

Retraction

Retracted: Integration and Recommendation of Multimedia Network-Assisted English Instructional Resources Based on Association Rules Mining

Mobile Information Systems

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] L. Liu, "Integration and Recommendation of Multimedia Network-Assisted English Instructional Resources Based on Association Rules Mining," *Mobile Information Systems*, vol. 2022, Article ID 8806525, 10 pages, 2022.

Research Article

Integration and Recommendation of Multimedia Network-Assisted English Instructional Resources Based on Association Rules Mining

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The integration of multimedia teaching refers to a novel teaching mode that combines multimedia, information resources, and information methods with content and teaching process in the teaching process with the guidance of contemporary educational ideas and organically unifies them on a spatial and temporal platform, so as to better accomplish the teaching tasks. However, with the deepening of network teaching and school connotation construction, various resources such as media materials, courseware, network courses, and teaching cases generated by education and teaching, as well as academic works, papers, patents, project results, and lectures of experts and professors gathered by scientific research, are increasing. In this situation, how to integrate teaching resources and courses to provide students with an independent learning platform and an information-based learning environment has become an urgent issue. For this problem, data mining has shown a strong vitality, and data mining can find out the potential connection between datasets. Association rule mining is the most researched and widely used data mining method. In this paper, we propose a multimedia network-assisted English integration of educational resources method based on association rule algorithm to give full play to the role of “multimedia technology” and realize the integration of traditional English teaching and information network culture, so as to achieve the purpose of optimizing English teaching. The experimental results show that with the increase of data volume, the average testing time of Apriori is reduced by 56.49 s compared with MapReduce, so the advantage of Apriori algorithm is more obvious. Therefore, this research can effectively provide students with rich and colorful personalized resources, realize high-performance interactive learning, and help students cultivate their independent learning ability as well as their lifelong learning habits.

1. Introduction

For the purpose of meeting the needs of knowledge-based society and constructing an education system of lifelong education and learning, China has envisioned the development of distance education using the advantageous resources of general schools since early years [1]. Modern IT represented by networking, digitalization, multimedia, and intelligence has become the main tool to expand people's ability and quality [2]. It has changed people's traditional way of living, learning, and working and has brought a profound impact on modern education content and teaching methods, which has also triggered a boom in the integration of IT and curriculum [3]. However, the application of

multimedia requires certain technology and skills, and in reality, the application level of teachers varies, and the effect of multimedia technology is not uniform [4]. Therefore, we should broaden the field of English learning and application and pay attention to interdisciplinary learning and the use of modern technology, so that students can broaden their horizons and improve their learning efficiency in the intersection, penetration, and integration of different contents and methods and initially acquire the practical English skills required by modern society [5].

As human beings enter the era of knowledge economy, knowledge is being updated and accumulated at an extremely fast rate [6]. The heterogeneity and tight coupling of development platforms and tools have led to a large number

of educational resource systems that are not interoperable, resource sharing, and software reuse, and the phenomenon of “information silos” still prevails in schools [7]. Association rule mining comes as a major branch of data mining research, and association rule is the most typical type of knowledge among many types of data mining [8]. Most teachers have no idea how to search for the required teaching resources and how to integrate the useful resources they find together, resulting in a vast amount of high-quality resources not being fully utilized [9]. Therefore, the integration of IT and teaching curriculum is necessary to deepen the curriculum content and teaching reform, and it is also an effective way to improve teaching efficiency, which has attracted widespread attention and exploration research of educators [10]. Association rule mining can discover interesting relationships between items or attributes that exist in the database, which are unknown and hidden in advance; that is, they cannot be derived by logical operations of the database or by statistical methods [11]. In order to give better play to the advantages of multimedia and improve the level of English teachers’ application of multimedia teaching, not only is it necessary to further clarify the basic theoretical issues such as the connotation of integration of multimedia and curriculum teaching, the ways of integration, and the strategies of integration, but there is also an urgent need to solve various problems and confusions that arise in the real integration of practical teaching.

This is because multimedia have the advantage of being graphic, audio and visual, and large capacity, which can present teaching content in a timely manner, show materials for classroom language practice activities, link teaching sessions, and supplement the background corpus of relevant topics [12]. At the same time, teaching resources are the basic conditions for training innovative talents and conducting research activities in higher education [13]. After all, the excellent educational resources of a school are limited, and the integration of the excellent educational resources has great limitations [14]. It is necessary to integrate the existing educational resources in order to meet the needs of higher education as much as possible under the existing conditions, from the point of view of both the current situation of educational resources and the current challenges of education [15].

The innovation points of this paper are as follows:

- (1) The multimedia online platform is adopted as the basic platform for the integration of teaching resources to achieve the integration of existing teaching resources effectively.
- (2) Using the association rule mining to study and evaluate the information of the existing teaching resources, we propose some ways to integrate the resources through scientific methods so that we can evaluate the teaching quality and students’ learning quality.
- (3) The research of multimedia network-assisted English integration of educational resources system based on association rule algorithm is to improve the

efficiency and accuracy of English teachers in schools, free them from tedious and boring work, and then improve their management level teaching quality.

The research framework of this paper contains five major parts, which are organized as follows.

The first part of this paper introduces the background and significance of the research and then introduces the main work of this paper. The second part introduces the work related to multimedia network-assisted English integration of educational resources, association rules algorithm. The third part of the paper introduces the design of the computer network integration of educational resources system and the implementation of the computer network integration of educational resources system, so that the readers of this paper can have a more comprehensive understanding of the idea of multimedia network-assisted English integration of educational resources based on the association rule algorithm. The fourth part is the core of the thesis, from the analysis of the integration of educational resources system using Apriori algorithm and the solution space analysis of the optimized association rules, to completing the description of the application analysis of the association rule algorithm in the integration of multimedia network-assisted teaching resources. The last part of the paper is the summary of the whole work.

