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Research Article

Design of Cross-Source Education Information Classification Model Based on Cloud Computing Technology

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Traditional classification algorithms can be well applied to limited data sets, but the application effect of uncertain data sets was poor. Therefore, this paper proposed a cross-source education information classification model based on cloud computing technology, which aimed to provide support for education information services in the cloud computing environment. Firstly, based on the analysis of the structure and function of the cloud computing platform, this paper expounded the cloud computing service mode and its deployment mode and gave a multisource information processing method based on the cloud computing center combined with the characteristics of information distribution in the cloud computing environment. Secondly, by analyzing the types of educational information resources, this paper summarized the feature extraction of educational information using data mining technology and gave the classification method of educational information based on text features. Finally, a cross-source education information classification model in the cloud computing environment was designed. The experimental comparison showed that the method proposed in this paper can effectively classify the multisource education information under the cloud computing platform. Compared with other traditional classification models, this model not only had higher classification accuracy but also can achieve better classification efficiency. The classification model proposed in this paper can provide a reference for the classification of other information resources in the cloud computing environment.

1. Introduction

With the continuous improvement of information technology, people's life, social, and economic development have been closely related to informatization. Under the promotion of informatization in the field of education, various teaching information resources have been constructed, such as teaching courseware, multimedia teaching resources, and books and materials, which can provide very beneficial help for teachers and students' learning and work [1]. However, because most of the teaching information basically exists in different systems in an independent way, it is difficult to realize the classification and sharing of teaching information between different systems. With the enrichment and improvement of teaching information, people's demand for teaching information is also diversified. The existing educational information platform can hardly meet the actual demand. The existing educational information platform has some limitations in information resource retrieval and sharing, which not only causes a serious waste of teaching resources to a great extent but also requires more human and financial resources for relevant educational institutions and management departments to maintain and update the platform.

As an emerging technology, cloud computing uses network integration to build different computer software and hardware into a super-large service platform, which can provide relevant data, computing, storage, and other resources for different users in an all-round way. By integrating advanced technologies such as virtualization technology, parallel computing, distributed, and network storage, cloud computing has the technical characteristics of distributed management, virtualization processing, and application expansion [2]. In the cloud computing environment, all kinds of users can obtain the required information services through the Internet platform without time and space constraints and using their own terminal facilities. Cloud computing can dynamically manage software and

hardware. Through the unified scheduling of information, it can not only realize on-demand distribution but also save management costs and improve resource utilization.

Using the cloud computing service platform can not only effectively reduce the construction and software and hardware maintenance cost of the educational information service platform but also improve the utilization of educational information resources and facilitate users' various needs for educational information to a great extent [3, 4]. For example, the virtualization infrastructure provided by the cloud computing center can not only share educational information resources but also uniformly schedule the information, so as to realize the centralized management of educational information. In order to give full play to the service and management functions of the cloud computing service platform for educational information resources, the loose coupling characteristics of the cloud computing center in resource management can be used to realize the unified management of decentralized information through the organic integration of various heterogeneous teaching information systems. Therefore, this paper proposed a cross-source education information classification model construction method based on cloud computing technology. Taking the cloud service center as the platform, this paper established an educational information classification model through data mining and text feature classification of the information provided by different educational information systems, so as to provide support for the efficient utilization and integration of educational information.

2. Related Works

With the rapid improvement of network technology and computer level, the demand for information resources in the field of education is increasing. The effective classification of educational information can not only facilitate individuals or institutions to find and use educational information resources but also use data mining methods to analyze relevant information in order to provide services for relevant personnel [5]. Therefore, how to select the appropriate classification algorithm, establish a reliable classification model, and effectively apply it to the classification of educational information has attracted extensive attention from people in relevant fields at home and abroad.

The classification algorithm mainly includes constructing the classification model and applying the classification model. The construction of the classification model mainly generates a description or model of the data set for each different category through the training of the data set and then tests the data set to test the classification model. Finally, a classification model that meets certain requirements is constructed by adjusting relevant parameters. The application classification model mainly uses the classification model to give certain category characteristics to the data of an unknown category and then get the corresponding results according to the application requirements. Domestic and foreign scholars' research on classification algorithms mainly includes traditional data classification methods and classification methods based on soft computing. Traditional data classification methods are also classification methods based on statistical learning theory, mainly including the decision tree classification method (DT), association rule classification method (AR), support vector machine classification method (SVM), Bayesian classification method (BS), and nearest-neighbor classification method (NN) [6–8]. The classification methods based on soft computing mainly include the neural network method, fuzzy rule classification method, genetic method, and rough set classification method. Most relevant scholars at home and abroad adopt to improve the existing classification algorithms or design some new classification algorithms, and there is less research on the specific application of these classification algorithms [9]. For example, although there are many researches on classification algorithms based on data mining technology and the characteristics of different algorithms are different, there is a lack of specific application fields.

According to the data characteristics in specific application fields, using appropriate classification algorithms or models to process data is a hot spot in the research field of data mining classification algorithms in recent years. Some scholars have studied the classification of comprehensive educational information resources and basic educational resources and put forward the method of classified management of educational information resources [10]. Some scholars apply data mining classification algorithm to college education information management, for example, classify and analyze teaching information, and use data mining technology to analyze various factors affecting students' academic performance.

