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Research Article

Integration and Optimization of Multimedia Network-Assisted English Teaching Resources Based on Association Rule Algorithm

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This paper proposes a paradigm of integration and optimization of English teaching resources based on the association rule algorithm and improves the Apriori algorithm by introducing interest measure and manual labeling through semisupervised learning of the neural network to improve the quality of English instruction assisted by the multimedia network. The efficiency of the method is higher than the original Apriori algorithm and the Apriori algorithm based on hash technology, according to experimental results. The new integration and optimization of the algorithm-based teaching model of English teaching resources also guide multimedia and network-assisted English teaching activities.

1. Research Status of Multimedia Network-Assisted English Teaching Resources

The twenty-first century is a time of digitization and modernization, as well as the reform and development of English education. The progress of science and technology and the development of informatization not only change people's way of clothing, food, housing, and transportation, but also affect the development of education, teachers' educational methods, and students' learning methods. In recent decades, both domestic and foreign scholars have devoted themselves to seeking a set of effective integration and optimization of modern English teaching resources.

As early as the beginning of the twenty-first century, some experts advocated for the use of distance education materials to improve the English teaching model research. In his paper, Liu Shiwei suggested that the beginning of the information age is the time when the English teaching model changes and develops; moreover, Liu also put forward in the paper the English pattern diagram of distance education resources optimized. In the model diagram, he proposed three teaching methods, namely, face-to-face teaching, correspondence teaching, satellite TV teaching, and network information teaching. Finally, he expressed his personal views on the concepts and requirements of an English network teaching information database for distance education [1]. In 2006, Li presented the requirement and ways of English teaching resource integration in higher vocational institutions from the standpoint of English teaching optimization. He proposed seven particular steps in the development of an innovative English teaching model of resource integration, with the intention of carrying out a variety of English activities, stating that not only on-campus resource integration, but also off-campus resource integration cannot be overlooked. With the advancement of multimedia technology, multimedia network auxiliary teaching is becoming increasingly widespread, as well as becoming increasingly large, driving the modernization of teaching patterns in colleges and universities [2]. In their paper, Pan stated that in the process of college English reading teaching, multimedia technology can effectively provide teachers with quick access to all types of teaching resources, allowing them to design unique teaching plans and create teaching scenes; for students, learning methods can be standardized, which is conducive to the development of students' independent learning ability and knowledge system construction ability [3]. Furthermore, numerous academics have expressed their thoughts and analyses on the integration of English teaching resources at various levels and levels of complexity [4]. For example, in an introduction to information technology and

junior high school English teaching resources integration, Pan Yunyun affirmed the information technology in the enthusiasm of the junior high school English teaching resources integration, carried out the investigation and research based on the students' learning status on campus, and proposed constructive strategies for the problems of information technology in the teaching and learning process. For example, Li put forward her own opinions on the difficulty of English learning in rural senior high schools. She first analyzed the concept of resource integration, then proposed the implementation strategies of high school English resource integration in rural areas, and finally emphasized the significance of resource integration. In recent years, many scholars and educators have not only put forward their own opinions on the level and region of multimedia-assisted English teaching resources, but also put forward the exploration of the mode of hybrid resource integration in English teaching [5]. Based on resource integration, Liu Ping and Liu Xia mentioned the concept of blended teaching and resource integration in their article Exploring the Blended College English Teaching Model Based on Resource Integration. In the paper, the authors first analyzed the current situation of college English teaching and the current situation of college English teaching resources, and proposed that although there are abundant online and offline teaching resources nowadays due to various factors, such teaching resources are not effectively used, and in response to this problem, they proposed a hybrid teaching model and resource integration, which is a good direction and reasonable discussion for both English teaching model and English teaching resources integration [6].

The research on multimedia network technology-assisted English teaching resources in China is 10 years later than that of foreign literature in terms of the year of publication on the Internet [7]. The research of foreign language literature based on multimedia network-assisted English teaching resources can be analyzed from the features of content teaching, teaching resource platform sharing, teaching application, and so on [8].

The earliest research based on English classes with multimedia support resources originated in the English teaching with multimedia technology advantages and existing problems of the discussion. In 2011, Ju Hongzhan and others put forward the advantages and existing problems of multimedia teaching in their thesis. They analyzed the problems in multimedia teaching and strove to amplify the advantages and reduce the disadvantages to improve the effectiveness of multimedia teaching.

