Japanese Online+Offline Hybrid Educational Resources Sharing System Based on Data Classification

Yi Wei(✉)

School of Foreign Languages and International Education, Chengdu Technological University, Chengdu 611730, China
weiyiry0855@163.com

Abstract. In the process of online+offline mixed educational resources sharing, due to the lack of effective data classification, the response rate of student terminal education server is slow, and it is difficult to share Japanese teaching resources quickly. Therefore, a Japanese online+offline mixed educational resources sharing system based on data classification is studied. Improve the hardware design of the sharing system from three aspects: resource management module, resource retrieval module, and user management module. On this basis, the principle of support vector machine is combined to define the sample data set, and relevant parameter indicators are combined to solve the expression of data classification model. Then, by analyzing the specific functional requirements of each application unit, the processing of mixed educational resources is realized. Combined with the relevant hardware application structure, the design of Japanese online+offline mixed educational resources sharing system based on data classification is completed. The experimental results show that under the effect of the data classification model, the average response rate of the student terminal education server has significantly improved, which is in line with the original intention of the system design to quickly share Japanese teaching resources.

Keywords: Data classification · Japanese teaching · Online education · Offline education · Mixed educational resources · Resource sharing · Support vector machine · Functional requirements

1 Introduction

Data classification is to combine data with certain common attributes or characteristics, and distinguish data by their attributes or characteristics. In order to realize data sharing and improve processing efficiency, we must follow the agreed classification principles and methods, and divide all information in the system into different sets according to a certain structural system according to the connotation, nature and management requirements of information, so that each information has a corresponding position in the corresponding classification system. In other words, the information with the same

G. Gui et al. (Eds.): eLEOT 2023, LNICST 543, pp. 267–282, 2024.
https://doi.org/10.1007/978-3-031-51465-4_18

content, the same nature, and the information that requires unified management are gathered together, and the different information and the information that needs to be managed separately are distinguished, and then the relationship between each set is determined to form an organized classification system. According to the purpose of classification, the most stable essential characteristics of the classification object are selected as the basis and basis of classification to ensure the most stable classification results. Therefore, in the process of classification, we should first clearly define the most stable and essential feature [1] of the classification object. Systematically arrange the features (or characteristics) of the selected classification objects according to their internal laws to form a classification system with clear logical hierarchy, reasonable structure and clear category. In the setting of categories or the division of levels, there is appropriate room to ensure that the established classification system will not be disturbed when the number of classification objects increases. Starting from the actual needs, the specific classification principles are determined by integrating various factors, so that the resulting classification results are optimal, meet the needs, comprehensive and practical, and easy to operate. If there are relevant national standards, the national standards shall be implemented; if there are no relevant national standards, the relevant industrial standards shall be implemented; If neither exists, relevant international standards shall be referred to. In this way, the coordination and conversion between different classification systems can be ensured as far as possible.

With the development of the Internet and the improvement of the level of science and technology, modern education has developed from the traditional face-to-face teaching of teachers and students in the classroom to the coexistence of multiple teaching methods, in which the education mode of online education has become the key goal of modern education services. The traditional face-to-face education mode is limited by time, space, manpower and material resources, which is difficult to meet the requirements of today's information construction and education reform. In contrast, online education transcends space and time constraints and provides people with a more convenient and flexible way of learning. Through the network, schools can be extended to families, companies and even any corner of society. People can flexibly allocate their learning time to integrate work, learning and life [2].Whether students, workers unable to study off the job or other social figures, regardless of social level or age level, there are conditions and opportunities to accept education at all levels. The promotion and development of online education has improved the information literacy of teachers and students, accelerated the updating of knowledge resources, changed the way people access resources and read, and provided more learning opportunities and better learning environment for learners. One of the advantages of online education is to realize the sharing of educational resources. The so-called educational resources refer to all objectively existing entities such as people, media, strategies, methods and environment that can improve and promote teaching. Network education needs to digitize educational resources, and the resources after digital processing can run in the multimedia computer and network environment. In order to further realize the new educational ideas, we will introduce a hybrid educational mode of online and offline learning in all fields of learning to improve the efficiency of educational learning.

