Research on Big Data Student Information Management System

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Abstract

In the era of big data, it is the core to realize high-quality personalized service in colleges and universities by digging deep into massive student information data resources[1-2]. This paper analyzes the key technologies and existing problems in student information management system, and proposes design and solution of student information management system based on data mining technology. The system is a user-oriented, information-oriented data management system for network data management. It uses database design management software to realize student information management to improve work efficiency and reduce management costs. It has achieved remarkable results by using data mining technology to improve the intelligent decision-making function of the college student information management system, and it supports and helps students' graduation employment guidance work.

Keywords

Student information; ASP.NET; SQLServer; student management.

1. Introduction

Today's society has already entered the information age. With the rapid coverage of the Internet, mobile users continue to increase[3], various types of information are exploding, and the era of big data is coming, resulting in various "Internet +" and "+ Internet" ideas, e-commerce, mobile payments, taxi software, and shared bicycles are all products of these ideas. In the field of education, there are also shadows of "+Internet", such as student enrollment status management system, college entrance examination volunteer system, and educational management system.

For the requirements of college students and teachers for intelligent information management[4], the information management system is born at the right moment. It can improve the efficiency of communication between teachers and students in colleges and universities, and it is convenient to analyze big data and improve the teaching results of teachers.

2. Key technologies

2.1 Cloud computing data mining technology

Cloud computing is an Internet-based computing method in which shared hardware and software resources and information that can be provided to computers and other devices as needed[5]. The "cloud" of cloud computing is the resources on the server cluster existing on the Internet, including hardware resources (such as servers, storage, CPU, etc.) and software resources (for example, application software, integrated development environment, etc.). The local computer only needs to send a demand message via the Internet, and there will be thousands of computers at the remote end to provide you with the resources you need and return the results to the local computer[6]. Intelligent library management systems require a more thorough perception of massive amounts of data, requiring multi-dimensional integration and analysis of massive amounts of data. More in-depth intelligence requires universal data search and services, and requires potentially useful data from large amounts of data information. The basic types of analysis of massive data are correlation analysis, cluster analysis and evolution analysis. These requirements analysis uses data mining techniques.

2.2 MVC mode

MVC full name is Model View Controller, which is the abbreviation of model-view-controller.It is a software design paradigm that organizes code with a business logic, data, and interface display. It aggregates business logic into a single component to eliminate the need to rewrite business logic while improving and personalizing the interface and user interaction. Analysis MVC is a program architecture: Model, View, and Control.

(1) Model model: mainly composed of Entity (data carrier), Dao (modified data), Biz/Service (complex business model).

(2) Controller (Control): The controller is composed of some classes, which are responsible for receiving and judging the information input by the user, and calling the corresponding model to load the data.

(3) View V: Display the information to the user as a graph.

2.3 SSH framework

SSH is short for Struts, Hibernate, and Spring. The underlying environment of the SSH framework is Java EE, and Java EE is based on Java SE[].

2.3.1 Struts

Struts is an open source framework. The main role is to reduce the time to develop web applications. Now mainly based on Struts2, it consists of a jar package (java archive file). Jar package provides all the features of the framework.

Struts2 principle(Figure 1):

