Research on Multimedia Distance Education Resource Management System Based on Knowledge Graph

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Abstract. With the rapid development of information technology, multimedia distance education plays an increasingly important role in modern education. In order to solve the problems existing in the existing teaching resource management system, a multimedia distance education resource management system based on knowledge mapping is proposed. The hardware configuration of the system is improved based on at 45db80 chip. In order to ensure the operation of the hardware configuration, the information classification management algorithm of the multimedia distance education resource management system is optimized combined with the knowledge map algorithm, and the information classification algorithm and information management process are improved according to the knowledge map algorithm, so as to realize the design of the multimedia distance education resource management system. Finally, the experiment proves that the multimedia distance education resource management system based on knowledge map is more effective than the traditional management system, and the detection results can reach more than 90%, which fully meets the research requirements.

Keywords: Knowledge Map · Multimedia Distance Education · Educational Resources · Resource Management System

1 Introduction

With the rapid development of information technology, multimedia remote education plays an increasingly important role in modern education. Multimedia remote education resources include teaching materials in the form of videos, audio, teaching documents, etc., which are transmitted to students through networks and other communication technologies, enabling them to receive high-quality educational resources at any time and place. However, with the increasing number and diversification of distance education resources, effective management and organization of these resources have become increasingly complex.

The research on multimedia remote education resource management system has important practical significance and application prospects. Firstly, effective resource

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management can improve the efficiency of educational resource utilization and the sharing of high-quality educational resources. By establishing a comprehensive management system, educational institutions can better organize and manage various types of teaching resources, ensure timely updates, integration, and sharing of resources, and thereby improve teaching quality and effectiveness. Secondly, the multimedia remote education resource management system helps to meet the needs of personalized learning. Different students have different Learning styles and rhythms. Through a flexible management system, students can choose appropriate teaching resources according to their own needs to achieve the goal of personalized learning. In addition, the multimedia remote education resource management system also helps to promote the development of educational informatization. With the popularization and application of information technology, utilizing multimedia remote education resources for teaching has become a trend. An efficient resource management system can provide better technical support and services, promoting the further development of educational informatization.

Reference [1] proposed a teaching resource management system based on Big data analysis. The system structure includes application presentation layer, service middle layer, Cloud storage layer and acquisition layer. The teaching resources are collected through the teaching resources collection module and stored in the Cloud storage module. After the division of teaching resources, they are input into the distributed file system HDFS for management. Reference [2] proposed a teaching resource management system based on the recommendation of Collaborative filtering. The system hardware uses embedded framework technology, uses SN74LVC8T245 logic master as the hardware central processing core, and carries out multi-dimensional feature matching processing on resource data through embedded communication protocol. The software design adopts the collaborative filtering mechanism. According to the multi-dimensional feature processing results of the hardware on the recommended terms, collaborative filtering is carried out on the term association information, so as to obtain the resource data with the strongest correlation with the key words, and complete the resource management.

In order to improve the performance of distance education resource management, a multimedia distance education resource management system based on Knowledge graph is proposed. The overall research approach of this article system is as follows:

(1) In order to ensure the implementation of system management functions and the overall stability of operation, the hardware of the system is designed with the AT45DB80 chip as the core.
(2) The Knowledge graph is used to optimize the information classification management algorithm of the multimedia distance education resource management system.
(3) According to the Knowledge graph algorithm, improve the information classification algorithm and information management process, and realize the design of multimedia distance education resource management system.

2 System Hardware Configuration

The overall functional design structure of the system refers to the composition of the whole system, as well as the physical and logical relationship between various parts and elements of the system. The main task of the overall structure design is to define each

functional module. The system combines the Windows XP operating system and later versions or the Mac OS X 10 operating system and later versions. System requirements for running Maya 2013 (64 bit); Windows: 7 SP1 operating system or XP x64 SP2 operating system; Mac OS X 10.7. x operating system; Red Hat Enterprise Linux 6.0 WS operating system. Windows and Linux Intel Pentium with AMD Athlon processor (or later) supported by SSE3 instruction set. Macintosh: Macintosh computer with Intel 64 bit processor. Certified hardware accelerated OpenGL graphics card. Microsoft Internet Explorer 8 Internet browser or later, Apple Safari web browser, or Mozilla Firefox web browser. Correctly handle the internal relations of the modules, as well as the call relations and data relations between them, define the internal structure of each module, and display the hardware configuration of the distance learning resource management system, as follows (Fig. 1):