In terms of teaching content, many domestic scholars have also put forward their own insights in foreign language journals; for example, a scholar in the article Computer English Teaching Model Based on Multimedia Platform proposes to address the current shortage of theories and researches on multimedia-assisted foreign language teaching in foreign language teaching, and to conduct a systematic discussion on the content of English teaching on listening, speaking, reading, and writing and its teaching design so that teachers can maximize the advantages of initial multimedia-assisted teaching when teaching. Another example is Rao

Lila, who puts forward suggestions and strategies in his study for the reformed teaching methods of college English under multimedia network technology, proposes new solutions for some problems in college English teaching, and explores the management mode of college English teaching under computer multimedia technology. In his paper, Xie proposes that English teaching should be based on the teaching content which is related to the integration of multimedia technology [9]. The author suggests that we should pay attention to the content rather than the form in English teaching, and that multimedia network technology can greatly enrich the teaching content by providing learners with videos, pictures, and sounds, making content-based teaching three-dimensional, vivid, and interesting, while the author also suggests that the process of language teaching should not be overly dependent on multimedia [10].

As for the application of teaching resources based on multimedia technology, Keqin Lu, for example, emphasizes in his thesis that the further information technology integration and subject teaching is a major trend in today's teaching reform, and that the effective integration of teachers, students, and the teaching environment with multimedia technology is beneficial to the learning motivation of teachers and students. But how to use modern equipment and resources to build a personalized learning environment acceptable to learners, for which the authors studied the study of the English teaching model based on personalized multimedia technology, aims to fully mobilize the integration of the resource environment, materialize and humanize the teaching content, and achieve personalized teaching and personalized learning in the classroom [11].

2. The Need for Multimedia Network-Assisted English Teaching Resources Integration

Due to a scarcity of English teaching resources and the proliferation of information data on the Internet, the integration of English teaching resources based on multimedia aid appears to be urgent and necessary.

First of all, what are teaching resources? In a broad sense, everything related to education has the possibility to become educational resources, including all kinds of teachers, educational institutions, and learning materials. In a narrow sense, educational resources especially refer to the teaching materials used by teachers and students, and teaching equipment and teaching platforms used by teachers and schools. For English teaching resources, in a broad sense, they refer to everything that can guide students to learn English and help them learn English; in a narrow sense, they refer to multimedia, English teachers, and teaching materials. The integration of English teaching resources is mostly emphasized in the broad sense in this paper. To begin with, an examination of multimedia network-assisted English teaching resources is conducted to determine integration and optimization issues.

2.1. Problems of Multimedia-Assisted English Teaching Resources. To summarize, research on multimedia-assisted English teaching resources has never stopped, but as the

research progresses, more and more issues in multimedia network technology-assisted English teaching have evolved, mostly in the areas listed below (Figure 1).

2.1.1. The Communication between Teachers and Students Is Limited.

English is a practical and communicative language subject, but many teachers put too much emphasis on multimedia teaching after using multimedia technology for teaching. For example, when using PPT during lectures, most teachers just read the prepared PPT slides and add a little explanation, which will cause students who are not good at learning English to be drowsy and even have no sense of participation in the English classroom. As a result, students' learning effect in the classroom is getting worse and worse. In addition, when using multimedia, almost everyone focuses on the playback of the multimedia, students pay less attention to teachers' pronunciation and body language when they are speaking English, which will lead to the decline of dialogues and interaction between teachers and students. The learning efficiency and learning effect of English teaching using multimedia are not half of that of the traditional classroom.

2.1.2. Multimedia Classrooms Are Not Conducive to Classroom Supervision of Students' Independent Learning.

Some schools use multimedia classrooms for English teaching activities, which is a new form of teaching, but it is a severe test for students who have poor self-discipline and insufficient self-learning discipline. Open multimedia classrooms give students the opportunity to face the English learning process on their own, but since most multimedia classrooms are computer-based and have Internet access, the abundance of other entertainment resources on the Internet can affect students with poor self-discipline. Instead of watching the classroom content taught by the teacher, they may use entertainment software such as Tencent Video and iQIYI. Therefore, if the integration of multimedia-assisted English teaching resources, personalized recommendations, and other contents are not properly grasped, multimedia teaching may lead to a significant decrease in students' efficiency in learning English and is not conducive to teachers' ability to attract students to the classroom content.