2. Related Work

2.1. Multimedia-Assisted English Integration of Educational Resources. During the implementation of school informatization construction, the construction of an integrated environment is a top priority. Especially in the current period when most schools are still in the application integration and information integration, the effective sharing and development of educational information resources, which is an important part of the whole informatization system, is becoming a key issue. With the help of educational information resource integration, it is greatly convenient for teachers to integrate various useful resources and make rational use of them, thus effectively solving the problem of insufficient technical personnel and teachers’ lack of IT skills.

Tian [16] proposed a composite digital object composed by Structural Kernel and Disseminator Layer to separate data and operations on data [16]. Zhang and Wang [17] proposed a data integration strategy for enterprise information applications in isolation and analyzed the application integration and data combination to describe the standardization of information in the data integration process [17]. Liu et al. [18] proposed the integration of IT and subject teaching, and the integration of IT and curriculum has been included in the outline of the new curriculum reform [18]. Peng [19] defines “curriculum and integration of educational resources platform” as follows: a curriculum and integration of educational resources platform is a platform for improving the quality of education and teaching by using information technology to organically integrate various resources, technologies, and environments

that help and facilitate students' learning with the curriculum content they are learning [19]. Wang and Gao [20] published the idea of optimizing students' English reading through multimedia network teaching resources, and they wanted to use concrete image resources to make the abstract information in reading concrete and thus facilitate the learning of English reading for the majority of students [20].

The application of IT in subject teaching not only inherits the advantages of traditional subject teaching but also can assist subject teaching to create a vivid context, with the relatively independent characteristics and advantages of the information age. Integration can make the elements in the system achieve overall coordination and interpenetration, so that each element of the system can maximize its effectiveness, and this process will lead to the generation of a new thing. Therefore, the efficient sharing, integration, and development of educational resources to ensure the rational, orderly, and healthy in-depth development of education informatization construction are an important research direction for school informatization construction.

2.2. Association Rule Algorithm. Most countries in the world, represented by the United States, pay great attention to the planning and standards of IT integration applied to teaching and learning when formulating curriculum standards and take IT and teaching curriculum integration as an important element in the new curriculum reform. However, the traditional way used to integrate the existing education resource system will cause problems such as long cycle time and large investment, and at the same time there is a lack of unified standards, which makes it difficult to fully ensure the orderly, compact, and optimal resource integration services. Therefore, the successful application of association rule mining in business and other fields has made it the most mature, important, and active research content in data mining.

Zhao et al. [21] first proposed in their analysis of the market basket problem to discover customer buying patterns in merchandising, which can be used to guide merchants in the scientific arrangement of stocking, inventory, and shelf design [21]. Yang [22] proposed algorithm that uses a division-based technique to partition the database processing effectively reducing the number of database scans during the mining process and reducing the burden [22]. Yu et al. [23] argue that the study of visualization methods for data mining process enables or makes the knowledge discovery process easy to understand for users on the one hand and improves the human-computer interaction in the knowledge discovery process on the other hand [23]. Xie [24] used sampling from the transactional database to get some rules that may hold in the whole database and then verified this result for the remaining part of the database, significantly reducing the cost of input and output [24]. Bai and Zhang [25] proposed an association rule algorithm based on the MapReduce computing framework under Hadoop; it takes its candidate item set for each transaction record by Map function and then uses the Reduce function for normalization to obtain the frequent item set [25].

Association rule mining can discover rules or patterns that cannot be obtained by traditional artificial intelligence and statistical methods and therefore has important research value. The integration of educational resources with association rule mining is hoped to satisfy the current demand for quality and quantity of teaching resources in higher education by making full use of existing teaching resources.

3. The Idea of Integrating Multimedia Web-Assisted English Education Resources on the Basis of Association Rule

3.1. Computer Network Integration of Educational Resources System Design. The general idea of the design of the computer network integration of educational resources system is to adhere to the people-oriented and establish a comprehensive, coordinated, and sustainable development concept as the overall leader. The aim is to comprehensively improve the level of information construction and application of the school and fulfill the objectives of talent training [26]. The integration of English teaching resources in the IT environment requires the use of modern IT, with computers and networks as the core, as a cognitive tool for promoting students' independent learning and a tool for creating a rich teaching environment under the guidance of advanced educational thought and theory [27]. The overall structure of the computer network integration of educational resources system is shown in Figure 1.

First of all, the system platform is designed. The computer network integration of educational resources system based on B/S mode adopts a multilayer application architecture, and the user working interface is all realized through a web browser. Given a transaction database with a minimum support of $w \text{ min Sup}$ for user input, if the t attribute set X is frequent, then its support number and minimum support number should, respectively, satisfy

$$\begin{aligned} SC(X) &\geq \frac{w \text{ min Sup} \times T}{\text{MAX}(w_i)}, \\ B(X) &= \left\lceil \frac{w \text{ min Sup} \times T}{\text{MAX}(w_i)} \right\rceil. \end{aligned} \quad (1)$$

The process of schema creation is the process of data mining [28]. XML is a new standard language used to automatically describe information, which enables computer communication to extend the function of the Internet from information transfer to a wide variety of other human activities [29]. The interestingness measure of XML was utilized to measure the interestingness of association rules, which is defined as the product of the joint probability density of two variables divided by the expected probability of these two variables:

$$I(A, B) = \frac{P(A, B)}{P(A)P(B)} = \frac{f_{11N}}{f_{1+}f_{+1}}. \quad (2)$$

When there are two m dimensional vectors $X_1 = (x_{11}, x_{12}, \dots, x_{1n})$ and $X_2 = (x_{21}, x_{22}, \dots, x_{2n})$, the Euclidean distance between them is

