Construction of Teaching Resources Supply Service System for Accounting Major under Big Data Technology

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Abstract. Under the background of deepening education reform and the rapid rise of digital economy, the supply service system of teaching resources for accounting majors in colleges and universities is difficult to meet the needs of accounting professionals training in the new period. In this regard, this paper takes the accounting major in colleges and universities as the research object, and according to the current situation of network teaching mode and digital teaching resources, puts forward the construction scheme of three-dimensional teaching network resource platform, which provides reference for the innovation of teaching ecology of accounting major. The platform takes big data technology as the core, uses Hadoop cluster to complete the distributed storage and management of teaching resources, cooperates with Lucene algorithm tools to complete the design and development of search engines, and integrates Web2.0 technology to form standard network applications. After the completion of the platform construction, the simulation test results show that the platform effectively solves the problems of integration, circulation, application and management of teaching resources, improves the utilization efficiency of teaching resources, and optimizes the teaching process, thus making a beneficial attempt for the construction of smart campus in universities under the big data environment.

Keywords: big data technology · accounting major · three-dimensional teaching resources · Lucene algorithm · software application

1 Introduction

With the rapid application of emerging technologies such as big data and cloud computing, the digital economy has become one of the most active areas of innovation and development. [1] Under the digital economy, the operation mode of enterprises and the external market environment have undergone fundamental changes, which has prompted enterprises to accelerate the completion of digital transformation and upgrading, while bringing certain impacts to the traditional financial accounting industry, and also put forward new requirements for the cultivation of accounting professionals. However, at present, many colleges and universities still follow the traditional talent training mode, and the lack of fixed teaching forms, lack of teaching resources and rigid teaching process

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seriously restricts the development of accounting education in colleges and universities. As a result, the supply and service system of teaching resources for accounting majors in colleges and universities is difficult to meet the needs of accounting professionals training in the new period, resulting in the phenomenon that the training objectives of accounting professionals are gradually out of touch with the needs of social development. [2] In view of this, this paper holds that in the process of accelerating the development of modern education informatization, accounting professional education in colleges and universities needs to re-plan the training objectives, adjust the concept of talent education and reconstruct the curriculum system according to the changes of accounting professional work content in the digital economy era and the requirements of personal comprehensive literacy. Moreover, colleges and universities need to focus on teaching resources, build a three-dimensional teaching network resource platform with the help of the application advantages of big data technology, Internet technology and computer software technology, and promote the reform of accounting teaching mode from two aspects: the effectiveness of teaching resources and the efficiency of teaching practice, so as to realize the innovative practice of accounting teaching ecology.

2 Development Process

The overall framework of the platform is divided into Web control layer, data access layer and database layer. First of all, the database layer is mainly realized by Hadoop framework under big data technology, so as to realize the distributed storage of a large number of different types of teaching resources. [3]Hadoop framework adopts cluster deployment, which requires the support of both hardware devices and software programs. In terms of hardware equipment, according to the functional requirements and data level of the platform, Hadoop cluster includes three nodes, named as Master1, Slave1 and Slave2 respectively. Master stands for master node, Slave stands for slave node, and each node needs two 8-core hexadecimal CPUs, with 32G memory and 1TB hard disk to meet the data storage requirements. [4] As for the software program, Linux CentOS 7(x86_64bit) is selected as the bottom operating system of each node in Hadoop cluster, jdk-8u181-linux-x64 is selected as the basic environment development tool, and the Hadoop framework version is 2.7.5. After Hadoop is installed, the components such as FileSystem, Replicas, Mapreduce, Yarn and HDFS are set and adjusted in turn to complete the construction of Hadoop environment. [5].

Secondly, the platform will complete the design and development of search engine based on Lucene algorithm. Lucene framework can build an index library according to the domains in different document objects, and supports QueryParser class to process the content input by users to obtain the Query object, and then performs the search through IndexSearch class, and returns the results matching the search conditions to the user. [6] Under the Hadoop framework, the index library will be built based on HDFS, and Lucene will run under the MapReduce computing model.