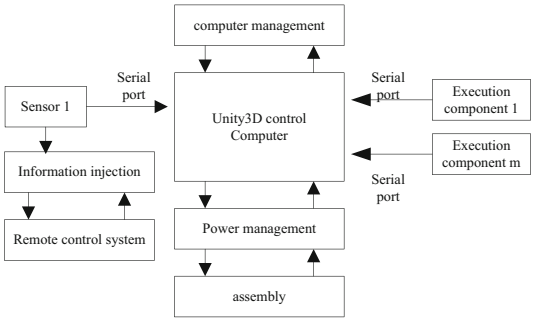

Fig. 1. Hardware Configuration of Remote Teaching Resource Management System

In the hardware configuration of the remote teaching resource management system, the system requirements for running Unity3D 3.5.5: Windows: XP SP2 or later; Mac OS X: Intel CPU & "Leopard" 10.5 or later. Core dual core Intel Core Duo processor or higher end model. 1GB memory and above. NVIDIA GeFore GTX_560 graphics card and higher or ATI Radeon HD_58_50 graphics card and higher configuration (desktop computer); NVIDIA GeFore GTX460 graphics card and higher configuration or AMD Radeon HD 7730M and higher configuration (notebook).

The peripheral circuit of the network chip can be connected with the external input power supply of the remote communication management system. While fully coordinating the ratio of voltage and current, the scattered electronic flow can be integrated into a bundle transmission form. Under the condition that the electronic input is maintained continuously, the GND network chip will spontaneously change from the disconnected state to the connected state, and feedback the stored electronic parameters to the lower level execution structure of the system in combination with the three types of resistance equipment components C, R, and M. The actual access resistance of type C resistance equipment is relatively high, which can occupy a large number of transmission voltage parameters in the case of high-level transmission. Then, according to the real value matching relationship between type R resistance equipment and type M resistance equipment, the subsequent electricity voltage division coordination is carried out. The

L capacitor is located in the middle of the peripheral circuit of the network chip, which serves as a link between the preceding and the following. It can properly dredge the accumulated electrons while transferring the transmission current.

The multimedia distance education resource module uses ENC28J60 components as the core to build the equipment, and the left and right ends are simultaneously equipped with equal communication transmission interfaces. The left interface is connected to the input end of the network communication data, and the right interface is connected to the output end of the network communication data [3]. In the cloud computing network environment, as the total amount of communication data to be transmitted changes, the occupation status of the input interface will gradually change. Generally, when the total amount of data to be input does not exceed 7.5×At 1015T, only the first 10 input ports can reach full occupancy status; When the total amount of data to be input reaches 9.3× At 1015T, all input interfaces can meet the rated transmission standard, but the last four interfaces can only maintain the intermittent input state. Compared with the input interface, the output interface has a relatively strong transmission and connection capability. When the total amount of data to be input keeps rising, these physical interfaces always have a strong connection capability until the cloud computing communication information temporarily stored in the ENC28J60 element is completely transferred to the application structure of the lower system (Fig. 2).

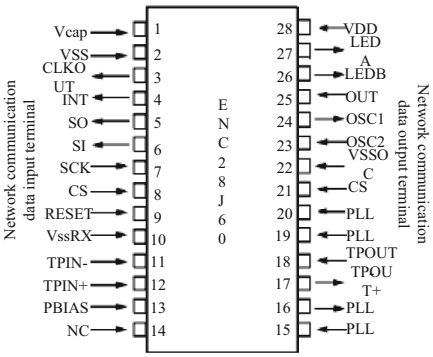

Fig. 2. Structure diagram of multimedia distance education resource module

Based on the above hardware structure, further optimize the system sensor interface circuit, separate the data plane and control plane forwarded by the bottom traffic switch and bottom router, and improve the traditional vertical integration state; Then the network switch is used as the device for traffic forwarding between the bottom traffic switch and the bottom router; Finally, the controller is used to control and manage the logically centralized devices, simplify the allocation strategy, and achieve reasonable allocation of shared ip resources.