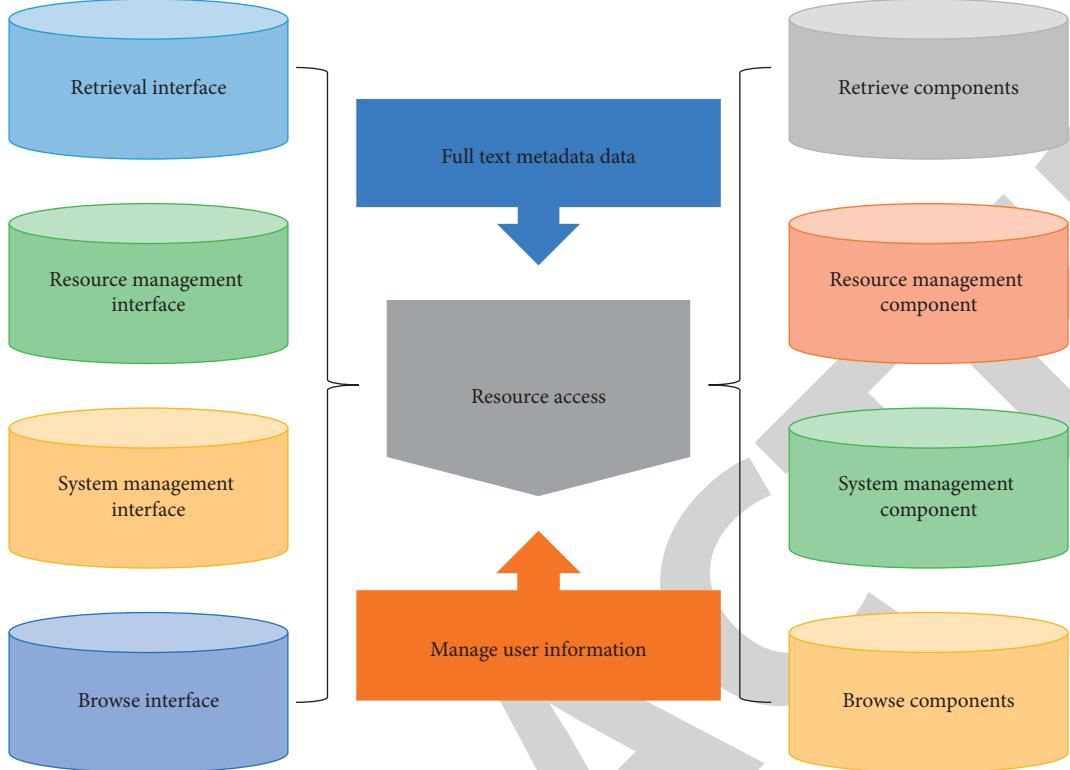


FIGURE 1: The overall structure of the computer network integration of educational resources system.

$$\text{dist}(X_1, X_2) = \sqrt{\sum_{i=1}^n (x_{1i} - x_{2i})^2}. \quad (3)$$

According to the platform of operation, it can be divided into online version and stand-alone courseware [30]. To integrate teaching information resources, online education is used as the basic platform to integrate all teaching information resources that are scattered in libraries, resource rooms, and information resource centers without effective planning. We first standardize them and then reorganize them to form systematic teaching information resources that can be shared on a large scale. The workflow of the computer network integration of educational resources system is shown in Figure 2.

Next is the functional design of the system. In the collection and submission module of this resource integration system, in addition to the system administrator, resource maintenance personnel need to register to fill in personal information and add it to the corresponding faculty and topic. After logging into the system, they enter “My Workspace” and complete the description, citation, and upload of resources through the submission interface. Therefore, data mining technology is required to respond quickly to changes in the data to provide decision support. The level-weighted support of the item set $X = \{i_1, i_2, \dots, i_k\}$ is defined as

$$\text{Sup}_h = \max \{h_1, h_2, \dots, h_k\} \times \text{Sup}(X). \quad (4)$$

$\text{Sup}(X)$ is the traditional support count of item X and $\max \{h_1, h_2, \dots, h_k\}$ is the weight of items.

The sum of teaching contents and implemented teaching activities of a course expressed through the network include teaching contents and network teaching support environment organized according to certain teaching objectives and teaching strategies. However, when multiple machines work together to process data, various problems can occur; for example, local node crashes can lead to errors in the operation of applications, and the failure of switches and routers can bring communication failures to the local network. Therefore, by taking advantage of the technical advantages and high compatibility of multimedia network assistance, we establish a unified search interface for teaching information resources with cross-platform search and optimize fuzzy query, so that users can retrieve resources that meet the needs in all databases by only one search. The system calculates the fuzzy support degree based on the results of the fuzzy query, which is calculated as follows:

$$\text{prop} = \frac{\sum_{i=1}^n T(\mu_{C-\text{muc}}(T_i), T(\mu_{A-\text{muc}}(T_i), T(\mu_{B-\text{low}}(T_i)))}}{\sum_{i=1}^n T((\mu_{A-\text{muc}}(T_i), \mu_{B-\text{low}}(T_i)))}. \quad (5)$$

i is the article i record, T is the T -norm operation, and T_i is the record.

Finally, the database is designed. The system uses PostgreSQL, an open-source relational database product, and JDBC as the database driver. The web-based courseware needs to run in a standard browser and can be shared through the