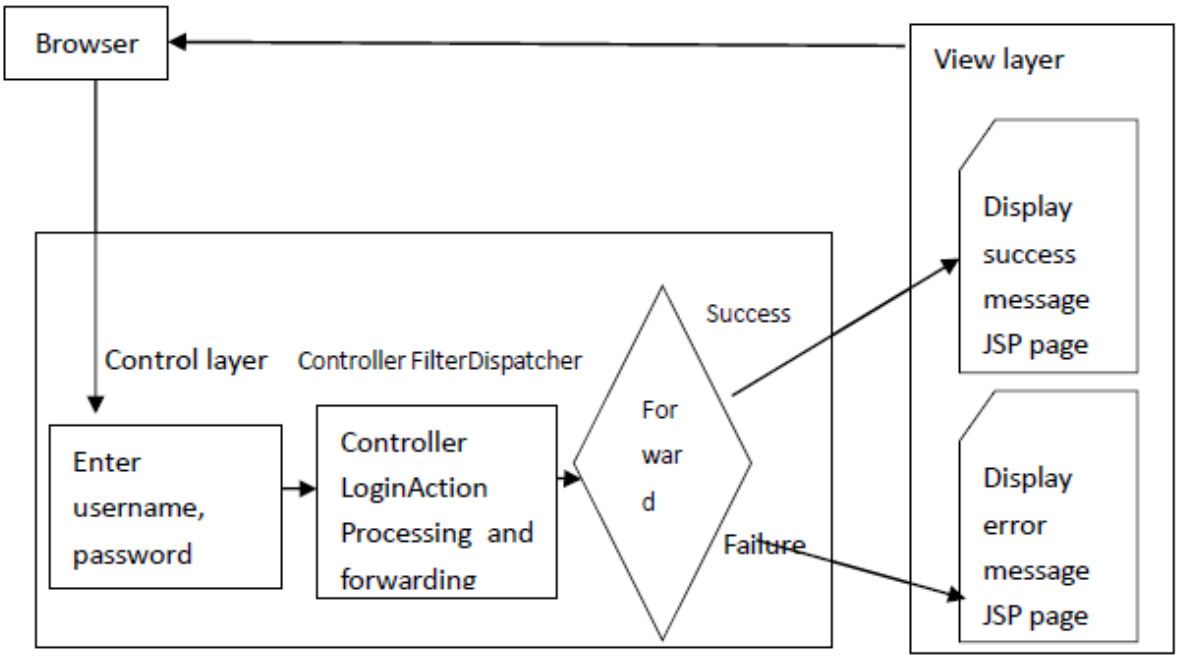

Figure 1.Struts2 schematic diagram

3. Hibernate

Its role is to store data in the database.

Spring

Because the high degree of coupling is not conducive to software modification and development, Spring is to reduce the coupling between Struts and Hibernate, so that it runs under the appropriate coupling degree.

JDBC

JDBC is a database connection, a Java API that executes SQL statements, and it provides an interface to program and database connections. The structure diagram is as follows(Figure 2):

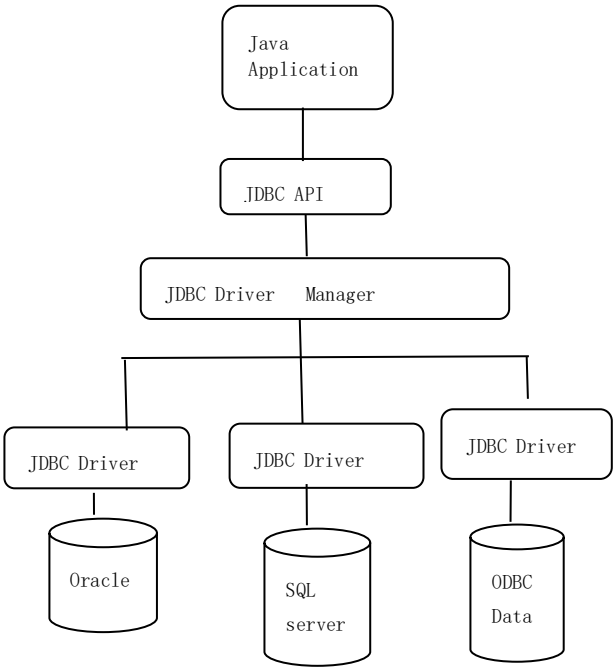

Figure 2.Database connection diagram

3.1 System Architecture

The system uses the B/S design mode, and the cloud server is built on the J2EE application server, web server and database server. The system uses the HTTP protocol method to realize the connection and data transmission with the remote server-side program. The system adopts the concept of layered design, abstracts the system out of the presentation layer, the logic layer, the persistence layer, and the communication layer, which can effectively reduce the coupling between modules to clarify the responsibilities of each module, thus enhancing the scalability of the system.

The system adopts B/S structure for development. It is divided into three hierarchical structures: interface display layer, business logic layer and data access layer.

①Interface display layer: Provides an interactive interface for the system, showing the level to the user in the web interface, including the layout, style and system style of the interface.

②Business logic layer: responsible for the processing and data transfer of key business, the operation of the user in the execution system.