3 Optimization of Basic Information Management Functions of Distance Education Resources

The statistical resource module is mainly used to make statistics on the actual utilization rate of different mathematical education resources. The module functions include the indicator setting statistics function, the result analysis and processing function, and the data report function.

The statistical resource module is mainly used to make statistics on the actual utilization rate of different Mathematics education resources. The module functions include the indicator setting statistics function, the result analysis and processing function, and the data report function. The specific functions of the resource management module include resource storage, maintenance of the resource library, review of resources, definition of resource permissions, and management of resource classification systems. The resource warehousing function specifically includes uploading individual resources and batch importing. Uploading a single resource refers to the user using a browser to upload a single resource in the user resource library [4]. Batch import refers to the user resource library implementing inbound processing of resource packages through this function. Defining resource permissions in the resource library includes defining the permissions of resources, administrators, and users.

In the design process of path identification in traditional systems, it is affected by the pop-up of the previous identification path, making it impossible for the new identification path to be represented by a single identifier for a route. Under the Knowledge graph, a route is represented by an identifier. Traffic will not be replaced or lost during the exchange process, and can all flow into the backbone for identification processing. Once leaving the backbone network, the pop-up logo reduces the mobility of the underlying traffic switch, thereby reducing the number of tasks executed by the switch and avoiding the occurrence of traffic packet forwarding delay. The resource identification format adopts the MPLS multi-protocol identification exchange header format, as shown in Fig. 3.

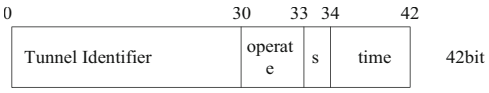

Fig. 3. Resource ID Format

The resource ID format shown in Fig. 3 shows that this format represents at least 500,000 tunnel ids, which can be used as the alternative path for all devices on the ip resource backbone network. Since the underlying traffic switch supports multi-protocol identity exchange header format forwarding, to solve the problem of excessive exchange information in the above contents, the classification management method of multimedia distance education resources is adopted to solve the problem of excessive information in the information controller and traffic switch of the whole network table entries, and the non-overlapping table entries in the knowledge graph are used for acute specific aggregation processing of each table entry. The network congestion problem is avoided by adjusting the convergence density.

The function of management resource classification system is mainly used to classify mathematical education resources according to metadata and manage the classification system. The function of setting statistics for classified indicators is mainly used by administrators to set statistical parameters, so as to make statistics on different types of mathematical education resources [5]. The result analysis and processing function mainly displays the statistical results in the form of data and charts. The data report function is mainly used to summarize and sort out the statistical data of educational resources in various time periods and make tables. The specific functions are as follows:

(1) Count resource visits and publish the ranking list of visited resources.
(2) Implement resource statistics according to resource categories.
(3) Make statistics on resource distribution according to media format.
(4) Statistics of mathematical education resources downloaded, uploaded and browsed by users.
(5) The statistics of mathematics education resources downloaded, uploaded and browsed by time.
(6) Mathematics education resources download, upload, browse ranking.
(7) Upload company rankings.

The collection of teaching management resource information includes two key links: link information collection and node information collection. Link information collection is a process of in-depth integration of teaching management resources. On the premise of removing redundant scheduling instructions, teaching management resource information will be rapidly transmitted in the scheduling link. Selective retention of some resource data with low correlation [6]. The collection process of teaching management resource information is shown in Fig. 4.