In the process of online+offline mixed educational resources sharing, due to the lack of effective data classification, the response rate of student terminal education server is slow, and it is difficult to share Japanese teaching resources quickly. Therefore, a Japanese online+offline mixed educational resources sharing system based on data classification is studied. Through reasonable data classification and storage strategies, common and popular educational resources can be placed on online servers closer to students, so as to respond to students' requests quickly. The less commonly used and unpopular educational resources can be stored on the offline server, reducing the load on the online server and improving the performance of the whole system. In this paper, the principle of joint support vector machine is adopted to define the sample data set, and the expression of data classification model is solved by combining relevant parameter indexes. Then, by analyzing the specific functional requirements of each application unit, the processing of mixed educational resources is realized. Finally, combined with the related hardware application structure, the design of Japanese online+offline mixed educational resource sharing system based on data classification is completed. The experimental results show that the average response rate of the server is greatly improved under the effect of the data classification model, which provides strong help for the rapid sharing of Japanese teaching resources.

2 Shared System Design Scheme

The improvement of the hardware design scheme of Japanese online+offline hybrid education resource sharing system should be carried out simultaneously from three aspects: resource management module, resource retrieval module and user management module. This chapter will study its specific design methods.

2.1 Resource Management Module

In the Japanese online+offline hybrid educational resource sharing system, the resource management module processes the shared information parameters by improving the storage behavior of teaching resources. Educational resources often have multiple forms of existence, such as documents, pictures, videos, and so on. Most of these massive digital resources exist in an unstructured form, which cannot be effectively stored using a unified data structure, thus making resource sharing difficult to achieve. In view of the characteristics of massive educational resources such as diversity, heterogeneity and low degree of sharing, the first problem to be solved in realizing the goal of massive educational resources sharing is the description of educational resources, that is, a standardized and feasible way should be defined to uniformly describe and package educational resources, so as to realize the unified storage and retrieval of resources. This is the basis for effective resource sharing [3].Therefore, the system should first carry out unified and standardized representation of resources.

Defining a consistent data resource description framework through data classification standards is an effective means to solve this problem. Metadata is the description of the data structure and content characteristics of the original data resources. Users browse metadata to access the original data resources, that is, the education resources themselves.

The so-called metadata standard is the collection of all rules when describing the specific objects of educational resources.

In addition, the hybrid education resource sharing system also provides 9 optional data elements, which are: publisher - the person responsible for making the resource available and available, usually identified by the name of the publisher; Other authors - other authors who have contributed to the creation of resource content; Related resource - another related resource identifier, but there is a relationship between the current resource and this resource, and the "relationship description" element describes this relationship; Relationship description - the relationship between the current resources and the resources represented by "related resources"; Coverage, the extension and coverage of resource content, including spatial location description, time period description or permission description; Permission - information about the permission owned or granted by the resource itself, including the permission statement for the resource, or a reference to the service that provides this information; Evaluation - comments or identification of resources from a third party who is not the author or publisher; Evaluators - individuals, organizations or institutions associated with evaluation; Version - the version of the learning object.

On the system page, users can view the metadata information of Japanese teaching resources and the content information of the resources themselves (displayed on the page in preview mode). When they need to obtain resources, they can obtain the corresponding resources in HDFS through the storage location field of the resources in the database table. Table 1 shows the design principles of the resource management module description information table ResourceInfo.

Table 1. ResourceInfo data description of resource management module

Field name	Field type	Explain
Title	Varchar(50)	Title of Japanese teaching resources
TypeId	Integer	Types of Japanese teaching resources
ResourceId	Integer	Japanese teaching resource ID
UserId	Integer	Owner of Japanese teaching resources
FormatId	Integer	Japanese teaching resource file format
Value	Integer	The value of Japanese teaching resources
Identify	Varchar(255)	Identification of Japanese teaching resources

The specification allows users to expand metadata elements according to the needs of the system, but it must conform to the format and technical specifications defined by the specification elements. With reference to this specification, the system designs the storage mode of resources as follows:

(1) The educational resources themselves and the resource description information are named with the same file name and stored in the designated folder of the HDFS distributed file system through Hadoop. The resource description information is

generated by the resource name and the resource content introduction in a fixed format for generating index files during resource retrieval.

(2) The metadata information of Japanese education resources is stored as a record in the MysQL database table, and the storage location of the resources in HDFS is recorded, which is the way to download and obtain resources. Metadata information is used for users to view various attributes of resources when resources are displayed.

