



The Data Classification Query Optimization Method for the English Online Examination System based on the Grid Image Analysis

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ABSTRACT

In the English network examination system, the big data distribution is highly coupled, the cost of data query is large, and the precision is not good. In order to improve the ability of the data classification and query in the English network examination system, a method of data classification and query in the English network examination system is proposed based on the grid region clustering and frequent itemset feature extraction of the association rules. Using the grid image analysis to improve the statistical analysis of the English performance analysis, the collection and storage structure analysis of the information resource data of the English network examination system is carried out, and the feature of the information flow of the English network examination system is extracted and the auto-correlation feature analysis of the running data of the English network examination system is carried out. The feature quantity of the frequent item sets of the association rules, which reflects the running state of the English network examination system is extracted. The feature quantity of the closed frequent items of the extracted association rules is identified and classified by using the distributed clustering method of the grid region. In order to improve the target orientation of the data repository query in the English network examination system, the classification query of the data repository in the English network examination system is realized. The simulation results show that this method shows high precision and real-time performance in the English network examination system.

KEY WORDS: English network examination system, regional cluster, grid image.

1 INTRODUCTION

ENGLISH is one of the "bridge" tools for mutual understanding and learning, and one of the basic skills to be mastered by the younger generation with knowledge. College English as a necessary public course for college students bears the burden of mastering and using English skillfully. However, the current teaching classroom has long teaching time, heavy tasks, and strong practicality (Bi S, Ho C K, Zhang R, 2015). Therefore, it is necessary to take effective measures to improve a students' English learning environment and further promote a students' ability to master and use English skillfully. College English online homework and the online examination system will be one of the effective improvement measures (Ulukus S, Yener A, Erkip E, et al.2015). It is necessary to construct an English examination

system, which is combines the system data to optimize the query method and improve the real-time performance of the system. The English network test system uses the latest Web technology to develop the Asp.Net Ajax. It enables the developed web application to send the updated data information to the server directly through the client's Ajax engine, and then uses the client's JavaScript to process the returned data, thus avoiding the phenomenon of the "flash screen". At the same time, different from the traditional web information exclusive request sending mode, Ajax adopts the information asynchronous request sending mode, and some operations are processed on the client side, so the response time of the server is greatly reduced. In order to improve the ability of data query in the English online examination system, we need to optimize the design of the data

classification query (Zhao N, Zhang S, Yu R, et al.2017).

With the expansion of the running scale of the English network examination system, the integration of the running state data of the English network examination system is becoming more and more high (Hu S, Ding Z, Ni Q, 2016). Large numbers of running data of the English network examination system are stored in the form of embedded cloud storage. By storing data in the database, in the English network examination system, using integrating information scheduling and data analysis, the real-time monitoring and information management of the running state of the English network examination system can be realized (Wen Z , Liu X, Beaulieu N C, et al. 2016). The English network examination system runs English. The data repository of the network examination system is established on the Internet platform. The client realizes the monitoring of the running information status of the English network examination system through the embedded application software and carries on the operation of the English network examination system through the sensor equipment to include row data acquisition, data processing and recognition of the collected data. By classifying and querying the data in the English network examination system, the real-time scheduling and detection of the running state data of the English network examination system can be realized. The running stability of the English network examination system can be improved, and the English network examination system will be studied (Park J J, Moon J H, Kim D I, 2016). The method of the data classification and query is of great significance in the scheduling and information management of the English network examination system. At present, the method of the source data program management and the spatial distribution feature of data are used in the query and application system development mode of the English network examination system, which has problems of large computational overhead and poor real-time performance. This paper proposes a method of data classification and query in the English network examination system based on the grid region clustering and frequent itemset feature extraction of the association rules. In order to improve the target orientation of the data repository query in the English network examination system, feature recognition and classification are carried out by using the distributed clustering method of the grid region to extract the features of the closed frequent items of the association rules, so as to realize the English network and the examination system data repository data classification query. Finally, the performance test is carried out by the simulation experiment, which shows the superior performance of this method in improving the ability of data classification and query in the English network examination system(Miao Y Z, Ma X P, Bu S P, 2019).