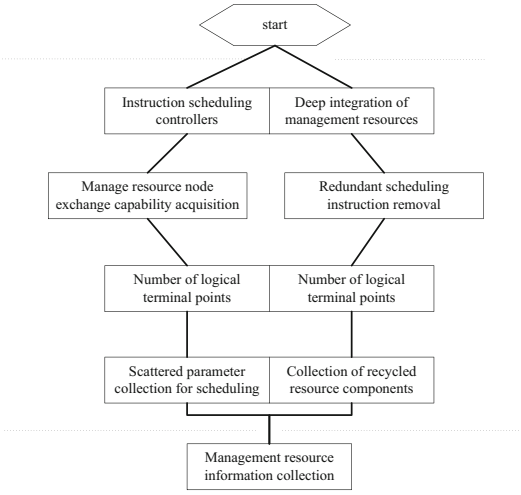

Fig. 4. Flow chart of information collection of teaching management resources

The resource management module mainly realizes the purpose of managing mathematics education resources by constructing and managing the resource base. The

resource base constructed by resource management module includes platform resource base and user resource base. The platform resource library is mainly maintained, constructed, and managed by the administrator. The user resource library is managed by the user himself, including the resources uploaded by the user himself, which are not collected by the platform resource library and audited. The resources in the user repository that are collected and audited by the platform repository are managed by the user only after the user has collected them. On the basis of the known time series of teaching management resources to be controlled, the parameter conditions such as the membership function and fuzzy rule of knowledge graph will not change, and the fuzzy control coefficient between adjacent resource data becomes the only variable that affects the definition result of optimization parameters.

4 Optimization of Classified Management Function of Multimedia Education Resources

In combination with the dynamic network scenario of the knowledge map, all teaching management resources can be divided into multiple components according to the available spectrum occupancy rate. When the scheduling request disappears, the SDON architecture will fully release the original spectrum resources, thereby changing the initial location of teaching management resource data and completing a dynamic scheduling migration operation. Throughout the entire migration operation, the spectrum rate occupied by teaching management resources is always kept at k, and the upper limit of virtual resource migration is never exceeded d. Based on this, the dynamic scheduling and migration standard calculation process of teaching management resources can be expressed as:

$$G = \prod \theta - 1 \prod_{l=1}^{d} z\varepsilon^{-\frac{1}{2}} \sqrt{d}(k+s)^{\varepsilon} \tag{1}$$

Among them, G represents the dynamic scheduling and transfer standard for teaching management resources, s represents the minimum value condition for virtual resource transfer, z represents the occupancy cycle frequency of the SDON architecture, and ϑ and ε represent two different dynamic transfer coefficients, respectively. All parameter conditions related to teaching management resources are put into the formula, and then the new scheduling algorithm can run smoothly according to the above operation process. According to the multiprotocol ID exchange header format, we designed the classified management of teaching resource scheduling paths, and the results are shown in Table 1.

According to the classified management scheme of multimedia distance education resources, the task of resource classification is realized under the knowledge map. Therefore, the classified management of multimedia distance education resources is also analyzed from three aspects: network sharing structure, control platform and infrastructure. The bottom layer traffic exchange protocol interacts with the network device to realize no idle connection of the bottom layer network device. The periodic receiving behavior is used to obtain the link table item information, and the table item rules are distributed to the underlying infrastructure through the control platform. After the traffic converges,

Table 1. Classified Management of Multimedia Distance Education Resources

Network sharing structure	Task scheduling database		
	Identity management	Table Item Adjustment	Classification and Management of Multimedia Distance Education Resources
control platform	Topology information discovery	information acquisition	Table Item Distribution Rules
Underlying infrastructure	Network devices support traffic exchange protocols		
	Backbone network entrance 1	Backbone network entrance 2	Backbone network entrance 3

the control platform can submit the traffic to the network structure for resource sharing [7] through an external interface. The knowledge map can be used to complete the separation of traffic forwarding and control plane from forwarding plane. On the implementation layer, the multimedia distance education resource classification management function can be used to avoid the impact of scheduling on the underlying traffic forwarding and maintain high forwarding efficiency. From the physical point of view, the design concept of overlay network structure is adopted to analyze the remote transmission of teaching resources, as shown in Fig. 5.