2.2 Resource Retrieval Module

The resource retrieval module provides users with a simple retrieval method to quickly and accurately retrieve the desired resources. In this system, users search resources by keyword. Due to the huge amount of educational resources involved in the system, it is difficult to achieve fast and accurate retrieval results only through traditional relational database queries. In order to improve the speed and accuracy of retrieval, the retrieval process is implemented on multiple DataNodes in the background through the MapReduce program in Hadoop.

The retrieval of online+offline hybrid educational resources mainly includes the establishment of inverted index files and the realization of parallel search. MapReduce programming model is used to establish inverted documents or realize parallel search. Every MapReduce program is a combination of map and reduce. The search content implemented by this system is based on resource description information, which consists of resource name and resource content introduction [4]. In the design of parallel retrieval, the user sends a query command to retrieve in real time, and the efficiency of user query is determined by the efficiency of parallel search. The operation of creating inverted documents is issued regularly, and the inverted index has been established before receiving the user's query command, so the efficiency of creating inverted index does not affect the efficiency of query. The implementation process design of the entire resource retrieval module is shown in Fig. 1.

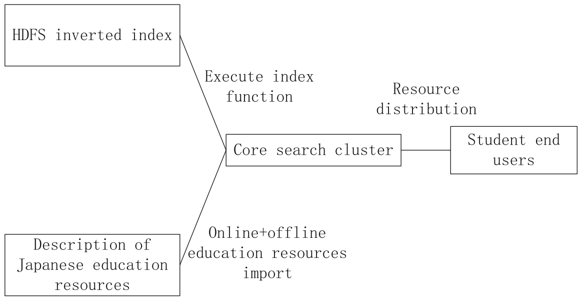

Fig. 1. Implementation process of resource retrieval module

The establishment of inverted index is the first stage of parallel retrieval, that is, to establish inverted index documents for resource description information imported into HDFS to provide input data for subsequent searches. It adopts Hadoop's Map/Reduce parallel programming mode. During the index establishment process, JobTracker coordinates the distributed processing of each DataNode node in the system. After the index processing of each DataNode node, the generated index fragments are reduced and merged into an index whole, and finally saved to HDFS. The design process of the entire distributed index is described as follows:

(1) Read the file description information from the specified location of HDFS as input, segment the input file through FileSplit, and process the input data with the key value in the form of < name, content > to the map function allocated to different DataNodes.
(2) Each map parses the input key values of < name, content >, name, value, content, extracts keywords, assigns the word frequency of each keyword to 1, and outputs them to the combiner in the format.
(3) Combine: complete the statistics and sorting of the word frequency corresponding to the same keyword. (Note: The word frequency statistics of map and combiner are different. A keyword is extracted in the map operation, and the word frequency assigned to it is 1, while the word frequency of combine is the accumulation of the same key value in the same DataNode, that is, the word frequency value corresponding to the keyword.). Then each combiner outputs its own statistical results, that is, the inverted sort index. At this time, the index is not perfect and needs to be merged by reducer.
(4) The reducer receives the output of the combiner, traverses all nodes to obtain the required intermediate data set, and then performs post processing such as de duplication, filtering, accumulation, and sorting to obtain the results.
(5) Finally, the OutputFormat class outputs the inverted index document as a file and stores it on HDFS.

2.3 User Management Module

The user management module of the Japanese online+offline hybrid educational resource sharing system consists of four parts: user registration and login unit, user information management unit, user integral management unit, and user authority management unit.

The user registration login module is used to register tourists and login users. Tourists can enter the registration page by clicking “Register” on the system homepage, enter the user name and password, and click “Register”. At this time, judge whether the user name is the same as the existing user name in the system. If not, add a new user name and password to the database, and jump to the user login interface. Otherwise, the user will be prompted that “the user name has been registered”, and the user needs to rename.

The user information management module is mainly used for users to manage their own information and administrators to manage all user information. The function design is as follows: all system users can view personal information and modify personal information. Ordinary users can apply for upgrading to authenticated users. Administrators can find users, view user information, add, delete, and modify user information according to conditions [5]. At the same time, the administrator needs to review the upgrade application submitted by the user, and agree or reject the user’s upgrade.

User credit management module provides users and administrators with the function of managing user credit. In the system, you can view your own point use details list at any time, including point change details, change time, change product score, and current remaining product score. Where the details of points change include downloaded resources, the name of downloaded resources, download time and the number of points deducted will be displayed; If the comment gets points, the comment resource name, comment time and added points will be displayed. Users can obtain points by uploading resources for others to download and commenting on resources. The administrator can view the change details of the points of the specified user and manage the user points.