2.1.3. Complexity of Equipment Manipulation and Limited Resources.

Most English teachers have liberal arts background, and some of them may not be proficient in the use of multimedia technology, such as the production of PPT courseware and teaching a small video production. This is partly because some equipment or teaching software is too complex, which makes teachers unhappy with the process. For example, a teacher wants to teach English grammar in high school and needs to insert a video clip to make students understand English grammar better. When searching for related videos on the Internet, he finds that there are many kinds of videos, which causes him to waste a lot of time in searching for corresponding videos, and this may lead to the quality of the courseware being affected.
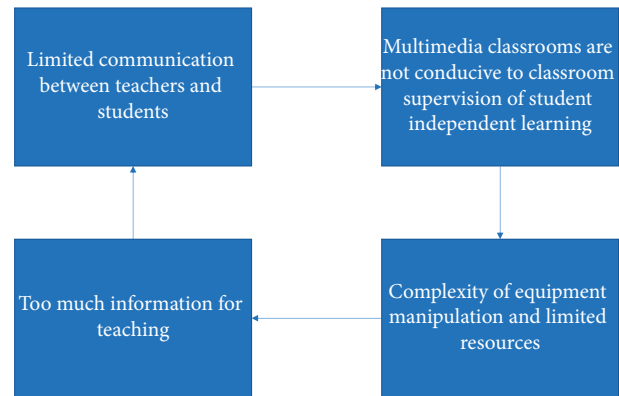

Figure 1: Problems of multimedia-assisted English teaching.

2.1.4. Too Much Information in Teaching.

In the process of multimedia network-assisted teaching, although a large amount of knowledge can be intuitively transmitted, it may lead to improper teaching rhythm in the process of teaching, and students may not accept too much knowledge input for a while. In addition, the multimedia teaching is usually in the form of PPT slides, which may lead to problems such as difficulty in taking notes and insufficient time to understand in the learning process. Simultaneously, for a large number of learning materials passed by teachers in the process of multimedia teaching, if teachers' teaching rhythm is not coordinated with students' learning rhythm, students will struggle to understand knowledge points, and the learning effect will be severely reduced.

To sum up, educators' research on the integration of multimedia network-assisted English teaching resources, as well as existing challenges in multimedia network-assisted English teaching, focuses on the integration and optimization of multimedia network-assisted English teaching resources. The goal of research into the integration of multimedia technology and English educational materials is to optimize teachers' teaching resources, teaching content resources, and teaching method resources so that teachers can make the most of limited English teaching resources, keep students interested in learning English, and aim at the existing problems in domestic multimedia technology in English teaching. One of the fundamental reasons for the problems of domestic multimedia technology in English teaching is that the teaching resources on the multimedia network are not well integrated and optimized, and the resource information on the network is too large and cluttered. Therefore, it is difficult for teachers to find suitable teaching resources to teach the corresponding knowledge points in the teaching process. For students, the lack of good English teaching resources support leads to poor learning efficiency and poor learning effect in the learning process.

2.2. Thinking and Necessity of Multimedia Network-Assisted English Teaching Resources Integration

2.2.1. The Development of Multimedia Technology, English Teaching Reform, and Policy Support.

To begin with, the Ministry of Education issued an action plan for 2.0 education informatization in 2018 [18]. The plan demonstrates that the

requirements for Internet access in all schools, as well as the requirements for broadband, meet the demand for educational informatization, as well as multimedia teaching equipment such as wireless campus application popularization, education resources public service platform development, and public education management platform to achieve fusion [19]. It also proposed the implementation of a sharing plan for large educational resources, emphasizing the use of big data collection technology to bring together the rich teaching, research, and cultural resources on the Internet in the era of information technology, and to integrate and optimize these resources to provide massive and suitable learning resource services for schools of different types and levels and for all teachers and students [20].

Secondly, in 2021, the Central Cyberspace Affairs Commission issued the 14th Five-Year Plan for National Informatization and for the first time put forward the requirement of "developing lifelong digital education." The first recommendation is that teaching resources should be integrated with current emerging technologies to enrich teaching forms and enhance the interactivity and experience of digital education resources. The second recommendation is to build a dynamic and updated high-quality digital education resource system for different needs at different levels. The third recommendation is to strengthen the management system of digital education resources and develop a data-driven intelligent and innovative application service system of digital education resources.