At present, the common classification methods for educational information resources mainly adopt the traditional nonautomatic classification based on literature or knowledge and automatic classification based on algorithm [11]. Traditional classification methods limit the scalability of educational information due to their small application range, while automatic classification technology can expand educational information to other related fields. If a scientific and reasonable classification model is established, it can be effectively applied. Algorithm-based automatic classification methods are widely used in the field of educational information, such as automatic generation system based on the educational yellow page platform and text classification model based on network educational resources. In recent years, there have been some researches on specific applications and integrating multiple classification methods [12, 13], for example, teaching information classification model based on multiple classifiers, educational information resource classification model based on rules and classifiers, and multiclassifier fusion model based on fuzzy rules. Compared with traditional data mining classification methods, these classification models or algorithms have made some progress in both performance and application.

3. Theoretical Basis of Cloud Computing Services

3.1. Overview of Cloud Computing Technology. Cloud computing technology is an emerging technology with the

development of computer and network technology. Cloud computing mainly includes distributed computing, parallel processing, virtual technology, and big data technology. It is an information service model formed based on the integration of related technologies. In the cloud computing environment, computers with distributed cooperative work mechanisms contain many computing resources and storage resources [14]. Because the computing and storage in the cloud computing mode have strong expansion functions, users can access the cloud service center after accessing the Internet through computers, smartphones, tablets, and other terminals. Due to the integration of different technologies, cloud computing can not only store a large amount of data but also provide users with convenient and fast services and give full play to the potential of network services.

Since the emergence of cloud computing technology, some companies have successively established their own different cloud computing centers and launched various cloud computing services and products. For example, users can quickly access the cloud computing infrastructure launched by Amazon through the Internet and can obtain various virtual computing resources, network resources, and storage resources after paying relevant fees. The Google App Engine (GAE) web operation infrastructure provided by Google can be automatically expanded according to the number of users. Therefore, end customers can access various services in the cloud application platform by accessing the Internet. In addition, some institutions have launched a variety of information service resources according to the service needs of different users. Through the concentration and integration of resources, they not only reduce the scale of equipment but also effectively reduce user costs and energy consumption.

In recent years, with the emergence of many cloud computing products and services, information technology has also developed rapidly, which not only brings efficient, diverse, and flexible services to people but also promotes great changes in production, life, and learning. However, the services provided by cloud computing also bring some problems. Cloud computing is an open service platform [15]. Different types of participants, services, and information resources can apply to join the cloud computing center at will. At the same time, the information services provided by the cloud computing center are dynamic and can change with the growth of the number and demand of users. In addition, affected by external factors, cloud computing services often show a certain degree of complexity and unpredictability, which brings some insecurity and unreliability problems to cloud computing information services. Therefore, some cloud service providers usually take some security policies or technical measures to ensure the security and stability of cloud computing services.

Cloud computing usually has the characteristics of rapidity and remoteness when processing data. Users use different terminals to access the Internet and make requests to the cloud service platform. After receiving the user's request, the cloud computing center will provide corresponding services. In order to meet the various needs of users, the key technologies involved in cloud computing services include network programming technology, distributed storage and management of massive data technology, virtualization processing technology, and server compatibility technology.

Cloud computing takes the Internet center as the server and uses the unified scheduling method to transfer data to the server and carry out relevant processing. In the cloud computing environment, because a large amount of data are scattered in different memories, it is necessary to read information from different memories during data processing. Virtualization technology is very important to realize cloud computing [16]. Virtualization objects mainly include servers, network devices, storage, data resource library, applications, and system platforms. By virtualizing the resources and facilities of cloud computing, users can use various services provided by cloud computing through terminals. There are a large number of servers in the cloud computing platform. For various servers and operating system platforms, coordinated control and compatible processing can be adopted to ensure the efficient operation of the cloud computing platform.

Cloud computing platform is generally composed of network devices, storage devices, servers, applications, and various services. Its working environment is usually established by cloud service providers. The network equipment required by cloud computing platform is usually composed of a high-capacity switch, virtual machine sensing and control equipment, high-speed data link, and scheduling equipment. Server devices distributed in different locations can work together using virtualization technology. Memory not only has a powerful storage function but also must have the automation of storage management and the ability to ensure safe storage. Applications in cloud computing mode usually have the characteristics of intelligence, pertinence, and portability. Cloud computing services generally have the characteristics of diversity, ease of use, and customization.

3.2. Cloud Computing Services and Their Deployment. The main objects of cloud computing services include all kinds of users, providers, data resources, and other elements. They are related to each other and jointly form the process of cloud computing services. Different entities have different requirements for cloud computing services. Users are concerned about the service quality, price, and efficiency provided by the cloud computing platform, while providers hope to provide efficient, high-quality, and low-cost services through the cloud computing platform according to users' needs, and meet users in a convenient way, to obtain the maximum benefits. In addition, users and providers are integrated and related to each other in the design, quality, interaction, and evaluation of services.

Different from the traditional information service mode, cloud computing services do not directly provide users with data resources, software installation packages, or platform usage but adopt different service modes according to different needs to meet users and truly realize the user-centered service mode. The service system provided by the cloud computing center includes software as a service (SaaS),

platform as a service (PaaS), and infrastructure as a service (IaaS) [17]. Figure 1 shows the most basic cloud computing service architecture.

SaaS is different from the traditional mode of software download, installation, and use. This service form does not require users to install or download software at the local terminal. It provides different applications to users in the form of service according to a certain software service agreement. The user pays a certain fee to the supplier to obtain the service of the required software function. What the cloud computing center provides to users is not software, but software functions that can meet the relevant needs of users.