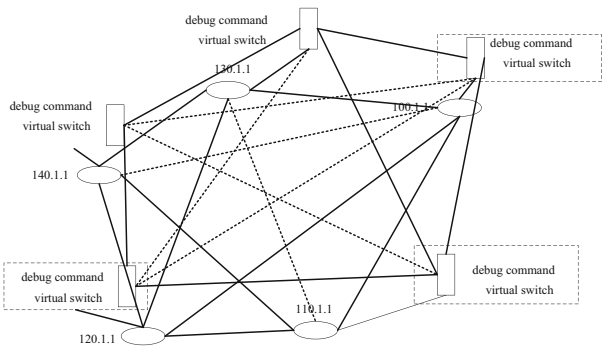

Fig. 5. Classification management of resources in physical state

The IP resource management and allocation scheme designed from the physical point of view needs to install a server at the traffic switch, and use the APP traffic detection software to schedule the traffic. The software can sense the network transmission quality, and feedback it to the control platform in real time for the controller in the platform to calculate, thus completing the distribution of the traffic switch table items. Use APP detection software to summarize the classified management results of multimedia distance education resources, and analyze the remote transmission of teaching resources, so as to provide a basis for the design of IP resource management and allocation scheme in

a logical state [8]. The information processing algorithm is optimized by combining the information processing flow of multimedia distance education resource management. If the information set of the multimedia remote education resource management system is H, the information set can be divided into F layers, with a common feature of A and an abnormal feature of B, then any information feature of the dataset will be collected:

$$W^k = \begin{cases} G - H_A^k(Ea, Eb) \\ G + F_B^k(Ea, Eb) \end{cases} \tag{2}$$

In the above formula, E represents the level of information feature resolution during system operation; E represents the data fusion value. Further combining cloud computing and Euler algorithm to calculate the relationship value between the dependent variable $Ay(x_n)$ of the information management program and the independent variable $Bx(y_n)$ of the teaching program, the specific algorithm is as follows:

$$Q \approx \prod \prod \frac{Ay(x_n) - Bx(y_n)}{W^{\mathrm{k}} - G} - 1 \tag{3}$$

On the premise that the total amount of teaching management resource data can meet the control demand, the deterministic and non deterministic relations are planned and integrated. When using the mathematics education resource management platform, users can put the resources they want to collect in their own favorites at any time for future use. At the same time, users can also add the resources in the favorites directly to the related resources to build hyperlinks and network knowledge bases of related knowledge. According to the generation mode of cloud concept, the knowledge map can be divided into two parts: forward generation and reverse generation. Among them, the knowledge map of forward generation can establish a standard normal cloud structure according to the distribution characteristics of resource data to be scheduled. The knowledge map of reverse generation uses the mapping relationship between resource data to be scheduled to build a new cloud drop unit. Let $|x|$, x' and $\overline{x}$ represent the expectation, entropy and super entropy values of the Knowledge graph respectively, and use the above variable values to express the forward and reverse occurrence characteristics of the Knowledge graph as follows:

$$\widehat{z} = \prod B - Ay(x_n)^{\frac{\alpha(\overline{x}-x')^2}{2(\overline{x}-x')^2}} \tag{4}$$

$$\breve{z} = \bigcap A + Bx(y_n)^{m-\frac{y(|y|)^2}{2(|y|)^2}} \tag{5}$$

Among them, $\widehat{z}$ represents the positive occurrence characteristics of the Knowledge graph, $\breve{z}$ represents the reverse occurrence characteristics of the Knowledge graph, y representing a random resource data to be scheduled, m represents another random resource data to be scheduled, but $b \neq m$, α represents the standard scheduling coefficient of the normal cloud, if χ represents the basic operational parameters of the cloud drop unit. Construct a complete time series of teaching management resources. Let $U_{\max}$ represent the upper limit value of teaching management resource data, and $U_{\min}$ represent

the lower limit value of teaching management resource data. The joint formula (4) can express the deterministic and non deterministic relationship between the controlled management resources as follows:

$$\widehat{q} = \chi \int_{U_{\min}}^{U_{\max}} \frac{\lambda_i(w_1 - w_2) + Ay(x_n)^{\frac{\alpha(\overline{x}-x')^2}{2(\overline{x}-x')^2}}}{\widehat{z}U_{\max}} \tag{6}$$

$$\breve{q} = \chi \sum_{U_{\min}}^{U_{\max}} \breve{z}U_{\min}\lambda_u - Bx(y_n)m - \frac{y(|y|)^2}{2(|y|)^2}/2(w_1 + w_2) \tag{7}$$