2.2.2. Reducing Teachers' Burden of Lesson Preparation and Teaching.

Higher education is the essence of college students' English education. Because college students are from all over the country, they have diverse levels and interests. Teachers should not copy others' lesson plans without considering the students' performance in class. In addition, there is a gap between colleges and universities and there are countless teaching resources on the network. It is very difficult for teachers to integrate English teaching resources on their own, so we need to break the barriers between teachers, colleges, and universities. In doing so, it is beneficial for teachers not only to prepare lessons and design teaching contents, and reduce teachers' burden, but also to build a shared service system of digital education resources and comply with national policies and calls.

2.2.3. Enrichment of Learning Methods.

English learning is a common phenomenon for most students. This is because English is an interactive and practical language subject. However, due to the impact of test-oriented education and the goal of completing the teaching syllabus, many teachers just read PPT slides when using multimedia technology to assist English teaching, failing to pay attention to students' leaning outcomes. The essential reason for this is that there is no authoritative English teaching resource platform and service system in China, so teachers cannot find a better way to face more and more diversified students in class. To solve this problem, the key is to build a new English teaching model with multimedia technology, establish an education system with

network digitization, intelligence, personalization, and lifelong learning, integrate and optimize all kinds of English teaching resources, and precisely locate the content that students or teachers want to search on the Internet. The optimization of multimedia network and English teaching resources is necessary for students to attend lectures and acquire knowledge, which is also conducive to enriching students' learning methods, combining learning with information and data, and establishing an intelligent and innovative model of integration and optimization of English teaching resources.

3. Data Mining and Association Rule Algorithm

3.1. Status Quo of Data Mining Association Rule Algorithm in the Field of Teaching.

Frequent pattern mining has caught the interest of many academics since the introduction of Agrawal, based on the idea of data mining algorithm of association rules. Many academics have explored the application of teaching resources in recent years, owing to the rapid growth of data technology and a plethora of redundant enormous volumes of online teaching resources. Deng Jijun researched and modified the Apriori association rule algorithm before applying it to the field of Internet education in his research. The new algorithm is significantly more efficient than the Apriori association rule method, according to the experimental results. Feng Li, for example, proposed using the Apriori method to realize the application of teaching resource allocation, and the improved algorithm revealed the relationship between courses [12]. It could substantially assist teachers in allocating teaching resources and content, as well as changing teaching design, in order to affect students' learning outcomes and teachers' teaching quality [13].

There was a lot of optimization of Apriori association rule algorithm. For English teaching, an important subject, many researchers also tried to combine data mining rule algorithm with English teaching, English teaching resource integration, and other problems. The earliest person who applied it to English teaching analysis was Yuan Xiaoling, who analyzed students' English grades in Research on the Application of Data Mining in Student Grade Management. After an in-depth study of English grade management in colleges and universities, she proposed to apply association rule algorithm and decision tree classification in data mining technology to grade management, and use the technology to find out the factors affecting students' grades and provide a guiding role for English teaching [14]. In the years that followed, the studies based on association rule algorithm and data mining are basically about the analysis and study of students' English performance, but some scholars also proposed the construction of implicit execution based on association rule algorithm. Zuo Xin et al. studied the topic of grammar problems based on data mining about English teachers' speaking, using association rules to discuss the relevance of teachers' and students' implicit knowledge, making teachers' invisible knowledge explicit, and providing reference for the construction of students' implicit knowledge [15]. In addition, some scholars proposed the method of decision tree and association rule based on data mining to evaluate the quality of English teaching [16]. Experimental

results show that the method proposed by the authors can effectively evaluate and analyze the key factors and internal relationships that affect the quality of English teaching [17].

3.2. Data Mining and Apriori Algorithm.

Data mining has steadily become the center of people's attention as the information age has progressed and computer technology has advanced. What is data mining exactly? Data mining is the process of extracting high-confidential, valuable, and hidden information from a large, disorganized, and diverse database. Concept/class description, classification and prediction, association analysis and cluster analysis, and so on are some of the categories of data mining. The next sections examine and analyze concept/class description, classification and prediction, and association analysis.