PaaS provides the development environment platform to users and provides a set of application development platform or solution to users in the form of service. The platform has the functions of software design, development, testing, and maintenance. Users do not need to purchase the software and hardware equipment of the platform and do not need to carry out a series of installation and debugging. The cloud computing center can provide the development platform with user services.

IaaS provides various network equipment, servers, databases, storage, and other facilities to users in the form of services. Users do not have to consider the infrastructure cost required by the cloud computing platform and can obtain the required infrastructure services after paying a certain fee. The services provided by cloud computing infrastructure allow users to obtain certain computing, storage, and data management capabilities remotely.

The deployment modes of cloud computing usually include public cloud, private cloud, community cloud, and hybrid cloud [15]. Various deployment modes adopt different services and composition modes. Users can choose any of them according to their needs. Figure 2 shows schematic diagram of four service modes and structures of cloud computing deployment.

Under the public cloud service mode, most suppliers provide computing, storage, data, management, and other services for different users free of charge. This cloud service mode is mainly accessed and used by accessing the Internet, which has strong scalability and efficiency. The private cloud deployment mode is mainly to provide relevant services for organizations, enterprises, or individuals. Cloud service providers are responsible for the construction of cloud platform infrastructure, and private cloud users need to pay relevant fees. Users are responsible for the supervision and security of private cloud services. Therefore, the private cloud can not only provide personalized service methods but also provide specific and applicable service content. The community cloud model mainly aims at organizations with the same or similar needs and provides cloud services in a shared way. This model adopts a set of cloud infrastructure services. Community cloud members obtain relevant information services by applying for cloud service qualification. Community cloud members jointly bear the infrastructure and resource use service fees provided by the community cloud. The hybrid cloud deployment model mainly combines two or more different cloud service modes according to different user needs. Cloud service modes in the hybrid cloud usually use their own service characteristics and provide services through integration, which not only gives full play to the advantages of different cloud service modes but also effectively realizes the ability of intelligent and intensive services.

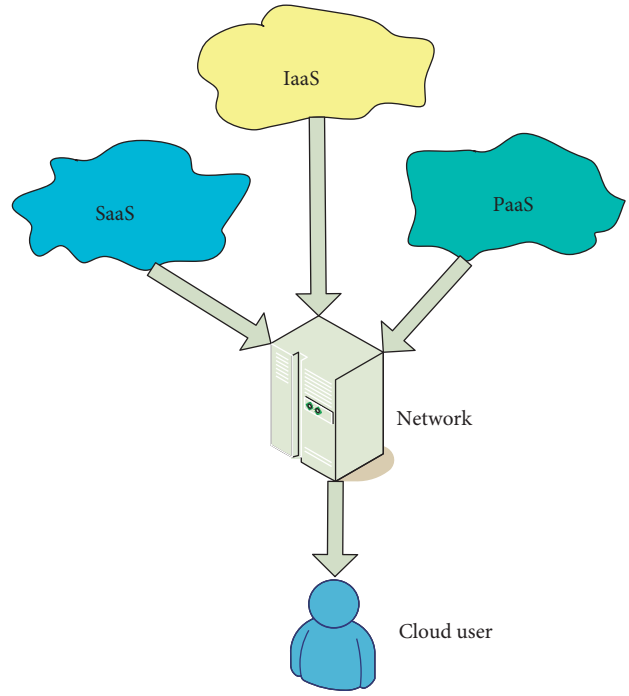

Figure 1: Schematic diagram of basic cloud computing service architecture.

3.3. Multisource Information Processing Mode Based on Cloud Computing Center. Cloud computing center has many information resources, with certain complexity and uncertainty. Users cannot meet their service needs through the traditional service mode. Although they can obtain information services in some special ways, they pay a large cost and time overhead. As a service provider, adopting the traditional service mode to provide users with information services in the cloud computing environment is not only poor compatibility but also low efficiency.

Cloud computing system contains many different types of information resources. Computing resources, physical resources, model resources, storage resources, and knowledge resources in different locations or spatial distribution can form a multisource information resource through integration [16]. Figure 3 shows the composition diagram of multisource information resources in the cloud computing system.

Effective management of multisource information resources is the premise to ensure that the cloud computing center completes various service functions. The management objects of multisource information resources mainly include the description, mining, retrieval, matching, and monitoring of information resources. Cloud computing system manages multisource information resources, effectively shields the