③Data access layer: to achieve database access, including the operation of data calls, data viewing, and data addition.

4. System implementation

The project creatively combines the resource information of traditional colleges and universities with the mobile phone of Android system to design an information management system, it is convenient to use and maintain, and highly versatile, which can greatly facilitate users to obtain various information resources of the system. Users only need to log in to the mobile client software and use the client software to connect to the server to implement intelligent information management operations(Figure 3).

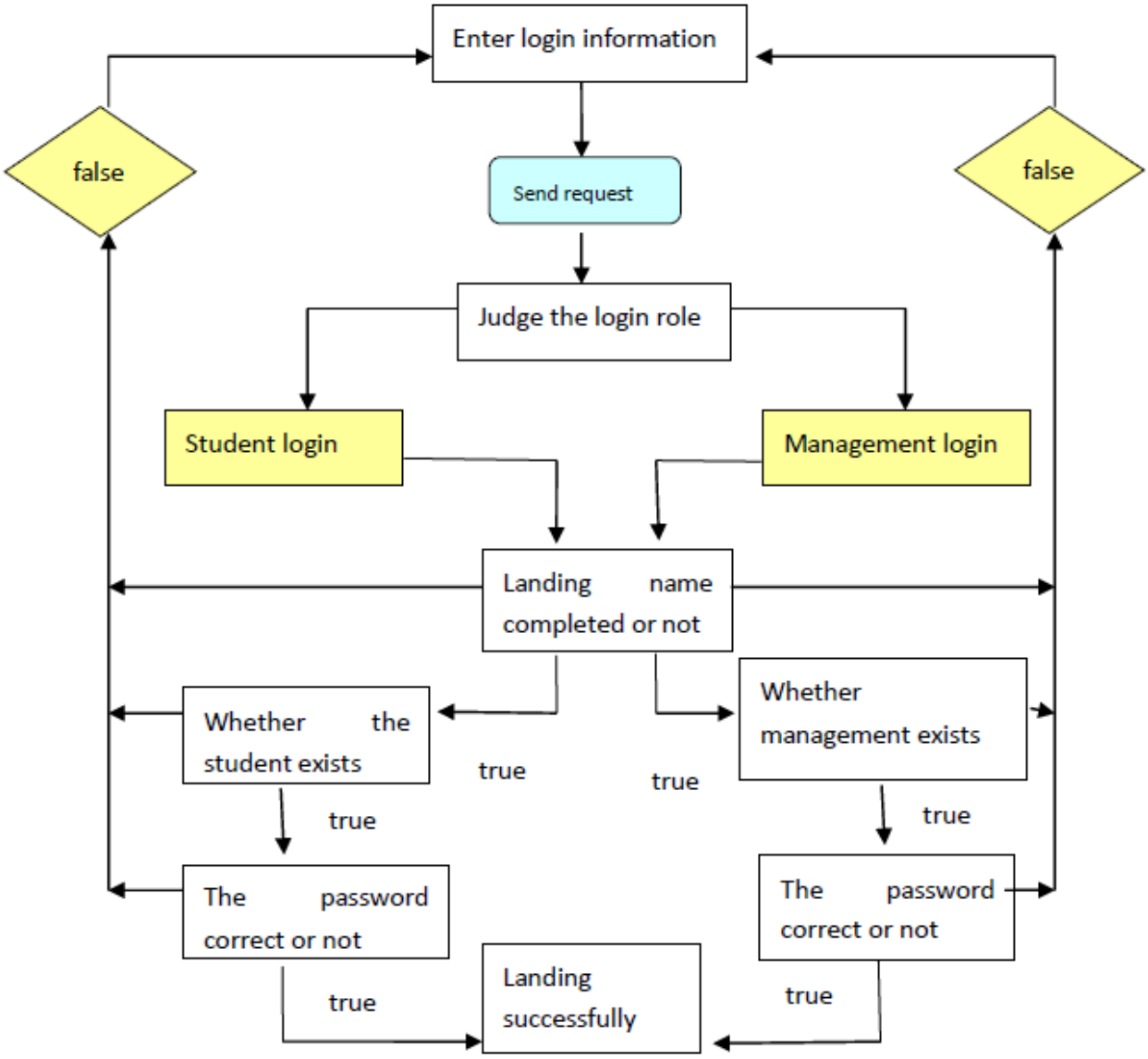

Figure 3.System implementation flow chart

5. System function

5.1 Login module

The login module is divided into two ends, one for the student and one for the administrator. Students can log in to the login module to enter their own username and password. The student's username is the their student number, the login password is also their student number by default, but the student can modify their login password after logging in. The administrator needs to log in with the user name and password set by himself in the login module.