Concept/class description refers to the relationship between data and concepts or classes. By using a simple and concise way to describe each class or concept that might be meaningful and valuable, such a description is called class concept description, which can be obtained by such kinds of ways as data characterization, comparison, and data differentiation.

Classification and prediction are mainly function models of the combination of classification analysis and prediction. Classification analysis mainly obtains its unique functions or models by mining and analyzing existing data, so as to identify its categories or attribution by using the location of data. There are three common classification prediction model construction methods, which are decision tree method, Bayesian method, and neural network method. These three methods of model construction have their own characteristics and need to adopt different construction methods for different application scenarios.

Association analysis is the method used in this paper, which is mainly used to discover the association rules between things, and the association rules show the degree of association. Through association rule mining of massive data information, we can find valuable and meaningful information hidden in it, which can help people to make decisions, plan design, plan setting, and so on.

In summary, through the analysis of the above data mining construction models, it can be seen in this paper; firstly, the research object is determined to be a large number of English teaching resources and their users, and secondly, there are certain correlations and regularities among English teaching resources. Therefore, this paper adopts the method of association analysis to realize the integration and optimization of English teaching resources.

The second step is to examine the data mining process. Data mining begins with data analysis, which is followed by the findings of the analysis being summarized, categorized, or assessed on a regular basis. Data gathering, data preprocessing and cleaning, model construction, and evaluation analysis are the main steps in data mining. The data mining system structure is depicted in Figure 2.

3.2.1. Apriori Algorithm Overview.

The Apriori algorithm is based on association rules and is primarily used to handle the problem of large-scale data set association analysis. The process of discovering frequent item sets is the most crucial phase in mining association rules, and the most iconic technique in this process is the Apriori algorithm, which was published in 1994 and is mostly used for the mining of single-dimensional binary association rules. Before introducing the Apriori algorithm, we first introduce the data mining based on association rules. Figure 3 shows the block diagram of the process of association rule mining in ELT resource integration.

Since the core algorithm of this paper is based on association rule analysis, it is necessary to explain the terms and concepts used in association rule analysis one by one.

(1) Item Set. The term item set in this paper refers to frequent and infrequent item sets. The item set is a collection of items when the information is minimized to the extent that there is no way to decompose it. If the support of a circumstance is greater than or equal to the minimum support, it is a frequent item set; otherwise, it is an infrequent item set.

(2) Confidence or Trustworthiness. Confidence refers to the degree of trustworthiness. If two situations occur at the same time, the confidence or trustworthiness is the probability of occurring at the same time/the occurrence of one of the two situations.

(3) Transaction. According to the aforementioned conceptual understanding, association rule analysis consists of two steps: the first is the development of frequent item sets, and the second is the generation of rules. The primary goal is to obtain the entire data warehouse, make some modifications (either merging or pruning), and locate all of the item sets that meet the minimum confidence level; second, we locate frequent item sets that match the description of association rules and meet the minimum confidence level by association rules, and then continuously update the association rules using these frequent item sets.

3.2.2. The Basic Principle of Apriori Algorithm.

According to Section 3.2, the overall efficiency of the association rule mining algorithm depends on how quickly the algorithm can find all frequent item sets (Figure 4).

In Figure 3, in the process of ELT resource integration, it is apparent that the Apriori algorithm is at the heart of the overall association rule analysis, and Figure 4 depicts the Apriori method's main premise. The Apriori algorithm's basic principle is to reduce the algorithm's search space by the nature of the set of frequent items, where the nature of the set of frequent items means that if the set is a set of frequent items, then its nonempty subset must also be a set of frequent items; otherwise, it is not. The Apriori algorithm is to search the data set or data warehouse in a hierarchical and progressive way to compress the item sets and finally to mine the data information that is of value and significance in accordance with the confidence or trustworthiness. Table 1 shows the pseudocode of the Apriori algorithm.