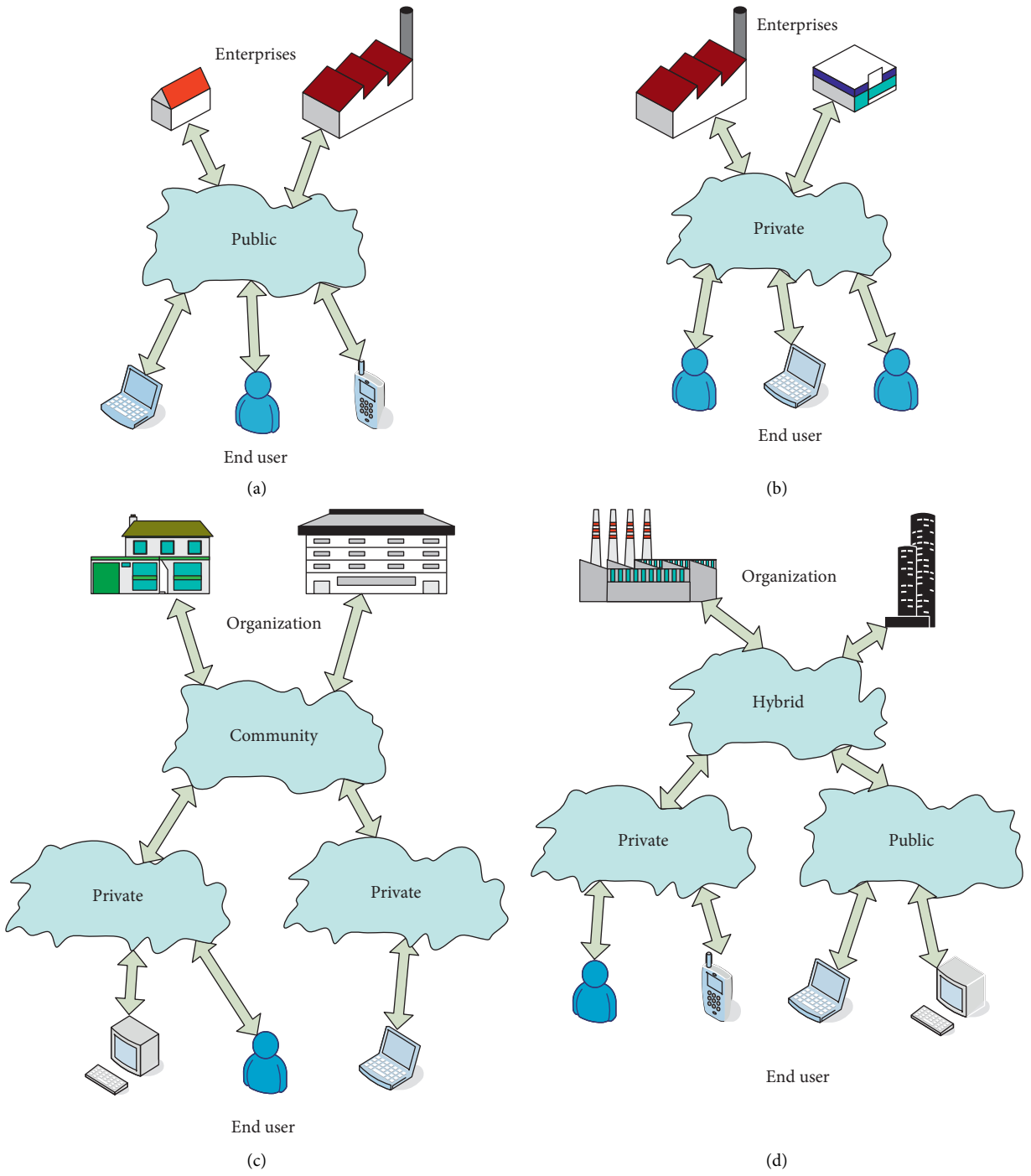

FIGURE 2: Schematic diagram of four service modes and structures of cloud computing deployment. (a) Public cloud. (b) Private cloud. (c) Community cloud. (d) Hybrid cloud.

heterogeneity of network information resources through virtualization technology, and integrates cross-domain information resources to form cloud service resources. Through the reconstruction of multisource information to form a single resource, it can ensure the efficient utilization of resources.

Multisource information service mainly starts from users, service providers, intermediaries, and data centers and forms a service model based on cloud computing centers through the interaction between them. By making a request for a service, the provider provides specific resource services to meet the needs of users [15]. Intermediaries mainly provide users with public portals or platforms for centralizing various information service resources. The data center stores various service resources to meet the needs of different objects. Figure 4 shows the relationship between the multisource information service model based on cloud computing center and its related elements.

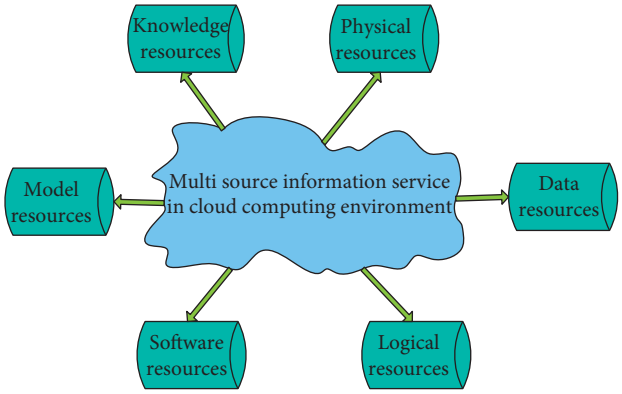

Figure 3: Composition diagram of multisource information resources under cloud computing services.

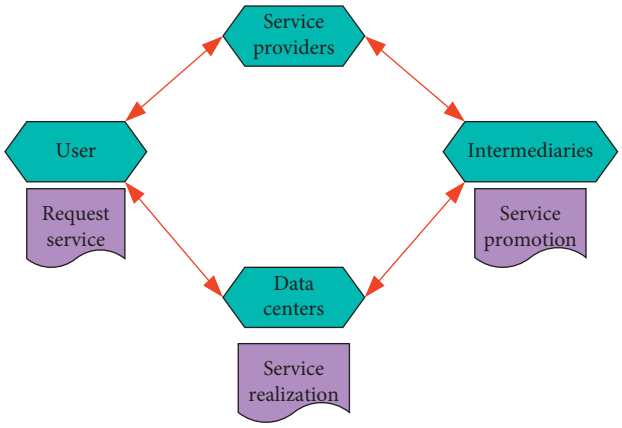

Figure 4: Schematic diagram of service mode based on the data center.