5.1.1 Basic Information Module for Students

The student's information module mainly records some basic information of the student, including the student's name, the student's age, the student's date of birth, the student's ethnicity, the student's gender, the student's birthplace and home address, etc. This information is required for each student to enter the system when entering the school, and it must be correct information, no false information, and the format must be strictly required.

5.1.2 Student's class information module

The student's class information module mainly records the class information of each student, including the student's class number and grade. If any student has a transfer during school, his class

information must be modified. The class information corresponding to the student must be true and valid.

5.1.3 Student's department information module

The student's department information module registers the student's department, including their specific department and major, and the department number should be recorded, so that the user can find the student's department information by number.

5.1.4 Student's curriculum information module

In this module, it displays the course information of the students, including the course number, the name of the course, etc. Students can log in to the system to view their course information, the administrator can log in to the system to modify or add and remove courses in this module.

5.1.5 Student's grade information module

In the student's grade information module, you can register the student's academic grade information. Students can log in to the system to view their academic scores in this module, and have an understanding of their grades per semester. Teachers can log in to the system to enter and modify student performance information.

5.1.7 Student's payment information module

In this module, it contains the student's accommodation fee information, the student's teaching materials fee information per semester, the student's food expenses information, the student's tuition fee information, and the student's insurance premium information. Teachers can log into the system in this module to operate on the student's payment information, and understand the student's payment status.

5.2 System function introduction

5.2.1 Adding functions

The student adds personal information according to the basic information of the individual, then submits the data for storage, the administrator logs in the system, and adds the functions in the system to supplement and improve the information of all aspects of the student.

5.2.2 Delete function

By entering the system and using the system's delete function, students can delete their own wrong information; the administrator can use this function to delete all aspects of the student's information in the system.

5.2.3 Modifying the function

Students can modify and correct the incorrect information in their own system after logging in to the system; the administrator can modify the information that was incorrectly entered.

6. System testing

6.1 Test method

The test methods used by the student information management system are as follows:

(1) UI test: This is specifically for the interface design of the system to test, mainly responsible for whether the text and appearance meet customer requirements;

(2) Random test: Randomly test the student information management system and randomly find the problem;

(3) Black box test: test the function of the student information management system;

(4) Safety test: Conduct safety tests on all aspects of the student information management system;

(5) Compatibility test: Put the system into different software and hardware environments to test its compatibility;

6.2 Test content and results

I conducted the following tests for the student information management system function, and the results achieved the expected goals. The test contents are shown in Table 4-1 below:

Table 4-1 Student Information system function Test Table

Test items	Test Results	Problem
Administrator login	success	no
Teacher login	success	no
Student login	success	no
Student's information Add, delete, modify, search	success	no
Teacher's information Add, delete, modify, search	success	no
Student achievement inquiry	success	no
Student achievement statistics	success	no
Student achievement modification	success	no
Password change	success	no
Announcement publication	success	no
Announcement modification	success	no
System settings	success	no

6.3 Test summary

The student information management system was tested by using the above test methods, which basically met the functional requirements, and no major problems occurred, which met my expected goals.

7. Conclusion

Based on the Struts open source architecture, this paper studies the big data mining technology of student information systems. It analyzes the existing problems in the student information management system, and proposes corresponding countermeasures based on data mining algorithms such as association rules, clustering and classification, and builds a student information management system based on data mining technology to realize personalized services such as information login, query, management analysis.

Acknowledgments

This work was financially supported by the Science Research Fund of Yunnan Provincial Department of Education, China (Project Number:2019J0827,2017ZZX325).

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