3.2.3. Performance of Apriori Algorithm.

First of all, Apriori algorithm, as a classical algorithm of association rules, has great advantages in data mining. Secondly, the principle of
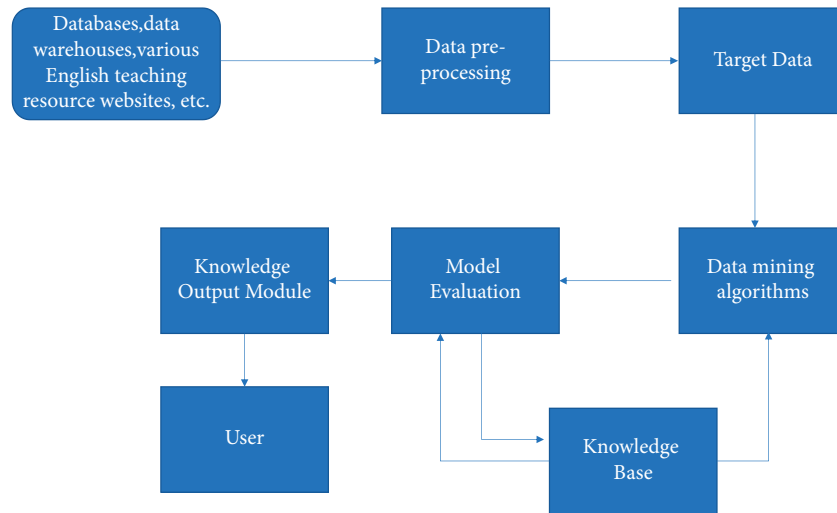
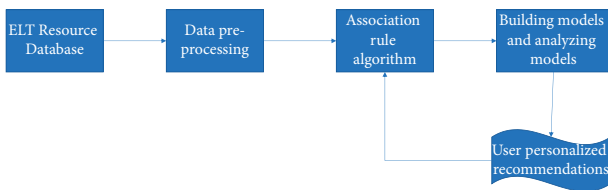FIGURE 2: The systematic structure system of data mining.

FIGURE 3: The process of association rule mining in the integration of English teaching resources.
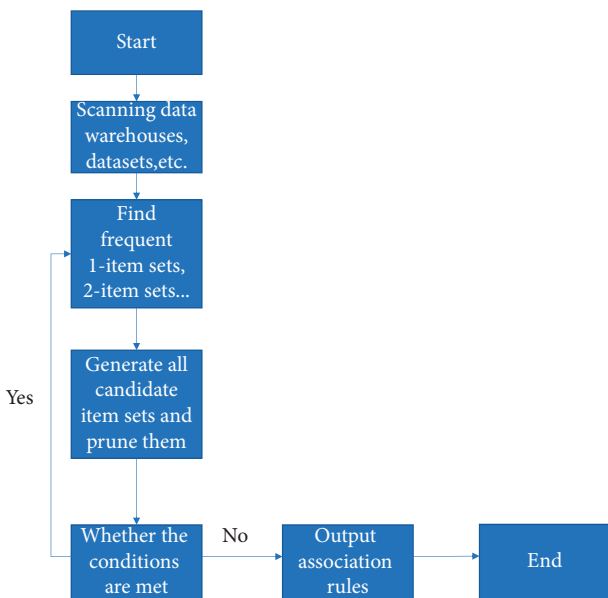

FIGURE 4: The basic principle of the Apriori algorithm.

Apriori algorithm is simple and easy to understand, and the pseudo-code of Apriori algorithm is also simple and clear as shown in Figure 1. Thirdly, if the confidence level is on the high side, the number of cycles on the scanning warehouse will be small and the space complexity of the Apriori algorithm will not be very high.

Firstly, Apriori algorithm is only applicable to sparse data sets due to its algorithmic characteristics; i.e., it is only applicable to short length data sets with frequent item sets, and it is not applicable to the integration and optimization of English teaching resources like those supported by multimedia technology. Secondly, there will be more rare data in the data set that is accidently destroyed, resulting in the phenomenon of lost data, which has an impact on the overall system performance. Finally, the Apriori algorithm's efficiency is an issue. The Apriori algorithm generates a huge number of candidate sets, which results in a large number of loops, resulting in algorithm performance degradation and low efficiency.

4. Optimization of the Association Rule Algorithm and Integration and Optimization Model for ELT Resources

As can be observed from the preceding discussion and analysis, the Apriori algorithm is not optimal for mining large data sets, particularly massive data sets like ELT resources; hence, this paper proposes an Apriori-based optimization strategy.