User permission management refers to that according to the permission rules set by the system, users can only perform their own authorized operations and access their own authorized resources. A good privilege management system should assign different system operation privileges to each class or user, and should be extensible. In this system, different user roles have different operation permissions. The administrator manages the permissions of all roles through the permission management module. The realization of this unit structure function involves three subjects, one is the user who owns the permission, the second is the user role set by the system, and the third is the executable permission operation for the system [6]. By assigning different operation permissions to different roles and then assigning the roles with permissions to a user, that is, there is no direct relationship between users and permissions. Users are associated with permissions through roles, so that users can implement the corresponding rights. The E-R model of the user rights management unit is shown in Fig. 2.

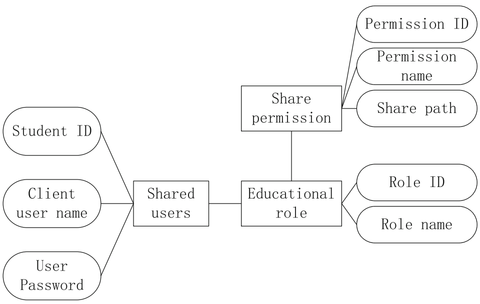

Fig. 2. E-R Model of User Rights Management Unit

In order to simplify the relationship in the Japanese online+offline hybrid education resource sharing system, each user only corresponds to one role. The administrator can directly view the role of the user and the operation permissions of the role through the browser, and can directly modify the user role and role permissions on the page according to the system function needs. After modification, when the user logs in to the system again, the operation interface will directly display the modified operation permissions. In this way, users and permissions are associated through roles, which not only conforms to the logic in real life, but also has simpler program design, clearer thinking, and simpler and more convenient access management for administrators. After a user logs into the system, the application program performs the following operations to obtain the user's operation permissions:

The program obtains the user ID from the session. If not, the page will locate the error prompt information page.

Query the role ID from the user role relationship table according to the obtained user ID.

Query the role permission relationship table through the user role to obtain all operation permission IDs of the role.

Query the operation authority table according to the authority ID, obtain the operation authority name corresponding to the ID and the operation page link corresponding to the authority, and display them in the user operation interface in order. Click the operation name to jump to the corresponding operation interface. If the user role does not have the corresponding operation permission, the corresponding prompt will be given on the user operation page.

3 Mixed Educational Resources Processing

On the basis of application modules at all levels of the system, in order to realize the sharing and processing of Japanese online+offline hybrid educational resources, the functional requirements of component structures at all levels should also be analyzed according to the data classification model.

3.1 Data Classification Model

(1) Support vector machine principle

The design of Japanese online+offline hybrid educational resource sharing system needs to refer to the data classification model, and the design of model structure must follow the principle of support vector machine. Direct push support vector machine is a generalization of support vector machine in semi supervised learning. Traditional support vector machine only considers labeled samples and looks for the maximum separating hyperplane from labeled samples. After taking unlabeled samples into consideration, direct push support vector machine looks for the hyperplane that can separate labeled samples and pass through areas with low data density.

As the key point of the whole educational resource sharing platform, the relevant educational resource system integration module realizes the reorganization of the existing system, uses the principle of support vector machine to SOA the existing system and reorganize the services, and then rearranges it. At the same time, it integrates the existing educational resources in the relevant system, In order to truly realize the integration of all systems related to educational resources in the whole school, and truly realize the sharing platform of educational resources.

The relevant education resource system integration module mainly integrates other existing teaching management systems through SOA, web service, EBS and other technologies. For various existing education resource systems in schools, SOA technology is used to realize service arrangement and reorganization, and then re open to the outside world, so as to make use of existing resources and combine existing services, Quickly integrate to form new business services, realize resource sharing faster, and reduce costs [7].

Due to the uniqueness of Japanese online+offline hybrid educational resources, the educational resources running on the system are more valuable, and it is not easy to retrieve them after they are lost. Therefore, the reliability requirements for the system are high, especially for the reliability of hardware devices such as file storage servers and database servers. The servers should have high reliability. In addition, the server should also have better redundancy, backup and recovery and other disaster recovery schemes, so that the relevant data stored on it can be easily and safely recovered in case of system hardware failure, thus ensuring the security and reliability of relevant Japanese education sharing education resources from the software level.