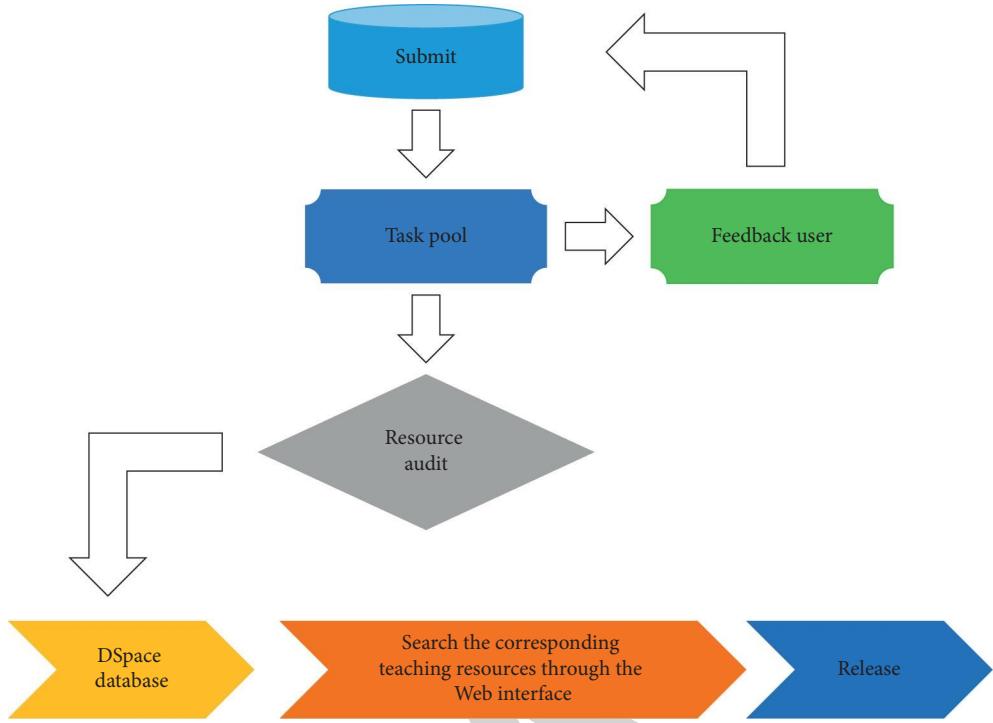


FIGURE 2: The overall process of resource integration system.

web-based teaching environment, while the stand-alone courseware can be downloaded from the web and run on a local computer. Because of the richness and diversity of resources, it is not easy for learners to find the resources they need, and providing a good in-site search can improve efficiency and increase the utilization of resources at the same time. The mining of association rules focuses on records with certain common characteristics, making the goal of mining closer to the needs of users. By making full use of the good communication environment of multimedia network and the function of recording the whole teaching process, we can obtain timely feedback information about the content and quality of teaching information resources and optimize them continuously.

3.2. The Realization of Network Integration of Educational Resources System. At present, the main task of the computer network integration of educational resources system is to integrate the four categories of various catalog resources in the university's collection, educational teaching affiliated resources, scientific research affiliated resources, and various free network resources. At the same time, all kinds of resources added to the college in the future, including the external digital resource library, are within the scope of integration of this system. The association rule mining includes the process of understanding and proposing the problem, data collection, data processing, data transformation, data mining, pattern evaluation, and knowledge representation, as shown in Figure 3.

Firstly, we collect relevant resources and plan them in a unified way and implement the digitalization of resources. Then, according to the system's resource classification

system, the resource maintenance personnel are responsible for uploading and submitting teaching resources to the corresponding faculty or subject specialties. Students can submit electronic assignments to teachers through the network, and the approved assignments can be freely accessed by students, and feedback can be given to students quickly. Integrated management is a proven method to improve the efficiency of resource management and utilization of school teaching resources. The required association rules are generated by using frequent item sets, and then the strong association rules are obtained by rounding according to the minimum confidence level set by the user. Thus, the feature vector is used to describe the related data with strong similarity in the database. The following equation enables the calculation of variation parameters for different data attribute features:

$$e(y, z) = \left[\sum_{j=1}^p |y_j - z_j|^s \right]^{1/s}. \quad (6)$$

y is the amount of data in the database, z is the number of attributes, and s is the differences of data characteristics.

The language teaching process is a dynamic process, which should follow certain rules. However, teaching methods are not static and should be used for different teaching tasks and objects, which requires teachers to adopt different teaching strategies according to different situations. The operations of access and the request/response messages used for access are abstractly described and then bound to specific transport protocols and message formats to finally define the service access points for specific deployments. For comparative analysis of factor data with different