Because the essential problem that affects the efficiency of the Apriori algorithm is that it generates a large number of candidates, which leads to the algorithm's low efficiency, and because English teaching resources are very large data sets, this paper reduces the number of candidates by adding labels of interest metric in order to achieve the integration and optimization of English teaching resources, and to better combine multimedia network-assisted teaching activities. Figure 5 shows the optimized block diagram.

Therefore, the process of using association rule algorithm in the integration of ELT resources in this paper is implemented as follows.

(1) Database selection of ELT resources

(2) Labeling the interest metrics of ELT resources

(3) Finding frequent item sets

TABLE 1: Pseudo-code of the Apriori algorithm.

```
(1)    //Find frequent 1 item sets
(2)        L1 = find_frequent_1-item sets (D);
(3)        For (k = 2; Lk − 1 ! = null; k++){
(4)    //Generate candidates and prune
(5)            Ck = apriori_gen (Lk − 1);
(6)    //Scan D for candidate counting
(7)        For each transaction t in D{
(8)            Ct = subset (Ck,t); //get the subset of t
(9)            For each candidate c belonging to Ct
(10)                c.count++;
(11)        }
(12)        //return the set of items in the candidate set that are not smaller than the minimum support
(13)        Lk = {c belongs to Ck|c.count ≥ min_sup}
(14)}
(15) Return L = all frequent sets.
(16) Step 1: join (join)
(17) Procedure apriori_gen (Lk − 1: frequent (k − 1)-item sets)
(18)    For each item set l1 belongs to Lk − 1
(19)        For each item set l2 belongs to Lk − 1
(20)            If ((l1 [1] = l2 [1]) && (l1 [2] = l2 [2]) &&...&& (l1 [k − 2] = l2 [k − 2]) && (l1 [k − 1] < l2 [k − 1]))
(21) then{
(22)                c = l1 join l2//join step: generate candidate
(23)                //prune if a subset c already exists in the k − 1 item set
(24)                if has_infrequent_subset (c, Lk − 1) then
(25)                    delete c; //pruning step: delete infrequent candidates
(26)                else add c to Ck;
(27)                }
(28)        Return Ck;
(29) Step 2: prune
(30) Procedure has_infrequent_sub (c: candidate k-item set; Lk − 1: frequent (k − 1)-item sets)
(31)        For each (k − 1)-subset s of c
(32)            If s does not belong to Lk − 1 then
(33)                Return true;
(34)        Return false;
```
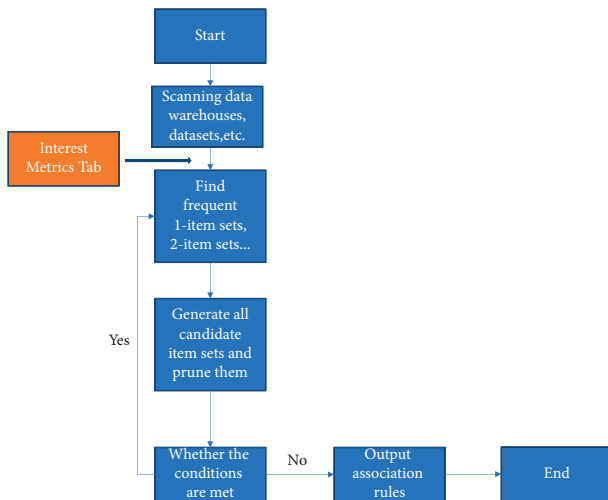

FIGURE 5: Optimization of the Apriori algorithm.

(4) Pruning and concatenation

(5) Output association rules

The flow of adding interest metric labels under unsupervised learning of neural networks is shown in Figure 6.

The first step is to select the database of English teaching resources. In this paper, the English teaching resources database on a certain website is selected for the study, and its resource data are shown in Table 2.

The second step is to label the interest metrics of the ELT resources. In this paper, the database of ELT resources is manually labeled using a semi-supervised learning method of neural networks in order to label the interest measures on the obtained data.

The last steps are to find the frequent item sets. In this paper, by introducing the semi-supervised learning method of neural networks, after labeling the database of ELT resources with interest measures, the processed data can be scanned by comparing the confidence levels and eliminating the candidates with the smallest confidence level to produce the item set l1, then by connecting to produce new confidence levels, then by comparing the new confidence levels, and proposing the smallest confidence level to produce the item set l2, and the cycle is repeated to finally produce the frequent item set of the final result.