Given tagged sample set $P_n = \{(p_1, i_1), (p_2, i_2), \cdots, (p_n, i_n)\}$, where, $p_1, p_2, \cdots, p_n$ respectively n different online education resource marking parameters, $i_1, i_2, \cdots, i_n$ respectively n different offline education resource marking parameters are shared χ the value always belongs to $[1, +\infty)$ the support vector machine expression can be defined as:

$$Y = \beta \times \frac{\min \frac{1}{\chi}\left|p_1^2 + p_2^2 + \cdots + p_n^2\right|}{\sum_{\alpha=1}^{+\infty} i_1^2 + i_2^2 + \cdots + i_n^2} \tag{1}$$

Among them, α represents the redundancy coefficient of educational resources, β represents the educational resource information identification parameters selected based on the data classification model.

Direct push support vector machine successfully uses a small amount of labeled data and a large number of unlabeled data to train a more ideal support vector machine model. Compared with the traditional support vector machine, the direct push support vector machine effectively uses the information implied in the unlabeled data, and successfully improves the classification accuracy of the support vector machine by combining the distribution information of the unlabeled data. But the direct push support vector machine needs to traverse all unlabeled data during the training process. When the problem size is small, it can be solved directly, but when the data size is large, the algorithm takes too long, or even the problem is unsolvable.

(2) Sample data set

In the process of implementing the data classification of Japanese online and offline mixed educational resources, the expression of sample data set can be used to describe the application ability of support vector machine principle. The definition of sample data set refers to the transformation of data samples in the real world into mathematical representations for training and classification of support vector machines. Specifically, the sample data set includes a set of labeled data samples, and each sample has multiple characteristics or attributes. These features can be text, images, audio and other different types of data. The abstract definition of sample data set represents each sample as a vector and associates it with the corresponding label.

Assume that there is a training set in a linear nonseparable space W, where exist respectively δ_1 and δ_2 two types of samples, sample points e_1 for this category δ_1. A sample in the training set that has been mapped $\tilde{q}$ obtain $\tilde{q}(e_1)$, the same category δ_2 sample points in e_2 mapped $\tilde{q}$ obtain $\tilde{q}(e_2)$. After mapping, the sample points become linearly separable, and the simultaneous formula (1) can $\tilde{q}(e_1)$, $\tilde{q}(e_2)$ shared distance between $D_{e_1 \leftrightarrow e_2}$ expressed as:

$$D_{e_1 \leftrightarrow e_2} = \frac{\sqrt{\sum_{a=1}^{+\infty} |\tilde{q}(e_2) - \tilde{q}(e_1)|^2}}{w_1 \times w_2} \tag{2}$$

where, a linear coefficient representing Japanese education resource information, w_1 Representation and δ_1 sample related education resource description vector, w_2 representation and δ_2 the description vector of educational resources related to the sample, and w_1, w_2 there are always value conditions shown in Formula (3).

$$w_1, w_2 \in W \tag{3}$$

It is used to realize real-time query of course resource list and course resource information according to the data classification model. You can query the list of all course resources corresponding to the query criteria through such query criteria as subject name, course resource owner (teacher name), course resource name, upload time, and school. According to different user permissions,Each time, a different number of course resource lists and brief descriptions that meet the query criteria are returned in the form of pagination.The detailed information of the course resource can be queried through the conditions such as the course resource number, course resource name, etc., including the metadata such as the course resource name, owner, upload time, file size, modification times, and download times. At the same time, the storage address of the course resource can be returned, so as to facilitate the whole process of viewing and downloading the course resource.After the metadata of relevant course resources is passed in, the relevant information is recorded in the database after uploading the course resources to the file server, so as to realize the operation of uploading course resources[8].Pass in the course resource ID, return the storage address of the course resources corresponding to the resource ID, and then download the specified course resources through the address, so as to realize the download function of course resources.Through the course resource ID, modify the description of the course resource, the course resource file and other information or data corresponding to the resource ID, so as to realize the dynamic maintenance function of the existing course resources.