Where, $\widehat{q}$ and $\breve{q}$ respectively represent the deterministic and non deterministic relationship between the management resources to be controlled, θ_i and θ_u respectively represent two different variable definition standards, i and u respectively represent the data value results of teaching management resources when the standard is obtained, and w_1 and w_2 represent two different scheduling time nodes. $y(w)$ is artificially defined as the time series of teaching management resources to be controlled, β represents the average value of two different scheduling time nodes, and the simultaneous formula (2) can express $y(w)$ as:

$$y(w) = \prod\prod 1 + (\widehat{q} + \breve{q})^{3\beta} - \frac{0.33e\varpi}{Q(\beta - G) - \widehat{z} + \breve{z}} \tag{8}$$

In the above formula, ϖ represents the scheduling coefficient after normalization, e represents the time quantitative factor of teaching management resources, and β represents the establishment condition of sequence cycle. For the standard teaching management resource data set, the adjacent two data always maintain the same scheduling frequency, but because the storage space occupied by the data itself is different, the fluctuation peak and valley values in each frequency cycle are also different [9]. In order to better determine the control and optimization parameters of teaching management resources, λ is defined to represent the scheduling frequency coefficient between adjacent resource data, $\overline{\varpi}$ represents the average value of the fluctuation peak value in the frequency period, and $\overline{\kappa}$ represents the average value of the fluctuation valley value in the frequency period. Using the above variables, the calculation results of the control and optimization parameters of teaching management resources can be expressed as:

$$N = \int_{\overline{\kappa}}^{\overline{\varpi}} [\lambda y(w) + \prod 1 - at \sum y(w) + \ln r]dr \tag{9}$$

Where a represents the attribute function parameter of the knowledge map, t represents the fuzzy scheduling rule, and $\ln r$ represents the logarithm of the maximum scheduling operator r based on the natural number. Integrating all the above theoretical basis, the optimization control processing of teaching management resources based on knowledge map is completed.

Let α_0 represent the minimum recommended quantity index of University Online Learning Resources Based on multiple intelligent algorithms, $\overline{y}$ represent the average

access quantity of University Online Learning users in unit time, β_1 and β_2 represent two different search conditions of learning resources, p_1 and p_2 represent two different storage vectors of learning resources, and W_1 represent the application storage conditions of online learning resources in the first level host, W_n indicates the application storage conditions of online learning resources on the host at the n th layer. Then:

$$H_a(E) = \prod 1 - \frac{N(\alpha_0 - 1)^2\{\beta_1 - \beta_2\}}{\overline{y}} \sum_{i=1}^{m} \ln \overline{y}[p_1 W_1 - p_2 W_n] \tag{10}$$

The evaluation results are graded, converted based on the measured values of the test system, and marked with 0–100 numerical grades respectively. The benchmark image of each test system and the score of the tested system are sorted out. The consistency of the scores shall be tested. The teaching contents in different stages and the different testing contents and teaching cycles in the same testing stage shall be evaluated respectively. The two groups of scoring values shall be compared and checked. If the difference between the scoring values is more than 20 points, it shall be regarded as the system testing results and be discarded. If the effective scoring times given in the same testing stage are less than 85% of the total scoring times. Cancel all the scores, and finally calculate the average score, standard deviation and 95% confidence interval [10] of the two states of each test image. Based on the above algorithm, the B/S model is applied to the client information management scheme to standardize the running steps of the online management system software of colleges and universities, as follows:

1. Input the teaching plan of colleges and universities. Teachers of courses generally input the teaching plan of the next semester at the end of the semester in class.
2. To modify a college teaching plan, if the administrator or user finds that there is an error in the teaching information that has been entered, or wants to modify the plan, he can apply to the superior for approval, and then the relevant staff or the teacher in the classroom will re authorize the teacher to complete the second correct information entry.
3. For the statistical query of information, all users of the system have their own statistical functions and query permissions. The query methods include individual query and combined structure query.
4. The purpose of entering and exporting teaching plans and storing backups is to ensure that information is not leaked, so the system will automatically check the existing data regularly, and automatically start the backup if there is a risk of data loss. Ordinary users have no permission to back up, only the system administrator has.