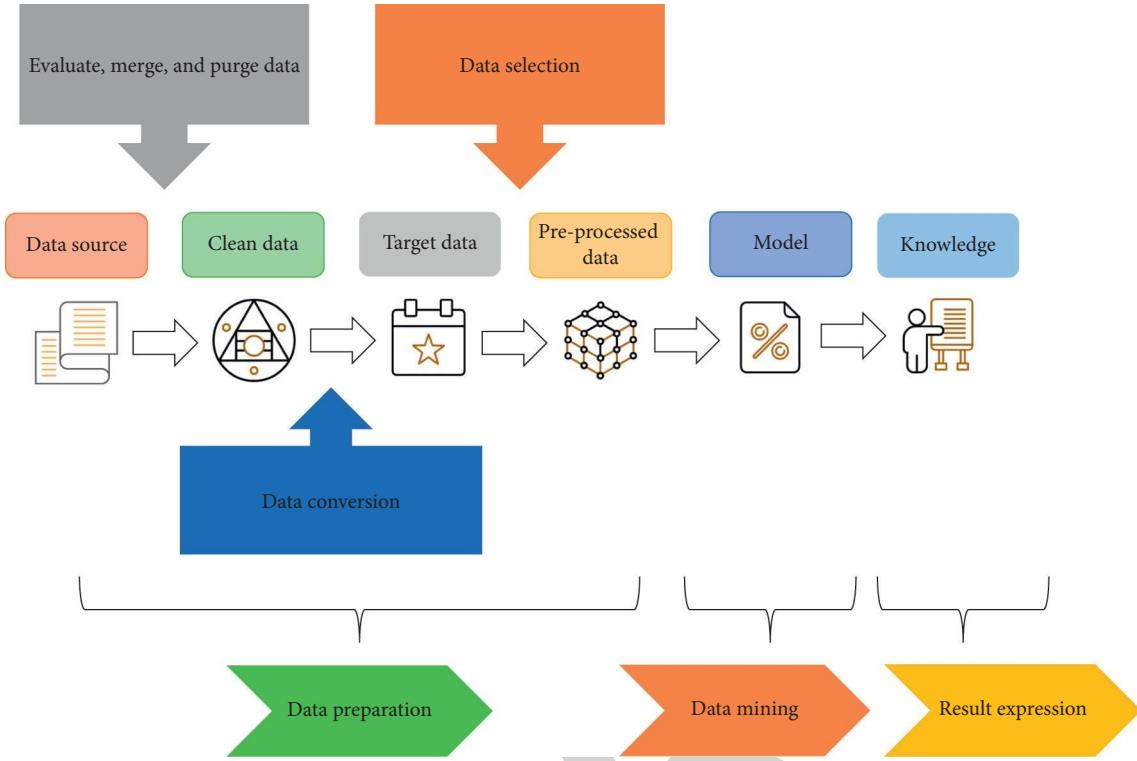


FIGURE 3: Process diagram of association rule mining.

magnitudes at the same time, they need to be normalized. The value of i factor j in all samples is

$$Z_{i,j} = \frac{X_{i,j} - \mu_j}{\sigma_j}. \quad (7)$$

μ_j is the mean value of i th factor and σ_j is the standard deviation of j th factor.

Second, when the user needs to access the full-text data in the resource, the system first takes out the full-text description information from the database and then points to the file system to read the corresponding full-text data. Then, the new mean value of each cluster is calculated. This process is repeated until the criterion function converges. The squared error criterion is used, which is defined as follows:

$$E = \sum_{i=1}^k \sum_{p \in C_i} |p - m_i|^2. \quad (8)$$

E is the sum of squared errors of all objects in the dataset, p is the point in space, i is the given object, and m_i is the mean value of cluster C_i .

For teachers and students in the network, real-time exchange of views is very necessary; it is an important form of teaching interaction, and in the electronic chat, subject teachers can answer students' questions in a timely manner. At present, the teaching resource management in schools is scattered in various departments and the basic management information is scattered in different management systems, and the integrated management of teaching resources is actually the integration of the management systems of these teaching resources. Since fuzzy association rule mining is

still the mining of the laws between items in the database, but at the same time, the numerical information corresponding to these items is considered, fuzzy association rule mining is essentially an extension of association rule mining. Each item set needs to carry a decision attribute d , and when performing a join to generate a candidate $k + 1$ item set, two frequent k item sets that can perform the join operation must satisfy

$$(l_a, l_b) \in \{(l_1, l_2) | \text{diff}(l_1, l_2) = 1, d_1 = d_2\}. \quad (9)$$

Finally, users can enter any of the English or Chinese search terms in the search box and the system will automatically match the title, author, subject term, abstract, series number, sponsor, and identifier records in the resource and display the search results that meet the requirements. In addition, resources related to the content of the course under study include electronic books, literature, etc. These resources can enable students to supplement their subject knowledge, expand their horizons, and increase their knowledge. If the resource base of multimedia network teaching can develop and integrate teaching courseware and software modules under these learning modes, combine them with the characteristics of language teaching, starting from the heuristic teaching and the dynamic teaching process, and realize the optimization and sharing of network media information resources in depth and breadth, it can realize the full utilization of these resources. Therefore, it is necessary to realize integrated management, and to allocate, utilize, and plan further construction of teaching resources from a global perspective. As for how to evaluate the validity of the output fuzzy rules, it is necessary to define a fuzzy rule truth degree.

4. Application Analysis of Association Rule Algorithm in Multimedia Network-Assisted Integration of Educational Resources

4.1. Analysis of Integration of Educational Resources System Using Apriori Algorithm. The Apriori algorithm is a width-first algorithm that finds all frequent item sets by multirip scanning of a database. We will discuss the problem of association rule mining with constraints using the Apriori algorithm as a prototype, and the following briefly describes the analysis of the integration of educational resources system using the Apriori algorithm. The scalability of the algorithm in this chapter is compared under different database sizes using two types of fuzzy rules, namely, $t = 0.1, t = 0.2$. The comparison results are shown in Figure 4.

First, the candidate frequent set is pruned, and the strategy of bottom-up or top-down search of the database is used several times. Through computers and the Internet, students can choose their own content and mode of learning based on their needs. Interactive computers and web-based learning resources also provide timely feedback to students. During the course of multimedia-assisted English teaching, teachers can obtain a great deal of knowledge points related to the text to be taught through network information resources and, through certain screening, put the most important and meaningful contents into the courseware to guide the text and lay the foundation for the teaching of the text afterwards. Then, we choose the model with neither constant nor temporal terms, and the time spent by Apriori algorithm with different support degrees when the support degrees are 30, 60, and 90, respectively, is shown in Figure 5.

The research of data mining methods in the network environment can, on the one hand, study distributed data mining algorithms with the help of the network to improve the mining efficiency, and on the other hand, a data mining server can be established on the network to cooperate with the database server to realize data mining. It implements a set of publicly accessible interfaces for Web Services to register their service information with UDDI's web service information repository. The acceleration ratio is the ratio of the time consumed by the same task running in a uniprocessor system and a parallel processor system. Table 1 shows the Apriori test of 20,000 records on a cluster with different number of nodes, with the same amount of data and the same degree of support in the test.