If the classification conditions are met, set ϕ represents the classification coefficient of Japanese online+offline mixed educational resources in the sharing system, f represents the educational resource import parameters in the shared system, $\overline{h}$ represents the unit cumulative amount of online+offline mixed educational resources, $\dot{k}$ indicates the directional transmission characteristics of resource information. With the support of the above physical quantities, formula (2) can define the sample dataset expression based on the data classification model as:

$$G = \frac{1}{\phi}\left(\sum_{-\infty}^{+\infty} f \cdot D_{e_1 \leftrightarrow e_2}\right) \cdot \sqrt{\frac{\left|\overline{h}\right|}{\dot{k}^2 - 1}} \tag{4}$$

Active learning is carried out for unbalanced data with few labels. If the initial training set is constructed by random sampling, it cannot guarantee that the initial training set has a high amount of information. Using these unreliable samples to train the initial classifier will lead to a large deviation from the correct position of the initial classifier, increasing the calculation cost of subsequent active learning iterative learning. And the initial training set selected randomly is largely unbalanced, which cannot improve the generalization accuracy for a few classes. Therefore, it is necessary to study the initial training set selection strategy of active learning.

When the resource sharing system adds educational resources according to the data classification model, first fill in the relevant information of the newly added educational resources, then select the file of educational resources to upload, then enter the relevant details, and finally select the operation of adding resources. The system verifies the file format, size, input information and other relevant information. After the verification is passed, the system uploads the fileThen write to the database, refresh the page, and add educational resources.

3.2 Functional Requirement Analysis and Realization of Shared Services

According to the business demand analysis of the Japanese online+offline hybrid education resource sharing system and the current demand of related systems, the whole system is divided into several modules, including user management, education resource management and related education resource system integration modules. The detailed functional requirements of each module are shown below.

The user management module includes two functional modules: user login and user information management. The user information management includes user information modification, adding new users and deleting users, which is used to maintain the user system of the whole system [9]. The user management module mainly includes user login and user information management related modules. The user information management module includes administrators adding new users. Administrators can add new users by importing the obtained new user list into the system. At the same time, all users have the right to modify their personal information. User information management includes user information modification, adding new users, deleting users and other functions to maintain the user system of the whole system.

Curriculum resource management is used to manage curriculum related resources, including the function of managing curriculum related resources such as curriculum documents and reference materials. You can add curriculum resources, view curriculum resources, and download selected curriculum resources through the system. At the same time, teacher users or administrators can maintain the information of curriculum resources,Delete or modify relevant course resources [10].

The solution result of the function requirement analysis expression of the resource sharing system is as follows:

$$L = \frac{\prod_{c=1}^{+\infty} \lambda \cdot \dot{j} \cdot |\Delta X|}{G} \tag{5}$$

Among them, c represents the education resource information transmission parameters in the system host, λ represents the resource information storage coefficient, $\dot{j}$ it represents the recognition characteristics of the shared host for Japanese online+offline hybrid educational resources, ΔX represents the unit cumulative amount of education resource information. In order to realize real-time sharing of Japanese online+offline mixed educational resources, the inequality conditions shown in Formula (6) and Formula (7) must be established at the same time.

$$\Delta X > 0 \tag{6}$$

$$\begin{cases} \lambda > 0 \\ \dot{j} \geq 1 \end{cases} \tag{7}$$

The integration of educational resources should quickly and conveniently complete the integration of other existing educational resources and existing systems, so as to achieve the great integration of the whole school's educational resource system. In the implementation process, the following technical problems need to be solved. (1) Processing of existing redundant data: at this stage, various independent applications have produced a lot of teaching resource data in the process of system operation, and there is a lot of redundancy between these data, resulting in poor data consistency. How to better handle the existing redundant dataProviding highly consistent educational resource data for educational resource sharing platform is the first problem that should be dealt with in the integration of educational resources. (2) Processing of existing redundant functions: there are many existing educational administration systems and teaching resource systems in the school, among which there is a large part of functional redundancy. Many systems have similar functions, operate and process similar data, and after integration, these similar data will be integrated into one,At this time, these similar functions operate on the same data from different levels, making the maintenance of system data consistency more difficult. How to integrate these redundant functions is also helpful to shorten the development cycle of the system.

On the basis of formula (5), the calculation formula of hybrid education resource sharing service can be expressed as:

$$M = \frac{\xi L}{\sqrt{\dot{B}(\omega + 1)}} \tag{8}$$

where, ξ represents the real-time sharing coefficient of mixed educational resources, $\dot{B}$ represents the response parameters of education resource sharing service based on data classification, ω represents the shared service execution vector. So far, it has realized the calculation and processing of sharing behavior parameters, combined with hardware application structures at all levels, and completed the design of Japanese online+offline hybrid educational resource sharing system based on data classification. The system design flow chart is shown below (Fig. 3).