4. Design of Cross-Source Educational Information Classification Model

4.1. Educational Information Mining and Its Resource Classification. As a link of knowledge discovery of data resource database, data mining is a process of effectively extracting the required data from data resource database by adopting relevant data mining algorithms. Through data mining methods, we can obtain implicit and unknown knowledge or rules from a large number of data resources, which are very important to users and helpful for decision-making. These rules can reflect the internal relationship between different objects in the data resource database, to provide a reference for decision-making management and teaching analysis.

For the data mining of educational information, it is necessary to extract the relevant knowledge and rules that directly affect the teaching plan and education mode from the educational information resource base according to the actual requirements of education and teaching. In addition, for different types of educational information, the convenience of system operation and the simplicity of relevant rules should also be considered in the process of data mining. According to the characteristics of educational information types and the particularity of their composition, different processing methods should be considered in the process of data mining of educational information. These processing methods mainly include data acquisition and quantification methods for multisource information, data conversion methods, and decision tree forms.

In the data mining of educational information, we need to analyze the characteristics of different educational information. According to the different requirements of information extraction, the characteristics of educational information are composed of different types of educational resources and functional requirements [18]. Analyzing the characteristics of educational information through a data mining function can provide a reference for the classification of educational information. Figure 5 describes the process of analyzing the characteristics of educational information by using the data mining method.

Educational information resources are rich in connotation and complex in nature. As public goods, educational information services or products can be used by different organizations or individuals, which is noncompetitive. According to the existing research, from a macro perspective, educational information services or products can be divided into pure public education information and quasi-public education information according to the public goods theory [19]. Educational information services or products that are completely noncompetitive in educational information resources are called pure public educational information. On the contrary, educational information services or products with incomplete noncompetitiveness belong to quasipublic educational information.

Pure public education information belongs to pure public goods. When a certain kind of pure public education information is provided to users for use, other people cannot be excluded from using the information; that is, any user can use the information free of charge. This shows that when a user uses an educational information service, other people are not limited to use the service at the same time, and the quantity and quality of other people using the service are not affected. Pure public education information can be used not only for educational institutions and their business exchanges but also for the public. For example, the education department provides relevant policies and regulations, institutional settings, function introduction, work trends, announcements, and other information to the society through relevant websites, public libraries, newspapers, and other platforms.

In addition, quasipublic education information mainly includes weak competition education information and strong competition education information. Weak competition education information refers to the noncommercial educational information services provided through some media, mainly for the noncommercial educational information needs of the public. For example, educational institutions provide educational statistics to the public through some media. Strong competitive educational information refers to educational information services with certain commercial value. When a user uses the information, although it will not be affected in the amount of other people's

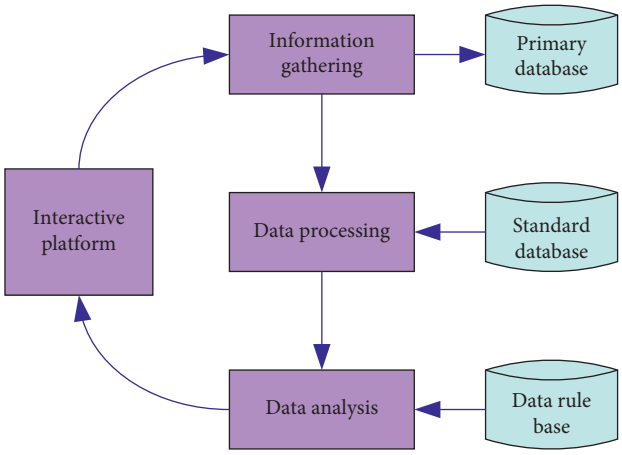

Figure 5: Educational information feature processing process based on data mining.

use of the information service, it will indirectly affect the value of other people's use of the information service to a certain extent.

The classification of different educational information is based on a certain application purpose or background, and the classification result is not absolute. For example, pure public education information can be transformed into quasipublic education information under certain conditions [20].

4.2. Text-Based Educational Information Classification Method. Educational information resources are rich in content, but the information distribution is discrete and disorderly, and there is no obvious law. For example, taking the profile of a school as an example, such educational information may appear on the school's portal, educational news platform, or relevant educational media. Different educational information has its own characteristics. For example, the profile information of colleges and universities is relatively rich and has more content, while the profile information of secondary schools has less content and the information is not updated in time. Therefore, the collection and value of information are usually determined by the type of educational information. Using traditional machine learning and automatic information retrieval methods is usually difficult to achieve the expected goal and may produce redundant data, which needs further classification and processing.

For a certain type of text information in educational information, it can be divided into specific subclass text information. Therefore, the classification of educational information can be determined by judging whether the document contains the characteristic information corresponding to the subclass text. According to the characteristics of educational information resources provided by cloud computing centers, this paper adopts the educational information classification method based on text features.

Firstly, the word segmentation method based on string matching is used to process the text data. Based on the dictionary, the substring in the text is extracted to be segmented according to a certain scanning algorithm, and the substring with the entry in the dictionary is compared. If the matching is successful, it indicates that the substring is a word segmentation in the text to be processed, otherwise continue to extract other substrings in the original text.