Based on the above steps, we can standardize and classify the massive educational information, so as to effectively meet the research requirements of multimedia distance education resource management.

5 System Test

In order to verify the operation effect of multimedia distance education resource management system based on knowledge map, the operation effect of traditional online management system is compared.

In order to ensure the rationality and effectiveness of the experimental detection effect, the experimental environment and parameters are standardized.

The experimental environment selects Intel Pentium I V166MXGHz configuration, SVGA graphics card, memory of at least 168 MB, and storage space of more than 80 GB. Windows NT Information Server 4.2 and Windows 2000/xp, TCP/IP version network protocol are selected for the Web server operating system. Database: Microsoft SQL Server 2000. The browser is Internet Explore 5.2.buildSDN experimental platform of Floodlight+Mininet. The virtual switch of model 2.4.0 is used inside, which can realize the bottom switching equipment, and support path identification and table item release functions. Floodlight runs on a separate virtual switch and provides a control platform for the knowledge map. It is mainly responsible for monitoring the network link load and dynamically adjusting the table entries; Mininet is used to design the network topology and support information interaction between the network structure and the control platform on Floodlight. The protocol data packet is transmitted to the host through the programming language script language, and the traffic is poured into the backbone network. The following table reflects the details of the experimental parameter settings of the model machine in the experimental group and the control group under the same experimental environment (Table 2).

Table 2. Experimental Parameter Setting Table

Parameter	experimental group	control group
EMT /(min)	60	60
CEC	0.52	0.52
IMD /(%)	64.17	64.17
IPQ	0.63	0.63
IDD /(T)	71.24	71.24

In the above table, the EMT parameter represents the experimental time, the CEC parameter represents the implementation coefficient of the knowledge map, the IMD parameter represents the ideal extreme value of the matching difference, the IPQ parameter represents the ideal dispatching authority amount, and the IDD parameter represents the ideal extreme value of the fragmentation degree. To ensure that the experimental results have strong persuasiveness, the experimental parameters of the experimental group and the control group are always consistent.

In the above experimental environment, the operation stability of the traditional system and the system in this paper is recorded. For the convenience of recording, the operation and detection results of the online management system of higher education in this system are recorded as A, and the detection results of the traditional comparison

system are recorded as B. The specific experimental results are shown in the following figure (Fig. 6):