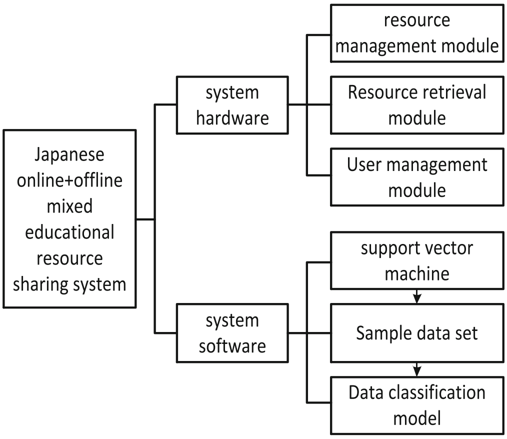

Fig. 3. System design flow chart

4 Example Analysis

4.1 Experimental Process

In order to verify the practical value of Japanese online+offline hybrid education resource sharing system based on data classification, sharing system based on neural artificial network, and sharing system based on SOA propagation model, the following comparative experiments are designed.

Step 1: Use Windows host cluster as the network terminal server, Mainframes host cluster as the client server, and use IPC channel organization to establish the data information transmission relationship between host and server.

Step 2: Input the running program of the Japanese online+offline hybrid education resource sharing system based on data classification in the client server, record the data change of the server response rate under the effect of the system, and the results are experimental group variables.

Step 3: Input the running program of the sharing system based on the neural artificial network in the client server, record the data change of the server response rate under the action of the system, and the result is a control group of variables.

Step 4: Input the running program of the shared system based on the SOA propagation model in the client server, record the data changes of the server response rate under the action of the system, and the results are compared with two groups of variables.

Step 5: Collect the variable data and summarize the specific experimental rules.

4.2 Experimental Index

Throughput: indicates the number of requests that the server can handle in a unit time, which can effectively reflect the response rate of the server. Its expression is:

$$v = \frac{N \cdot G}{T} \tag{9}$$

where N represents the number of requests, G represents the data size, and T represents the total time.

4.3 Principle and Conclusion

In the education resource sharing network, the response rate of the student terminal education server is equal to the Japanese teaching resource sharing rate. Because it is relatively difficult to measure the latter, in the actual application process, the real-time sharing of Japanese teaching resources can be analyzed according to the response rate level of the server.

The figure below reflects the numerical changes of server response rate under different experimental environments.

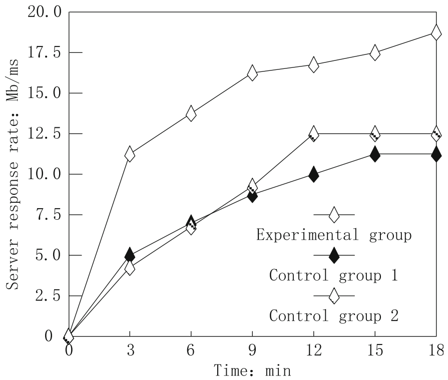

Fig. 4. Server Response Rate (Network System Busy)

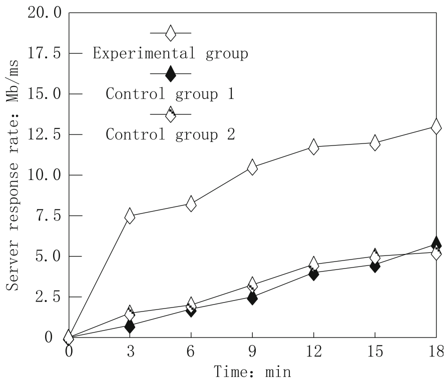

Fig. 5. Server Response Rate (Network System Idle)

In Fig. 4 and Fig. 5, respectively, take the maximum value of the server response rate of the experimental group and the control group, and calculate the average response rate. The specific calculation results are shown in formula (10).

$$\begin{cases} \overline{v}_1 = 15.76 \\ \overline{v}_2 = 8.51 \\ \overline{v}_3 = 8.84 \quad (\text{Unit}: \ \text{Mb/ms}) \end{cases} \tag{10}$$

Among them, $\overline{v}_1, \overline{v}_2, \overline{v}_3$ represent the average server response rate of the experimental group, control group 1 and control group 2 respectively.

According to the calculation result of formula (10), the average speed of the experimental group is the highest, with a mean difference of 7.25 Mb/ms from the control group 1 and 6.92 Mb/ms from the control group 2.