2 ANALYSIS OF THE STORAGE STRUCTURE AND DATA CHARACTERISTICS OF THE ENGLISH NETWORK TEST SYSTEM

2.1 The Principle Analysis and Distributed Structure Model of the Data Repository Query in the English Network Examination System

IN order to optimize the query of the English network examination system, the data structure analysis is carried out by using the methods of the information fusion and data feature decomposition, the query storage structure model and the data distribution model of the English network examination system, which are established (Moon J H , Park J J, Kim D I, 2016). Assume G_c represents the intersection of the directed graphs G_1 and G_2 of the associated feature distribution of the English network examination system. In the directed graphs G_1 and G_2 of the query node distribution, the neighborhood spaces of the English network examination system A, B and C are obtained. With a common node, the similarity degree of data attribute set is calculated, and the formula of similarity degree S_c of query node distribution in the English network examination system is obtained as follows:

$$S_c = \frac{2n(D_1 \cap D_2)}{n(D_1) + n(D_2)} \quad (1)$$

In this formula, $n(D_1)$ and $n(D_2)$ represent the data fusion centers in the digraphs G_1 and G_2 , respectively. In the information retrieval, we encode the information according to the query condition of the data, extract the running state characteristic quantity of the English network examination system, carry on the semantic group according to the running state characteristic of the English network examination system, and obtain the English network. The similarity of the association semantic set in the data repository of the examination system S is (Okandeji A A, et al 2016):

$$S = S_c * (a + b * S_r) \quad (2)$$

When $S_r = 0$, the similarity information S depends on $S_c * a$. The semantic association coefficient a of the information query represents the degree of connectivity in directed graphs G_1 and G_2 :

$$a = \frac{2n(G_c)}{2n(G_c) + m_{G_c}(G_1) + m_{G_c}(G_2)} \quad (3)$$

where, $n(G_c)$ denotes the number of type matching in the set of fuzzy degree points G_c , and $m_{G_c}(G_1) + m_{G_c}(G_2)$ denotes the average amount of mutual information related to G_1 and G_2 in G_c .

2.2 The Analysis of the Autocorrelation Characteristics of the Running Data of the English Network Test System

The middleware and platform software of the English network examination system is hierarchical (Zhang R, Ho C K. 2013). The modularized system structure extracts the information flow feature of the English network examination system, analyzes the running data of the English network examination system with the autocorrelation feature, and assumes the time of information sampling in the English network examination system $\{x(t_0 + i\Delta t)\}$, $i = 0, 1, \dots, N-1$. The data flow vector length is N , and the feature space in the information data of the English network examination system is $V = [v_1, v_2, \dots, v_n]$. The fitness function of constructing the running information data of the English network examination system is expressed as follows:

$$f_{ij} = w_i \delta_i + w_c \delta_c + w_q \delta_q + w_s \delta_s \quad (4)$$

The $w_i + w_c + w_q + w_s = 1$ represents the weight coefficient, and the cloud storage node subset of the data repository of the English network examination system is $S_i (i = 1, 2, \dots, L)$, and combines the feature matching method to carry out the fusion clustering of the information transferred in the data. The correlation degree between the two clusters M_i and M_j is obtained as follows: $Chustdist(M_i, M_j)$, the load of the data repository query node of the English network examination system is balanced and the load of the running information data storage of the English network examination system is obtained by combining the autocorrelation characteristic analysis method:

$$F^p[x(t)e^{i\omega t}] = X_p(u - v \sin a) \exp(-j \frac{v^2}{2} \sin a \cos a - juv \sin a) \quad (5)$$

where, X_p is the middleware clustering center of the English network examination system, u is the distribution scale characteristic of the information data of the English network examination system, and v is the basis function (Wang Y, Sun R, Wang X, 2016). According to the results of the autocorrelation analysis of the running data of the English network examination system, the information fusion and clustering processing are carried out to realize the classification and query of the data.