Secondly, the database is projected onto a frequent pattern tree, FP-tree, to keep the association information of item sets, and then the frequent item sets are searched by scanning the count of path nodes in the FP-tree. The wide application of IT in the integration of educational resources system provides a good technical support to integrate the scattered teaching resource management information from different management systems. For those knowledge points that are difficult for teachers to express in words, or abstract concepts, students can get good learning in multimedia classroom in various forms. Some data or applications in a particular domain may require specific algorithms to find

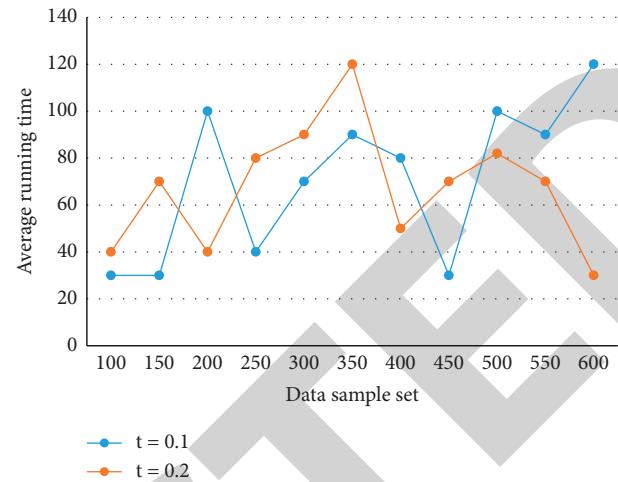


FIGURE 4: Scalability of Apriori algorithm.

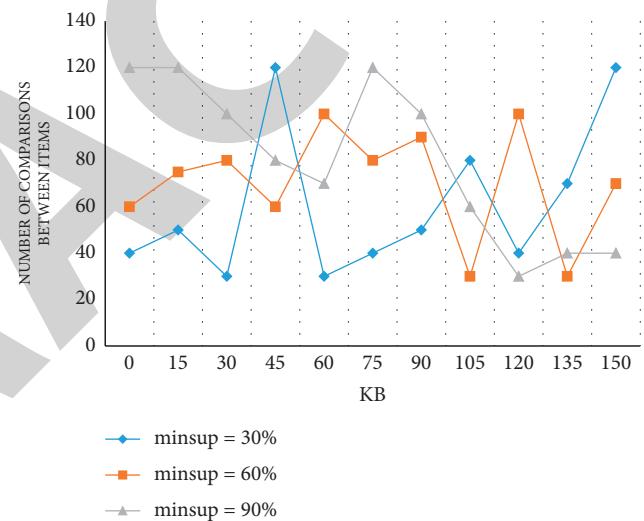


FIGURE 5: Comparison of time spent under different support levels.

TABLE 1: Tests under different nodes.

Number of nodes	Elapsed time (s)	Speed-up ratio
2	1382	1.9038
4	3827	2.3988
6	7643	3.2815

patterns, and general-purpose data mining systems have inherent limitations for these domain-specific data and may not be able to meet the requirements. In the performance comparison experiments between DL and association rule algorithms, we use a minimum support of 15%. The database size for the experiments ranges from 0 to 120 tuples, and the sequence of items climbs. As the number of tuples increases, the performance comparison results of DL and association rule algorithms are shown in Figure 6.

Finally, each time the support of a subset is calculated, the transaction records in the transaction database are traversed from top to bottom, and all the records are scanned and compared. Therefore, it is easy to use Analysis Services

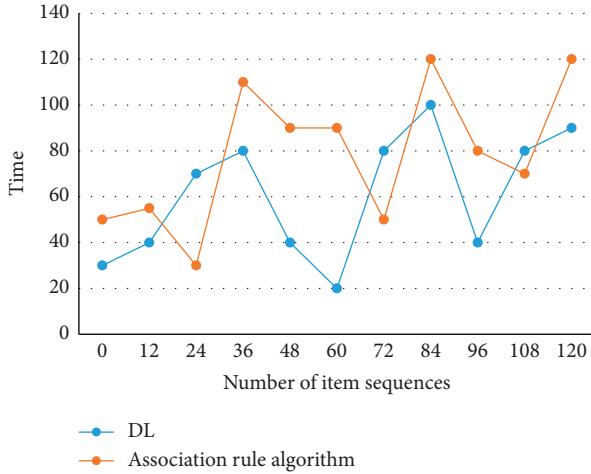


FIGURE 6: Performance comparison experiment between DL and association rule algorithm.

to build the dimensional and multidimensional record sets of the data warehouse designed in the previous section, by following the various wizards in Analysis Services step by step, integrating business logic and data mining systems in specific areas, and combining data analysis techniques with domain-specific knowledge to accomplish specific tasks. The multimedia system is used to select the appropriate question and answer format, find the right entry point for each student, and more effectively help students consolidate their knowledge in the classroom. It also enlivens the dull classroom atmosphere to a certain extent and allows students to learn new content more efficiently. At the same time, the integration of educational resources system itself is a collection of many information systems and information resources, with powerful data processing functions, which can well handle different standards and formats of data between different teaching resource management systems.

4.2. Solution Space Analysis of Optimization Association Rules. From subject knowledge to reading materials, from learning new knowledge to practice quizzes, from group solutions to real-time answers, from sharing resources between teachers and students to links with other platforms, from teachers' classification and management of knowledge to the provision of search engines, from students' learning to teacher-student interaction, the platform provides a three-dimensional, student-serving support environment. Due to completeness, the result of association rule mining is often a huge number of rule sets. These redundant rules can be summarized into two parts: one part of the rules lacks statistical relevance, while the other part of the rules does not meet the "novelty" requirement. Thus, optimizing the solution space of association rules is particularly important. In order to verify the filtering and merging efficiency of optimizing the solution space of association rules, we conducted an experiment on a transaction database of about 20 MB containing temporal interval attributes, and the results are shown in Figure 7.

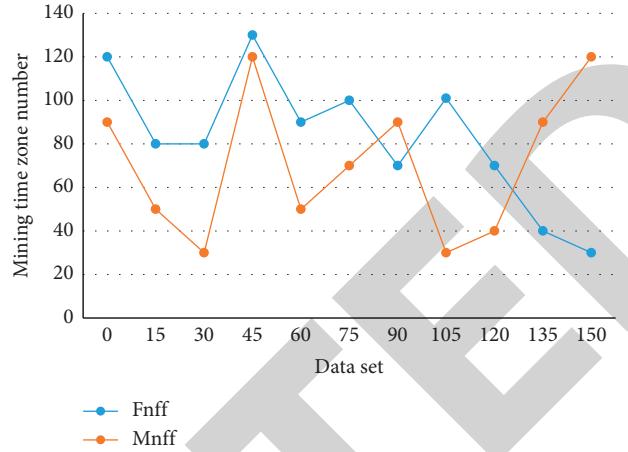


FIGURE 7: Experiment of filtration efficiency feff and merging efficiency meff.