Secondly, after word segmentation of text information, a vector space model is used to represent the text to be processed. Therefore, the text features are selected by relevant algorithms, and the corresponding feature weights are calculated to form a multidimensional vector space [21]. The vector space of the document F can be expressed in the following form:

$$F = F(f_1, w_1; f_2, w_2; \ldots; f_n, w_n), \tag{1}$$

where f_i represents the feature item of the text to be processed; that is, it can reflect the basic attribute information of text F, which is usually composed of words or phrases. Due to the different positions or frequency of feature items in the text, the degree of representing the text is also different. w_i denotes weight, which is used to reflect the importance of feature items in the text F.

The feature items in the text can not only reflect the category to which they belong but also effectively distinguish other categories. The weight calculation of feature items in the text is very important for the accuracy and overall performance of text information classification [8]. The weight of feature items can be calculated by using the frequency of feature items in the text and the frequency information of antitext. The calculation formula is as follows:

$$w_{ij} = ff_{ij} \times ivf_j = ff_{ij} \times \ln\left(\frac{m}{n_j}\right), \tag{2}$$

where ff_{ij} represents the frequency of occurrence of feature item f_j in text F_i, n_j shows the reciprocal of the text with feature item f_j, m denotes the total number of texts, and n_j is the number of texts with feature item f_j.

Finally, by constructing the education information classification model, we can classify the automatically obtained education information in the cloud computing environment and take the text information and its characteristics that meet the category requirements as the target information. According to the characteristics of the educational information data set, a classification model based on fuzzy rules can be established to classify educational information [11]. As shown in Figure 6, the classification model mainly includes the construction of a fuzzy set and feature base, the analysis of text information, and the implementation of classification algorithm based on fuzzy rules.

The classification algorithm based on fuzzy rules represents the data as follows:

$$U = \{O, P, Q\}, \tag{3}$$

where U represents the text information to be processed, which mainly includes three parts. O is a set of participles in the text. Q denotes the text containing the paragraph information, and P represents the category collection containing the paragraph.

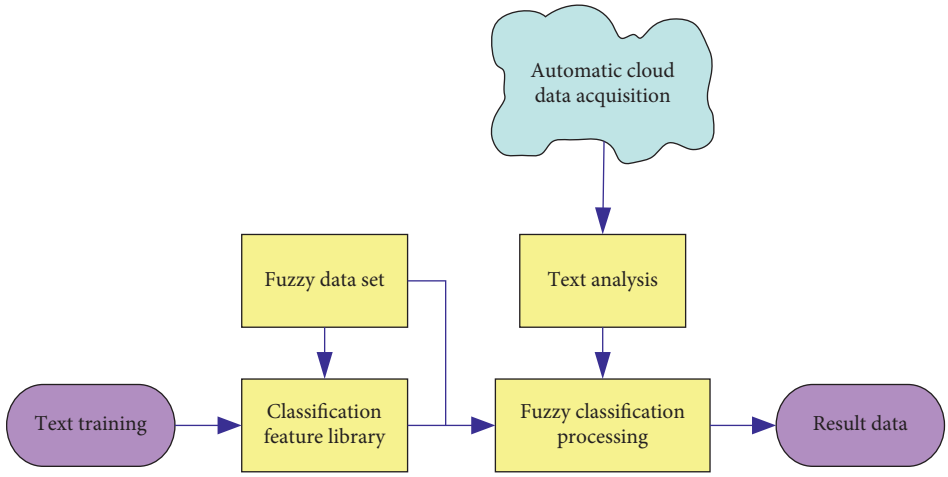

Figure 6: Schematic diagram of feature classification process based on fuzzy rules.

$$T = \{H, J, K\}, \tag{4}$$

where T denotes the feature library used for the classification algorithm and H, J, and K, respectively, represent the feature item, the weight of the feature item, and the category to which the feature item belongs.

4.3. Cross-Source Education Information Classification Model in Cloud Computing Environment. Aiming at users' demand for educational information, starting from users' behavior, and according to users' intention and interest, a multisource educational information cloud computing service platform is introduced. Semantic extension and text matching technology are used to analyze the semantics of multisource educational information. The extracted text features are matched with the cloud computing service resource database, and then, the reorganized education information is transmitted from the cloud service center to the user terminal through information classification processing. In the cloud service mode, a cross-source education information classification model based on cloud computing technology is established according to the different needs of users for education information, as shown in Figure 7.

The multisource information resource layer includes physical information resources and logical information resources. Physical information resources are mainly based on cloud computing service system. Through resource integration and integration technology, cross-source information resources are integrated and processed to provide an interface for the use of logical information resources. Logical information resources mainly use virtualization technology to process cross-source information resources. By analyzing the characteristics of user needs, logical information resources are transformed into knowledge levels in order to provide services for users. In the core technology layer of the model, cloud service technology is mainly used to meet the service needs of different users. Cloud service technology mainly includes virtualization technology, data mining, resource scheduling, and construction technology.

In the multisource information cloud service layer of the model, any individual, educational and scientific research institutions, and other relevant organizations can access the cloud computing service platform through the terminal and obtain relevant services according to their needs. Users can put forward requirements to the cloud computing center by inputting keywords and then provide users with corresponding service results after processing operations such as retrieval, analysis, and matching of feature information through the cloud platform. In addition, different from the traditional education information classification and service mode, the multisource information cloud service layer can use the data mining and knowledge discovery methods in the core technology layer to achieve the accurate matching of user needs and resource services.