3 THE OPTIMIZATION OF THE INFORMATION QUERY IN THE DATA REPOSITORY OF THE ENGLISH NETWORK EXAMINATION SYSTEM

3.1 The Feature Extraction of the Frequent Item sets of the Association Rules

ON the basis of the collection and storage structure analysis of the information resource data in the English network examination system and the feature extraction of information flow in the English network examination system, the feature quantity of the frequent item sets of the association rules is extracted and realized (Li C. et al. 2016). This paper proposes a data classification query method based on the grid region clustering and frequent itemset feature extraction of the association rules in an English network examination system (Wang R, Tao M, Liu Y, 2013). According to the distributed spatial information of the English network examination system, the adaptive modification of the running state of the English network examination system is carried out, and the query pheromone function of the data repository of the English network examination system running in the English network examination system is obtained as follows:

$$R_s^{(0)} = \sum_{n=0}^k \langle R_s^{(n)}, d_{\gamma n} \rangle d_{\gamma n} + R_s^{(k+1)} \quad (6)$$

where, $R_s^{(n)}$ represents the load balancing response of the information data in the cloud storage space, $d_{\gamma n}$ is the bandwidth of the distributed storage of the information data in the English network examination system, and $R_s^{(k+1)}$ is the data repository of the English network examination system.

By using the autocorrelation feature matching method, the features of the frequent item sets of association rules for the running state features of the English network examination system are obtained as follows:

$$M_v = w_1 \sum_{i=1}^{m \times n} (H_i - S_i) + M_h w_2 \sum_{i=1}^{m \times n} (S_i - V_i) \quad (7)$$

By analyzing the semantic features in the data repository query of the English network examination system and combining the results of the feature extraction of the frequent item sets of association rules, the data repository of the English network examination system is optimized.

3.2 The English Network Examination System Data Repository Query Output

The features of closed frequent items in the extracted association rules are identified by using the grid region distributed clustering method, and the

template matching set of the information category attributes of the English network examination system (Lu X, Wang P, Niyato D, et al. 2015).

$$P_F = \sum_{j=k}^N \sum_{\sum u_i=j} \prod_{i=1}^N (P_{fi})^{u_i} (1 - P_{fi})^{1-u_i} \quad (8)$$

where, P_{fi} indicates the English network examination system fusion clustering center, and U_i is storage space load. Through the fuzzy directivity clustering processing, the feature compression of the information flow stored in the correct English network examination system and the data optimization query is realized. The result of the query is expressed as follows (Feng W, Wang Y, Lin D, et al 2017):

$$\lambda^n(d_{\gamma_0}) = \int_{-\infty}^{+\infty} f(t) d_{\gamma_0}^*(t) dt \quad (9)$$

The information fusion output of the information query output in the data repository of the English online examination system is:

$$flow_k = \{n_1, n_2, \dots, n_q\}, q \in N \quad (10)$$

Based on the above analysis, the data classification query of the data repository of the English network examination system running in the English network examination system is realized (Matilainen M, Nordhausen K, OJA H, 2015). Figure 1 shows a comparison diagram of the multiple model simulation data.

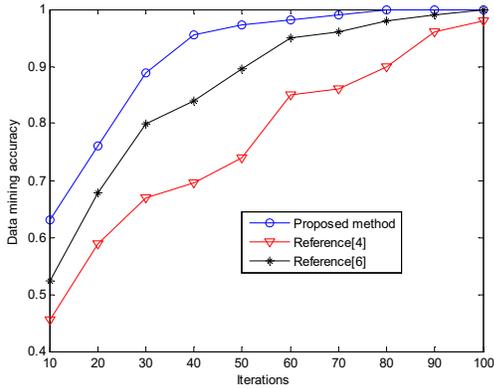


Figure 1. A Comparison Diagram of the Multiple Model Simulation Data.