First, the given set of data is mined using the Apriori algorithm and the domain knowledge (given in the form of template rules) provided by the user. It can be used in conjunction with many existing Internet communication protocols, including HTTP, SMTP, and FTP, and also provides a simple and more convenient mechanism for exchanging structured and unstructured information flows between endpoints in an interconnected network. It also supports a large number of applications ranging from messaging systems to remote procedure calls (RPC). Instructional resource integration systems must be autonomous; that is, they need to have automation technologies embedded to alleviate or eliminate manual deployment and management tasks yet allow the platform to respond intelligently to the requirements of the application. Based on the integration, teaching resource managers can build an integrated model of teaching resource list and process list for teaching and research programs, unify static resource management information and dynamic teaching and research processes, and configure existing teaching resources with the actual needs of teaching and research.

Secondly, for the rules that differ from the latter items of the template rules, we use the principle of information theory to sort them in order to identify those unexpected rules. The basic situation that teaching resource management information and teaching research information are independent of each other, and that teaching resource management information flows are independent of each other among different departments, still exists after the integration of the management system. To illustrate the memory occupation of the solution space of association rules, we track the size of TISS and TISS* for different transaction database sizes, and the experimental results are shown in Figure 8.

The main goal of Web Services is to build a common platform-independent and language-independent technology layer on top of various existing heterogeneous platforms, and applications on top of different platforms rely on this technology layer to implement mutual connection and integration. Users can submit requests for

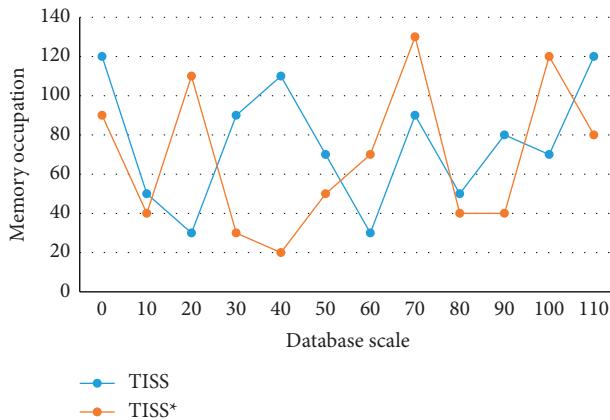


FIGURE 8: Experimental results of memory occupancy.

TABLE 2: Test data and time.

Number of records	MapReduce test time (s)	Apriori test time (s)
120	94.28	54.27
240	124.27	73.87
360	172.36	93.29
Average test time	130.30	73.81

resources and applications at any time, and then the cloud environment manager is responsible for allocating resources and deploying services. For the Apriori algorithm, we verify the efficiency of the algorithm by means of node comparison. The experimental results are shown in Table 2, which shows the amount of data used for testing and the time used.

As the amount of data increases, the test time gap between MapReduce and Apriori gradually increases. The average test time of Apriori is 56.49 s less than that of MapReduce, so the advantage of Apriori algorithm is more obvious.

Finally, the rule that is optimal for a given posterior term is selected, and this part of the operation leads to a local update of the rule template, and if the mining result is unsatisfactory, the adjusted rule template can be used to remine the dataset. The use of Web Services technology to build a data mining platform enables the interconnection and interoperability of information between heterogeneous information systems, making it easier to achieve data mining on distributed and heterogeneous databases. Parallel deployment refers to changing the traditional sequential deployment method to parallel execution, performing multiple deployment tasks simultaneously, and deploying virtual machines to multiple physical machines at the same time. Through the communication environment and teaching process recording function of the integration of educational resources system, we can get timely and comprehensive feedback information about the utilization status of teaching resources. In turn, we can make appropriate adjustments to the integration and construction of teaching resources, so as to make better use of teaching resources.

5. Conclusions

With the deepening of education informatization and the increase of integration of curriculum teaching resources, the demand for curriculum integration of educational resources platform is bound to increase. The integration of IT and English teaching aims to fully mobilize students' initiative and enthusiasm, so that students' creative thinking and practical ability can be effectively exercised in the process of teaching integration, thus creating an ideal English learning environment for international students. Through multimedia technology, teachers can create many realistic English learning scenarios, so that students can devote themselves to them, adapt to the English environment, and learn English better. The computer network integration of educational resources system provides richer functions to meet the needs of various teaching resources submission, saving, management, and publishing applications. Since data mining software can discover useful information hidden in a large amount of data, it can provide powerful support to specific fields; particularly, the complex process of data mining is invisible to users in the application field. Therefore, in this paper, we design and implement a computer network integration of educational resources system by linking association rule mining in data mining with multimedia network English integration of educational resources and analyze the association between Apriori algorithm and integration of educational resources system. By using this paper's association rule algorithm-based multimedia network-assisted English integration of educational resources method, the existing resources can be integrated to realize the full sharing of high-quality resources within and among schools, and the advantages are complementary.

