the proposed method recommends an equilibrium of about 94% for the sample data, About 84% of the sample data recommended by the literature [6] method, About 82% of sample data recommended by literature [7] method; The recommended equilibrium of the proposed method is higher, More feasible.

To further verify the effectiveness of the proposed method, the experimental analysis of this method, literature [6] method and literature [7] method to recommend the trust of the sample data, the results are shown in Figure 3:

The experimental results in Figure 3 show that there are some differences in the trust degree of sample data recommendation by three methods under the same experimental environment. Among them, the trust degree of physical education network teaching resources recommended by the proposed method to users is always higher than 90, while the trust degree of physical education network teaching resources recommended by the other two methods to users is within a reasonable range, but it is always lower than this method. This is due to the construction of the trust relationship model to determine the relationship between the recommended physical education network teaching resources data attributes, according to the directed graph to determine the resource balance recommendation algorithm, to complete the physical education network teaching resources balance recommendation. The performance of this method is improved.

In the experiment, we also analyze the accuracy of the sample data recommended by the methods of this paper, reference [6] and reference [7], and the results are shown in Figure 4.

The experimental results in Figure 4 show that there are some differences in the accuracy of sample data recommendation by three methods under the same experimental environment. Among them, the accuracy of physical education network teaching resources recommended by the proposed method to users is always higher than 90, while the accuracy of physical education network teaching resources recommended by the other two methods to users is

within a reasonable range, but it is always lower than that of this method. In contrast, the performance of the proposed method is based on the advantages.

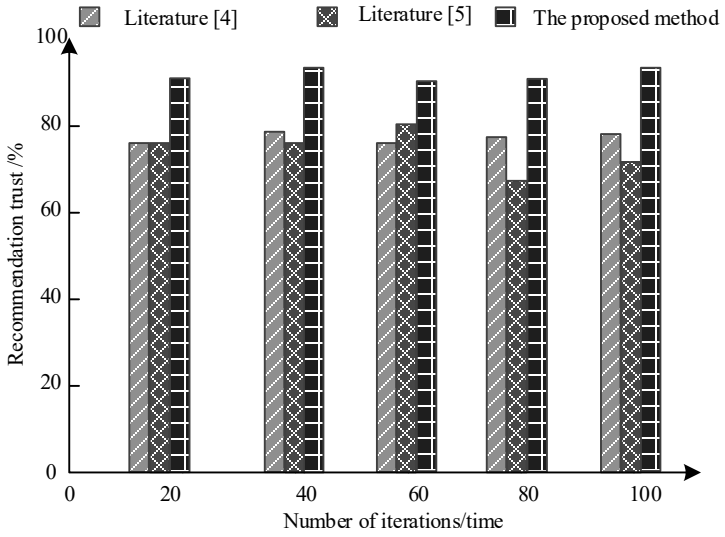

Figure 3. Trust analysis of resource recommendations for different methods

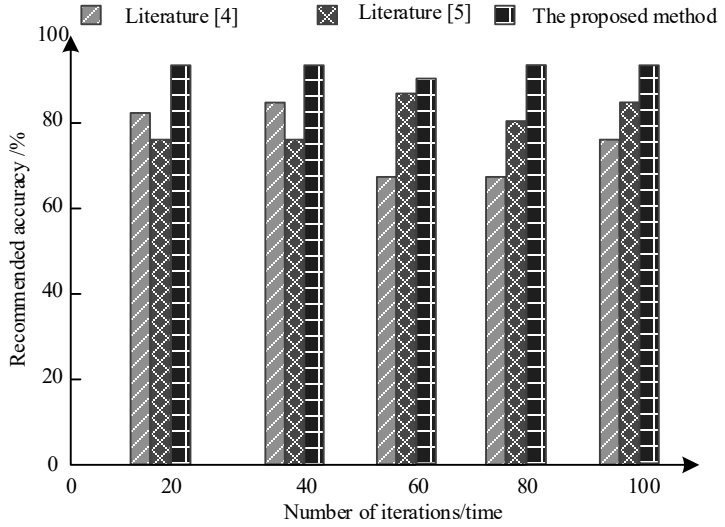

Figure 4. Recommended precision analysis of different methods

5 Conclusion

This paper proposes a balanced recommendation algorithm for PE network teaching resources based on trust relationship. By SVM algorithm, the teaching resources of physical education network are classified, and then the invalid data of teaching resources of physical education network are deleted, and the remaining teaching resources of physical education network are taken as the extraction object to complete the extraction of teaching resources of physical education network. Through Kalman filtering method, the data of sports network teaching resources with noise are reduced, and then the data with high similarity are fused to complete the preprocessing of physical education network teaching resources data. By constructing the trust relationship model, the relationship attribute between the recommended physical education network teaching resources data is determined. This method has the following advantages:

(1) The highest level of resource balance recommended by the proposed method is about 96%, which has some advantages;

(2) The resource trust recommended by the proposed method is always higher than 90, which indicates that the method is trustworthy.

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References

[1] A. Al-Emadi, *The evaluation of the physical education initial teacher training programme at Qatar University*, Ph. D. Thesis, Durham University, Durham, UK, 2002.

[2] Q. Yuan, Network education recommendation and teaching resource sharing based on improved neural network, *Journal of Intelligent and Fuzzy Systems*, Vol. 39, No. 4, pp. 5511-5520, October, 2020.

[3] M. F. Billah, N. Saoda, J. Gao, B. Campbell, BLE Can See, *Proceedings of the 20th International Conference on Information Processing in Sensor Networks*, Nashville, TN, USA, 2021, pp. 132-147.