4 THE SIMULATION EXPERIMENT

BY testing the precision rate and time cost of the data repository query of the English network examination system, this paper analyzes the performance of this method in realizing the query of the English network examination system, and the quantity of the information resource data information in the English network examination system. The unit

load of the running state information of the English network examination system is 120 MBps. The initial sampling length of data is 2000. The simulation duration of the data repository query in the English network examination system is $T=100$ s. According to the above simulation parameters, the English language is obtained. The temporal waveform of the data distribution of the network test system is shown in Figure 2.

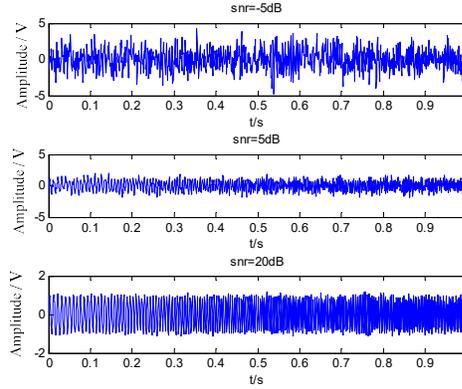


Figure 2. The Data Distribution of the English Online Examination System.

The proposed method is used to query the information in the data repository of the English network examination system, and the feature set of the query output are obtained as shown in Figure 3.

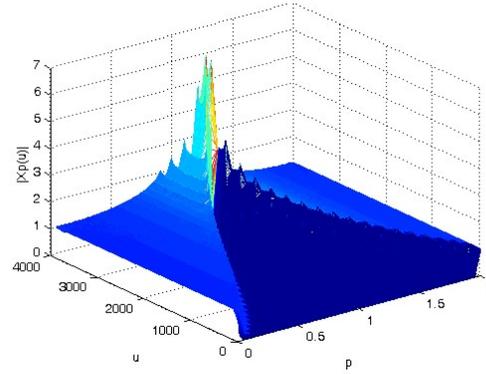


Figure 3. The English Network Examination System Data Repository Query Output Feature Set.

Figure 3 shows that using this method to query the data repository of the English network examination system shows good feature clustering, and the precision and time of the data repository query of the English network examination system are tested by different methods. The results obtained are shown in Table 1. The analysis shows that the method of this paper has better precision and less time cost for the data repository query of the English Network examination system running in the English Network

examination system. Figure 4 shows the precision simulation diagram of the model.

Table 1. The Performance Comparison.

Jamming intensity /dB	Proposed method		Traditional method	
	Precision ratio /%	Time/s	Precision ratio /%	Time/s
-10	95.36	1.54	82.12	3.43
-5	96.33	1.35	86.21	2.57
0	99.46	0.65	92.32	1.76
5	100	0.31	93.21	1.12

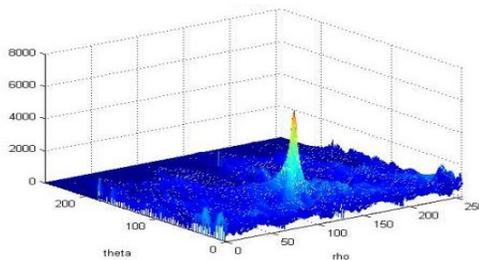


Figure 4. The Precision Simulation Diagram of the Model.

5 CONCLUSIONS

IN order to improve the ability of the data classification and query in the English network examination system, a method of the data classification and query in the English network examination system is proposed based on the grid region clustering and frequent itemset feature extraction of the association rules. The collection and storage structure analysis of the information resource data of the English network examination system is carried out, and the feature of the information flow of the English network examination system is extracted and the auto-correlation feature analysis of the running data of the English network examination system is carried out. The feature quantity of the frequent item sets of the association rules, which reflects the running state of the English network examination system is extracted. The feature quantity of the closed frequent items of the extracted association rules is identified and classified by using the distributed clustering method of the grid region. In order to improve the target orientation of the data repository query in the English network examination system, the classification query of the data repository in the English network examination system is realized. The simulation results show that this method has high precision and real-time performance in the English network examination system. This method has obtained a good application value in the data query and retrieval of the English online examination system.

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7 NOTES ON CONTRIBUTORS



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