Through the above steps, the unsupervised learning method of neural network was used to annotate the interest measure, and the confidence table was finally obtained as follows (Table 3).
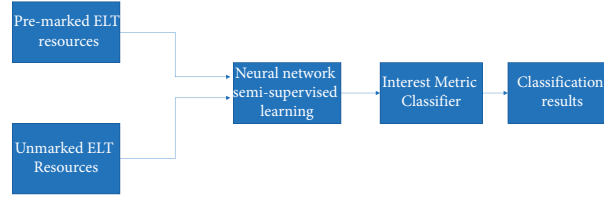
FIGURE 6: Flow of interest metric labels under unsupervised learning of neural networks.

TABLE 2: English teaching resource database item data.

Item	Number of items	Item form
Listening	Greater than or equal to 2000	Easy listening practice, intelligent listening diagnosis based on dictation practice
Speaking	Greater than 800	Read with me, situational human-computer dialogue, interpretation, and oral composition
Reading	Greater than or equal to 800	Easy reading practice and intelligent reading diagnosis
Writing	More than 100	Intelligent machine review, guidance on writing style, grammar, vocabulary, and content
Translating	Greater than or equal to 500	Translation from Chinese to English, sentence translation, chapter translation, and interpretation

TABLE 3: Confidence degree of the optimized Apriori algorithm applied to the integration of English teaching resources.

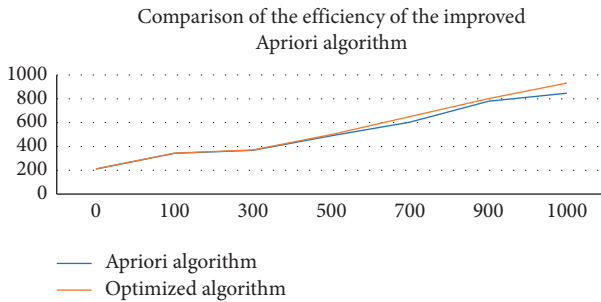| Frequent set 1	Frequent set 2	Frequent set 3	Frequent set of 4	Frequent set 5	Confidence (100%)
11	33	19	20	17	15
10	25	8	15	12	35
9	14	8	13	5	45
8	9	7	9	3	50

FIGURE 7: Comparison of the efficiency of the improved Apriori algorithm and the original Apriori algorithm.
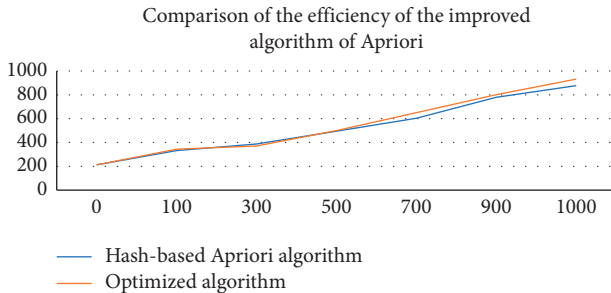

FIGURE 8: Comparison of the efficiency of the improved Apriori algorithm and the hash-based Apriori algorithm.

In this paper, in order to reflect the efficiency of the algorithm, we compare the efficiency of the original Apriori algorithm and the algorithm of the hash technology.

In Figures 7 and 8, the vertical coordinate is the number of iterations and the horizontal coordinate is the time consumed by the algorithm, where the time is in seconds. The efficiency of the algorithm in this paper is higher than both the original Apriori algorithm and the hash-based Apriori, where the efficiency advantage is reflected after 600 iterations.

5. Conclusion

Firstly, from the algorithm level, this paper has optimized the original Apriori algorithm, and the experimental results show that the efficiency of the optimized Apriori algorithm has been considerably improved; secondly, from an application standpoint, this paper has applied the optimized algorithm to the integration and optimization of English teaching resources, with confidence levels ranging from 15% to 50%. Due to the enormous amount of data, the confidence level is within a reasonable range. We can consider optimizing data preprocessing steps in the future research to compensate for the manpower required for manual labeling, and the integration and optimization of English teaching resources based on the association rule algorithm proposed in this paper are beneficial to multimedia-assisted English teaching. The establishment of an English teaching resource integration and optimization model is also beneficial to students and teachers for teaching activities, and it has certain guiding meaning and effect on the multimedia-assisted English teaching model under information technology.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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