Data Availability

The labeled datasets used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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References

- [1] R. Liu, "Design of ideological and political multimedia network teaching resources integration system based on wireless network," *Scientific Programming*, vol. 2021, no. 3, pp. 1–15, Article ID 4293771, 2021.
- [2] Y. Du and T. Zhao, "Network teaching technology based on big data mining and information fusion," *Security and*

- Communication Networks*, vol. 2021, no. 9, Article ID 6629563, pp. 1–9, 2021.
- [3] F. Xiao, “Research on the influence of English teaching behavior based on association rules algorithm,” *Modern Education Forum*, vol. 2, no. 2, p. 3, 2019.
 - [4] L. Wan, “Extraction algorithm of English text summarization for English teaching,” in *Proceedings of the International English education research: English version*, no. 1, p. 4, Xiamen, China, January 2018.
 - [5] Y. R. Lei, L. Lei, and L. Q. Liu, “Application of fuzzy association rules in the analysis on higher vocational college students’ performance,” *Journal of Computer Science*, vol. 28, no. 1, pp. 1–12, 2017.
 - [6] X. Wu, “A study on college English teaching reform based on the integration of computer network and foreign language courses,” *Journal of Physics: Conference Series*, vol. 1992, no. 3, Article ID 032031, 2021.
 - [7] K. Hao, “Multimedia English teaching analysis based on deep learning speech enhancement algorithm and robust expression positioning,” *Journal of Intelligent and Fuzzy Systems*, vol. 39, no. 2, pp. 1779–1791, 2020.
 - [8] Y. Yao and C. Ma, “A multimedia network English listening teaching model based on confidence learning algorithm of speech recognition,” *International Journal of Electrical Engineering Education*, Article ID 002072092098467, 2021.
 - [9] A. Nie, “Design of English interactive teaching system based on association rules algorithm,” *Security and Communication Networks*, vol. 2021, no. s1, Article ID 9275363, pp. 1–10, 2021.
 - [10] B. Xia, “A study of English situational teaching in the context of multimedia network,” *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 6, pp. 766–771, 2017.
 - [11] T. Zhang, X. Chen, and K. Cai, “Evaluation of teaching quality in colleges and universities based on association rule algorithm,” *Agro Food Industry Hi-Tech*, vol. 28, no. 1, pp. 2611–2614, 2017.
 - [12] Y. Zhang, “The realization of intelligent algorithm of knowledge point association analysis in English diagnostic practice system,” *Complexity*, vol. 2021, no. 5, Article ID 5545866, pp. 1–10, 2021.
 - [13] H. Yu, D. W. Sant, G. Wang, and J. Guy, “Mitochondrial transfer of the mutant human ND6T14484C gene causes visual loss and optic neuropathy,” *Translational vision science & technology*, vol. 9, no. 11, pp. 1–11, 2020.
 - [14] P. Li, Y. Ning, and H. Fang, “Artificial intelligence translation under the influence of multimedia teaching to study English learning mode,” *International Journal of Electrical Engineering Education*, Article ID 002072092098352, 2021.
 - [15] Q. Li, “Research on English situational teaching via multimedia and network,” *Revista de la Facultad de Ingeniería*, vol. 32, no. 12, pp. 631–636, 2017.
 - [16] X. Tian, “Research on college English micro class teaching model based on personalized intelligent adjustment algorithm,” in *Proceedings of the 2018 International Conference on Robots & Intelligent System (ICRIS)*, pp. 438–442, Changsha, China, May 2018.
 - [17] Y. Zhang and D. Wang, “Integration model of English teaching resources based on artificial intelligence,” *International Journal of Continuing Engineering Education and Life Long Learning*, vol. 30, no. 1, p. 1, 2020.
 - [18] P. Liu, H. Cui, Y. Cao, X. Hou, and L. Zou, “A method of multimedia teaching evaluation based on fuzzy linguistic concept lattice,” *Multimedia Tools and Applications*, vol. 78, no. 21, pp. 30975–31001, 2019.
 - [19] S. Peng, “Research on interactive English speech recognition algorithm in multimedia cooperative teaching,” in *Proceedings of the 2018 International Conference on Intelligent Transportation, Big Data & Smart City (ICITBS)*, Xiamen, China, January 2018.
 - [20] H. B. Wang and Y. J. Gao, “Research on parallelization of apriori algorithm in association rule mining,” *Procedia Computer Science*, vol. 183, pp. 641–647, 2021.
 - [21] Z. Zhao, Z. Jian, G. S. Gaba, R. Alroobaea, M. Masud, and S. Rubaiee, “An improved association rule mining algorithm for large data,” *Journal of Intelligent Systems*, vol. 30, no. 1, pp. 750–762, 2021.
 - [22] N. Yang, “Exploration of English listening capacity based on multimedia and network teaching of middle school students,” *Campus English*, vol. 40, pp. 125–127, 2017.
 - [23] L. Yu, Y. Liu, and J. Zhou, “ESP curriculum scheme and its teaching strategies on the basis of multimedia network environment,” *Youth years*, vol. 12, p. 1, 2017.
 - [24] X. Xie, “English teaching based on multimedia and network,” *Overseas English*, vol. 14, pp. 166–167, 2019.
 - [25] H. Bai and Q. Zhang, “WITHDRAWN: English smart classroom teaching system based on 5G network and internet of things,” *Microprocessors and Microsystems*, no. 99, Article ID 103421, 2020.
 - [26] P. Li and J. Xiong, “Research on English teaching process supported by network multimedia technology in higher vocational colleges,” *Journal of Physics: Conference Series*, vol. 1915, no. 4, Article ID 042052, 2021.
 - [27] H. Du, “Research On the English teaching platform based on the campus network multimedia,” *International English education research: English version*, vol. 1017, no. 3, pp. 1138–1143, 2019.
 - [28] X. Cheng and K. Liu, “Application of multimedia networks in business English teaching in vocational college,” *Journal of Healthcare Engineering*, vol. 2021, no. 4, Article ID 5519472, pp. 1–9, 2021.
 - [29] J. Li, “Based on multimedia and network social environment—a study of pragmatic acquisition in college English teaching,” *Journal of Contemporary Educational Research*, vol. 5, no. 4, p. 4, 2021.
 - [30] C. Fan, “An analysis of the theory innovation and teaching practice of foreign language situational teaching based on multimedia network assistance,” *Boletin Tecnico/Technical Bulletin*, vol. 55, no. 18, pp. 36–42, 2017.