5. Experiment and Analysis

5.1. Experimental Design and Performance Evaluation Index. Evaluating the educational information classification model can truly reflect the performance of the classification model in practical application. At present, accuracy, or error rate, recall rate, precision rate, and test value are mainly used in the performance evaluation of the classification model.

When evaluating the results of the classification experiment, if we do not consider the differences in personal thinking and assume that the manual classification is completely correct, we can compare the classification results based on the machine with the text classification results based on expert evaluation [21, 22]. The data formed after comparison can be expressed in four scores, as shown in Table 1.

tp indicates the number of positive samples belonging to the correct classification. *tn* represents the number of negative samples belonging to the correct classification. fp indicates the number of positive samples belonging to wrong classification. fn represents the number of negative samples belonging to wrong classification. Therefore, the actual number of positive samples can be expressed as $t = \text{tp} + \text{fp}$, the actual number of negative samples can be expressed as

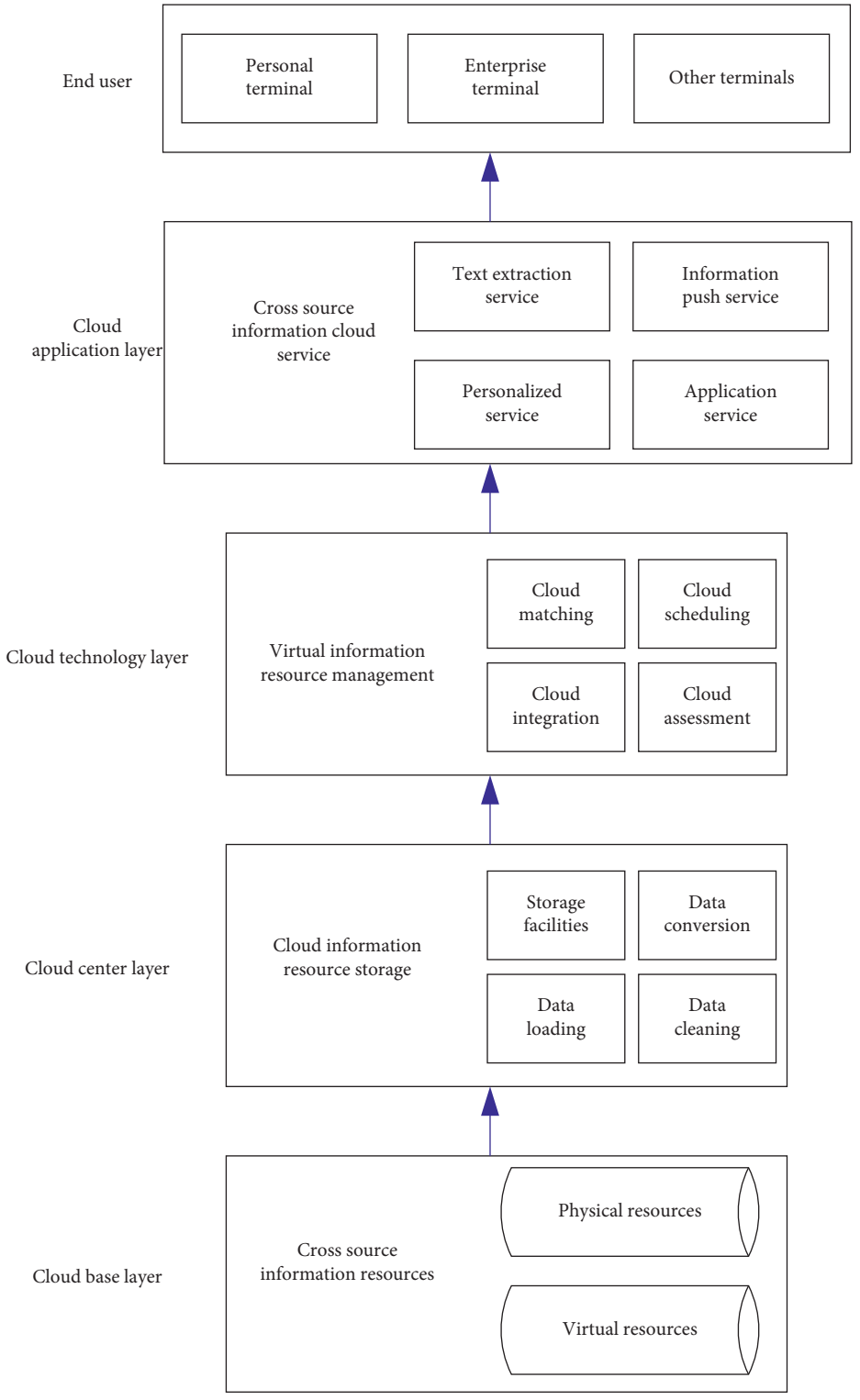

Figure 7: Construction of cross-source education information cloud computing classification model.

Table 1: Evaluation parameters of classification model.

Item	Positive sample	Negative sample
Correct classification	tp	tn
Wrong classification	fp	fn

f = tn + fn, and the number of sample examples used in the experiment can be expressed as num = $t + f$. Therefore, the relevant classification and evaluation criteria can be calculated.

The accuracy can be expressed by the proportion of the number of correctly classified instance samples to the total

Table 2: Statistical results of educational information classification based on support vector machine classification model.