[4] A. A. El-Latif, B. Abd-El-Atty, W. Mazurczyk, C. Fung, S. F. Venegas-Andraca, Secure Data Encryption Based on Quantum Walks for 5G Internet of Things Scenario, *IEEE Transactions on Network and Service Management*, Vol. 17, No. 1, pp. 118-131, March, 2020.

[5] E. E. Alvarez, W. K. Gilles, S. Lygo-Baker, R. Chun, Teaching Cultural Humility and Implicit Bias to Veterinary Medical Students: A Review and Recommendation for Best Practices, *Journal of Veterinary Medical Education*, Vol. 47, No. 1, pp. 2-7, February, 2020.

[6] L. Li, Design on college education information recommendation system based on fuzzy algorithm of multivariate mixed criteria, *Modern Electronics Technique*, Vol. 43, No. 4, pp. 97-99, February, 2020.

[7] Y. Cui, W. Qi, H. Pang, H. Zhao, Extreme gradient boosting recommendation algorithm with collaborative filtering, *Application Research of Computers*, Vol. 37, No. 1, pp. 62-65, January, 2020.

[8] N. Nguyen, B. Liu, H. Weng, A Distributed Algorithm: Minimum-Latency Collision-Avoidance Multiple-Data-Aggregation Scheduling in Multi-Channel WSNs, *IEEE International Conference on Communications (ICC)*, Kansas City, MO, USA, 2018, pp. 1-6.

[9] Y. Wang, B. Muthu, C. B. Sivaparthipan, Internet of Things Driven Physical Activity Recognition System for Physical Education, *Microprocessors and Microsystems*, Vol 81, Article No. 103723, March, 2021.

[10] W. Zheng, B. A. Muthu, S. N. Kadry, Research on the design of analytical communication and information model for teaching resources with cloud-sharing platform, *Computer Applications in Engineering Education*, Vol. 29, No. 2, pp. 359-369, March, 2021.

[11] J. L. Branchaw, P. A. Pape-Lindstrom, K. D. Tanner, S. A. Bissonnette, T. L. Cary, B. A. Couch, A. J. Crowe, J. K. Knight, K. Semsar, J. I. Smith, M. K. Smith, M. M. Summers, C. J. Wienhold, C. D. Wright, S. E. Brownell, Resources for Teaching and Assessing the "Vision and Change Biology" Core Concepts, *CBE - Life Sciences Education*, Vol. 19, No. 2, Article No. es1, June, 2020.

[12] J. Gao, H. Wang, H. Shen, Task Failure Prediction in Cloud Data Centers Using Deep Learning, *IEEE Transactions on Services Computing*, 1-1, May, 2020.

[13] C. A. Green, K. M. Mahuron, H. W. Harris, P. S. O'Sullivan, Integrating Robotic Technology into Resident Training: Challenges and Recommendations From the Front Lines, *Academic Medicine*, Vol. 94, No. 10, pp. 1532-1538, October, 2019.

[14] S. Qianna, Evaluation model of classroom teaching quality based on improved RVM algorithm and knowledge recommendation, *Journal of Intelligent and Fuzzy Systems*, Vol. 40, No. 2, pp. 2457-2467, February, 2021.

[15] Z. Chen, J. Zhang, X. Jiang, Z. Hu, X. Han, M. Xu, S. V., G. N. Vivekananda, Education 4.0 using artificial intelligence for students performance analysis, *Inteligencia Artificial*, Vol. 23, No. 66, pp. 124-137, December, 2020.

[16] K. Forinash, B. Whitten, Resource Letter TEP-1: Resources for Teaching Environmental Physics, *American Journal of Physics*, Vol. 87, No. 6, pp. 421-432, June, 2019.

[17] J. Cheng, H. Wang, Adaptive Algorithm Recommendation and Application of Learning Resources in English Fragmented Reading, *Complexity*, Vol. 2021, Article No. 5592534, pp. 1-11, March, 2021.

[18] E. M. Abou-Nassar, A. M. Iliyasu, P. M. El-Kafrawy, O. Song, A. K. Bashir, A. A. Abd El-Latif, DITrust Chain: Towards Blockchain-Based Trust Models for Sustainable Healthcare IoT Systems, *IEEE Access*, Vol. 8, pp. 111223-111238, June, 2020.

[19] M. C. Wittmann, L. A. Millay, C. Alvarado, L. Lucy, J. Medina, A. Rogers, Applying the resources framework of teaching and learning to issues in middle school physics instruction on energy, *American Journal of Physics*, Vol. 87, No. 7, pp. 535-542, July, 2019.

[20] F. Zou, D. Chen, Q. Xu, Z. Jiang, J. Kang, A two-stage personalized recommendation based on multi-objective teaching–learning-based optimization with decomposition, *Neurocomputing*, Vol. 452, pp. 716-727, September, 2021.

[21] N. Zhang, Y. Han, R. G. Crespo, O. S. Martinez, Physical education teaching for saving energy in basketball sports athletics using Hidden Markov and Motion Model, *Computational Intelligence*, Vol. 37, No. 3, pp. 1125-1140, August, 2021.

[22] M. Sebastian, A. Sebastian, J. Rudnicki, Recommendation for Photographic Documentation of Safe Laparoscopic Cholecystectomy, *World Journal of Surgery*, Vol. 45, No. 1, pp. 81-87, January, 2021.

[23] J. Li, Z. Ye, Course Recommendations in Online Education Based on Collaborative Filtering Recommendation Algorithm, *Complexity*, Vol. 2020, pp. 1-10, December, 2020.

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