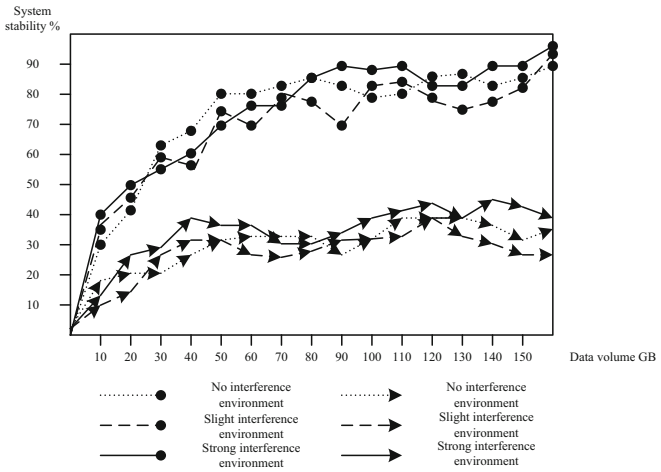

Fig. 6. Analysis of Experimental Results

Based on the above monitoring results, it can be seen that the multimedia remote education resource management system proposed in this paper based on the knowledge map has obvious stability effect in the application process. Because of the traditional system, it further simulates the resource congestion problem in the network, uses 60 services as the experimental object, and concentrates these 60 services between switches 1 and 2. That is, between the subnets 168.11.0.0/9 and 168.12.0.0/9, the two links are congested. The knowledge map is mainly used to represent a route by an identifier. In this process, there will be no replacement or loss, and all of them can flow into the backbone for identification processing; However, in the process of designing path identification in traditional systems, the impact of the pop-up of the previous identification path will make it impossible for the new identification path to realize that one route can be represented by one identification. In order to illustrate that the method of knowledge mapping is more effective than the traditional system for rational allocation of IP resources, it is necessary to compare the two methods, collect and report the current network information of the path, and uniformly schedule the path to the background router through the path quality detection service for path selection, so as to control the classified management of multimedia distance education resources; However, the traditional system directly schedules the traffic, which is easy to cause traffic packet delay, jitter, packet loss and other problems in the link. In order to illustrate that the knowledge mapping method is more effective than the traditional system for ip resource management and allocation, it is necessary to compare the two methods.

Select 5 virtual switches, and the table entries generated are random. Analyze the table entries of the converged virtual switches by counting the number of table entries. The actual number of aggregation table items is shown in Fig. 7.

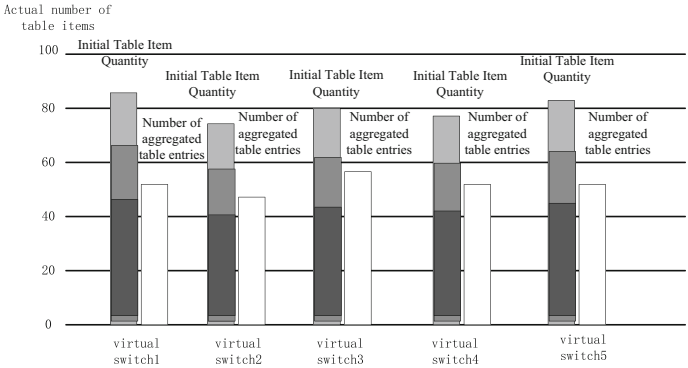

Fig. 7. Actual Aggregation Table Item Quantity

As shown in Fig. 7, according to the statistical results of aggregated table items, the traditional system and the knowledge map management system are used to compare and analyze the table items in each switch after aggregation. The results are shown in Table 3.

Table 3. Table Items of Switches with Different Methods

Number	IP Range	Traditional system management scope	Knowledge Graph Management System Management Scope
1	168.11.0.0/9—168.12.0.0/9	168.32.0.0/9—168.35.0.0/9	168.12.0.0/9—168.15.0.0/9
	168.11.0.0/9—168.12.0.0/9	168.43.0.0/9—168.45.0.0/9	168.21.0.0/9—168.24.0.0/9
	168.30.0.0/10—168.35.0.0/9	168.72.0.0/10—168.78.0.0/9	168.35.0.0/10—168.42.0.0/9
2	168.48.0.0/9—168.48.0.0/9	168.78.0.0/9—168.145.0.0/9	168.11.0.0/9—168.128.0.0/9
3	168.128.0.0/9—168.128.0.0/9	168.145.0.0/9—168.188.0.0/9	168.11.0.0/9—168.192.0.0/9
4	168.192.0.0/9—168.192.0.0/9	168.188.0.0/9—168.193.0.0/9	168.11.0.0/9—168.187.0.0/9
5	168.187.0.0/9—168.187.0.0/9	168.193.0.0/9—168.199.0.0/9	168.11.0.0/9—168.193.0.0/9

By comparing the IP range after the convergence of the traditional system and the IP range after the convergence of the knowledge map management system in the table, it can be seen that the accuracy of the resource management range can be effectively improved by using the knowledge map management system, which cannot be verified by using the traditional system. By comparing the exchange items in the classification management of multimedia distance education resources between traditional systems and knowledge map management systems, it can be seen that the knowledge map method is more reasonable for resource allocation. In conclusion, it is feasible to use knowledge mapping management system to manage and allocate ip resources.

6 Conclusion

Aiming at the security requirements of network teaching information in colleges and universities, a multimedia distance education resource management system based on knowledge map is proposed. The fusion of knowledge map technology has the advantages of low cost and high reliability, which can effectively solve the problem of low monitoring accuracy in traditional management systems. Although the system has good application prospects, the stability of the system needs further investigation.

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