To sum up, the conclusion of this experiment is:

(1) The sharing system based on neural artificial network does not meet the application demand of improving the average response rate of the server, so its application ability in solving the problem of slow response rate of student terminal education server is relatively weak.
(2) Compared with the sharing system based on neural artificial network, the application of the sharing system based on the SOA propagation model can appropriately improve the average response rate of the server, but it still cannot meet the actual demand standard.
(3) The application of Japanese online+offline hybrid education resource sharing system based on data classification has significantly improved the average response rate of the server. Compared with the sharing system based on neural artificial network and the sharing system based on neural artificial network, this new system can better solve the problem of slow response rate of the student terminal education server,So as to realize the rapid sharing of Japanese teaching resources, which is consistent with the original design intention of the sharing system.

5 Conclusion

Among educational resource sharing technologies, Hadoop is a popular framework for distributed storage and parallel computing at this stage.In the process of designing and implementing the education resource sharing system, Hadoop storage model HDFS is used to store massive Japanese mixed education resources, and Hadoop parallel processing framework MapReduce is used to retrieve massive digital education resources. The use of distributed file system HDFS storage resources has the characteristics of low hardware requirements, low storage costs, simple backup mechanism, and easy capacity expansion. The sharing system uses the characteristics of HDFS tree structure directory and the method of classified storage of resources to store different kinds of resources in different directories of HDFS to optimize the storage results and facilitate resource management. In terms of data retrieval, the popular full-text retrieval is adopted at this stage, and the inverted index is established and the parallel search is realized by using MapReduce programming model on the Hadoop platform. In the technology of sharing educational resources, remarkable achievements have been made by using Hadoop storage model HDFS and parallel processing framework MapReduce. However, in the process of online+offline mixed educational resources sharing, the sharing time did not achieve the expected effect due to the complex algorithm. In the following research, we will dig deep into the information and patterns in educational resources to further promote the development of educational resources sharing technology, aiming at shortening the computing time and providing more efficient and intelligent resource management and services for the education field.

Aknowledgement. The first batch of "Research and Development and Application of Intelligent Proofreading Corpus for Japanese Courses in Colleges and Universities Based on Blockchain Technology" by the Production and Learning Coordination Center of the Department of Higher Education of the Ministry of Education in 2022 Project No.: 20220603242103215.

References

1. Barakaz, F.E., Boutkhoum, O., Moutaouakkil, A.E.: A hybrid nave Bayes based on similarity measure to optimize the mixed-data classification. TELKOMNIKA (Telecommun. Comput. Electron. Control) **19**(1), 155–162 (2021)
2. Brahmane, A.V., Krishna, C.B.: Rider chaotic biography optimization-driven deep stacked auto-encoder for big data classification using spark architecture: rider chaotic biography optimization. Int. J. Web Serv. Res. **18**(3), 42–62 (2021)
3. Hza, B., Jing, B.A., Yw, A., et al.: Few-shot electromagnetic signal classification: a data union augmentation method. Chin. J. Aeronaut. **35**(9), 49–57 (2022)
4. Ferraiolo, D.F., Defranco, J.F., Kuhn, D.R., et al.: A new approach to data sharing and distributed ledger technology: a clinical trial use case. IEEE Netw. **35**(1), 4–5 (2021)
5. Chigozie, M.P., Ogbo, A.I., Okoh, A., et al.: The effect of education, research and development on women entrepreneurial proclivity. Solid State Technol. **65**(5), 881–888 (2021)
6. Shi, Y., Zhao, Z.: Computer-aided software development and application in physical education in colleges and universities. Comput.-Aided Des. Appl. **19**(S1), 59–69 (2021)
7. Narwaria, M.: The transition from white box to black box: challenges and opportunities in signal processing education. IEEE Signal Process. Mag. **38**(3), 163–173 (2021)
8. Akpolat, A.N., Yang, Y., Blaabjerg, F., et al.: Design implementation and operation of an education laboratory-scale microgrid. IEEE Access **9**(99), 57949–57966 (2021)
9. Schor, D., Teng, J.L., Kinsner, W.: The future of engineering education. IEEE Pot. **40**(2), 4–6 (2021)
10. Tien, N.H.: Formative assessment in business and entrepreneurship education in Poland. Xinan Jiaotong Daxue Xuebao/J. Southwest Jiaotong Univ. **56**(1), 176–187 (2021)