Item	School profile	Enrollment	Platform construction	Teaching staff	Honorary awards	Teaching facilities	Student employment
Number of categories	375	186	218	269	195	237	285
Precision	0.852	0.829	0.869	0.904	0.847	0.838	0.875
Recall rate	0.894	0.886	0.913	0.923	0.892	0.917	0.903
F_1	0.885	0.864	0.885	0.918	0.884	0.868	0.894

Table 3: Statistical results of educational information classification based on the classification model proposed in this paper.

Item	School profile	Enrollment	Platform construction	Teaching staff	Honorary awards	Teaching facilities	Student employment
Number of categories	438	226	242	315	248	274	326
Precision	0.913	0.895	0.925	0.916	0.932	0.916	0.923
Recall rate	0.932	0.925	0.932	0.943	0.918	0.938	0.942
F_1	0.925	0.912	0.929	0.937	0.926	0.924	0.936

number of instance samples, and its calculation formula is as follows:

$$AC = \frac{\text{tp} + \text{tn}}{\text{num}}. \tag{5}$$

The error rate can be expressed by the proportion of the number of misclassified instance samples to the total number of instance samples, and its calculation formula is as follows:

$$ER = \frac{\text{fp} + \text{fn}}{\text{num}}. \tag{6}$$

Precision is often called accuracy, which can be expressed by the proportion of the number of positive samples of correct classification to the total number of samples of all correct examples of classification. Its calculation formula is as follows:

$$PR = \frac{\text{tp}}{\text{tp} + \text{tn}}. \tag{7}$$

Recall rate can be expressed by the proportion of the number of correctly classified positive samples to the total number of actual positive samples. Its calculation formula is as follows:

$$RR = \frac{\text{tp}}{\text{tp} + \text{fp}}. \tag{8}$$

F_1 test value is mainly expressed by the harmonic average of accuracy rate and recall rate, which reflects the overall performance of the classification model. Its calculation formula is as follows:

$$F_1 = \frac{2 \times RR \times PR}{RR + PR}. \tag{9}$$

Among these classification performance evaluation indicators, precision and recall rate are commonly used. Because these two evaluation indicators reflect the classification quality of the model from different angles, the balanced use of precision and recall rate must be considered when designing the classification model.

5.2. Results and Analysis. In order to verify the cross-source education information classification model based on cloud computing proposed in this paper, 2000 randomly collected school profiles are used as the training set of the model. Through intensive training, the accuracy and recall of the classification model are balanced. Then, 500 school profiles collected at fixed points are used as the test set of the model. In order to verify the classification performance of the classification model proposed in this paper, a typical classification model based on a support vector machine (SVM) is used for comparative experiments. After experiments on the test set with two different classification methods, the corresponding statistical results are obtained, as shown in Tables 2 and 3.

From the experimental results of the two different classification algorithms reflected in the above table on the classification number, recall rate, accuracy, and F_1 test value of seven categories, it is known that the F_1 value obtained when using this model to classify educational information is greater than that based on SVM classification, indicating that this model has obvious advantages in the performance of comprehensive classification of educational information.

In order to study the effectiveness of the model proposed in this paper in information classification, this model and other common models such as classification method based on support vector machine are applied to the educational information monitoring system, respectively, and experimental observation and comparative analysis are carried out. Using these four different models to classify the educational information resources provided by the cloud service center in real time, we can get the relationship between the number of text resources to be processed and the required time overhead, as shown in Figure 8.

From the comparison results of different models, we know that when using different classification models to deal with educational information resources, with the increase of the number of text resources, the time cost of information classification of the model gradually increases. When dealing with the same number of text resources, the time cost of

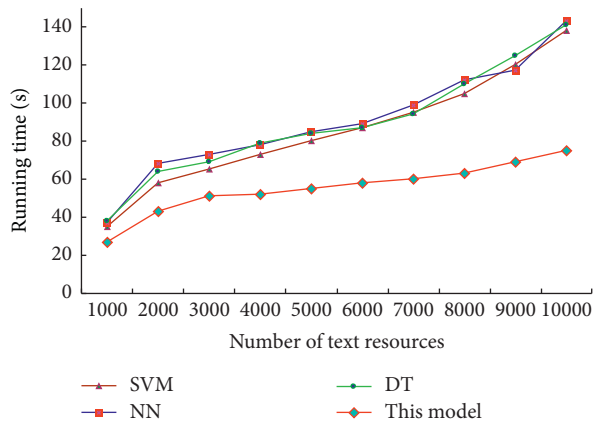

Figure 8: Efficiency comparison of real-time classification of educational information resources provided by cloud service centers with different models.

using the classification model proposed in this paper is less than that of other classification models, which shows that this model has higher efficiency in realizing educational information classification.

6. Conclusion

Based on the analysis of the shortcomings of existing classification algorithms in the application, this paper proposed a cross-source education information classification model based on cloud computing technology. By analyzing the composition and function of the cloud computing platform, this paper expounded the cloud computing service mode and its deployment characteristics and gave a multisource information processing method based on the cloud computing center according to the distribution law of different information in the cloud computing platform. According to the types of educational information resources and their distribution characteristics in the cloud computing environment, data mining technology was used to extract the relevant features of educational information, and a text-based classification method of educational information was proposed. Finally, the cross-source education information classification model in the cloud computing environment was designed. The experimental results showed that the method proposed in this paper can not only effectively classify the multisource education information under the cloud computing platform but also has higher classification accuracy and work efficiency compared with other traditional classification models. The classification model proposed in this paper can provide theoretical and application references for the classification of other information resources in the cloud service environment.

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 author declares no competing interests.

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