Finally, the realization of Web control layer mainly depends on Javaweb technology system. The platform chooses Tomcat 8.0 as the Web server to call and control the Web control layer, data access layer and database layer, so as to support users to complete the operation of various data information. Through the introduction of the above key

technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of three-dimensional teaching network resource platform for accounting specialty is also clarified.

3 Functional Implementation

3.1 Login and Upload

The platform presupposes two roles of users: students and teachers. Student users have many application functions, such as searching, viewing, collecting, downloading, etc. However, the function design of teacher users mostly focuses on the organization and management direction of the platform, which can complete the operations of uploading, maintaining and deleting all kinds of teaching resources, and at the same time has the management authority over students and the platform. All kinds of teaching resources will be uploaded to HDFS through the interface API of Hadoop, and the title, abstract, teacher information, links and other contents of teaching resources will be segmented by Lucene framework to form a single index item, and the index database will be updated by IndexWriter [7].

3.2 Retrieval and Application

When student users enter keywords in the search box of the interface, the platform will segment the input content and calculate the similarity weight of keywords in the index database by using TF-IDF formula [8]. Formula TF-IDF is shown in Formula 1, where W represents the similarity weight, TF represents the frequency of keywords appearing in the index database, IDF represents the inverse frequency of index items containing keywords in all index items in the index database, f represents the frequency of keywords appearing in the index database, $c(T)$ represents the total number of index items in the index database, n represents the total number of index databases, and m represents the number of index databases where keywords appear. The key codes for realizing this part of the function in the platform are as follows. [9] The whole operation process depends on the IndexSearcr method under the Lucene framework. The calculation results show that the greater the weight, the higher the frequency of the input keywords in the index database, and the higher the matching degree between the contents and keywords in the index database.

$$W = TF * IDF,\ TF = \frac{f}{c(T)}\ IDF = \log \frac{n}{m} \tag{1}$$

3.3 Data Statistics

Under this function module, teachers and users can make statistical analysis on the usage of the platform by students and users in a certain period of time. Common statistical

Table 1. Lucene framework retrieval comparison test results

		SQL command		Lucene framework		
Field name	Content	Result set	Time (s)	Result set	Time (s)	Judgement
ID	1234	1	1453	1	1793	Same
Name	Wang %	4651	1141	4651	283	Same
Msg	School%	537297	10798	537297	375	Same

Table 2. Platform performance test results

No.	Retrieval time	Thread	Tab	Connect time (ms)	Delay time (ms)
1	11:50:03	1–1	Network request	9	66
2	12:08:21	1–2	Network request	11	79
3	13:33:59	1–3	Network request	13	91

analysis contents include platform usage time, course resource search volume, cumulative search volume, etc. Relevant data results will also be displayed in the form of charts to facilitate users' intuitive viewing and application.

After the platform design is completed, the simulation test will be carried out, with a total of 5,623,699 groups of original data. The experimental results of data search between Lucene framework and SQL command are shown in Table 1. The results show that Lucene framework is far more efficient than traditional SQL commands in searching text content, and can adapt to the demand of search engine under Hadoop. In addition, the overall smooth operation of the platform and the concurrent processing ability of users are tested, and the test results are shown in Table 2. The results show that under the premise of 500 concurrent requirements, the platform runs smoothly, and the average response time is below 100ms, and the performance meets the design specifications [10].

4 Conclusion

This paper aims at promoting the reform of the teaching resources supply service system for accounting majors, aiming at many shortcomings in the traditional teaching mode, and builds a teaching resources supply service system with the help of the practical characteristics of big data technology, network information technology and computer application technology. The platform effectively solves the problems of integration, circulation, application and management of teaching resources, improves the utilization efficiency of teaching resources and optimizes the teaching process, thus making a beneficial attempt for the construction of smart campus in universities under the big data environment.

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