Research on Modelling of Innovation Information System in Smart Libraries Using Computer Big Data

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Abstract. To change the traditional ideological and political teaching in higher vocational colleges, students passively accept knowledge, and the teaching efficiency is low. The article developed an ideological and political network teaching system based on computer big data NET. The teaching system uses NET computer platform technology and castle framework and adopts the MVC system architecture model based on the B/s three-tier structure to develop the teaching system. It was found that the ideological and political network teaching system is running stably during several tests and use by the developers. The system page is displayed normally, and all functions of the system can be correctly responded. The system meets the design requirements.

Keywords: Computer, big data, higher vocational colleges, ideological and political, innovation, teaching system.

1. Introduction
In traditional ideological and political teaching, students are taught ideological and political knowledge by ideological and political professors, and the content is determined by the teacher. Students can only passively accept the content of education, and the effectiveness is low. With the development of computer communication technology and network technology, teaching informatization has been vigorously developed, and network teaching methods have gradually formed.

The ideological and political network teaching system uses the Internet to reintegrate scattered resources, speed up the spread of resources, promote the sharing of educational resources, and improve teaching efficiency. The network teaching system is a kind of virtual education and teaching environment built on the Internet or campus network. Through this platform, the functions of teaching, communication, resource sharing and independent learning can be realized. Online teaching has become an important way of education and teaching reform in our colleges and universities. And is used in various courses of education [1]. Most current network teaching assistant systems usually adopt B-S or C-S access mode. Among them, education and teaching resources are usually concentrated on the server side of the system, and each user's PC side cannot realize the exchange of learning resources. Although this method can meet the needs of the classroom, there are still the following problems: First, the problem of single point of failure. Since learning resources are provided on the server side, once a problem occurs on the server side, the system cannot run; second, the cost is high. To better meet the needs of the system, a variety of different teaching services need to be
structured, and at the same time as the number of clients increases. Higher requirements are put forward on servers and data; third, poor scalability. When the number of users increases, the number of expensive servers needs to be increased to provide more stable services. In this regard, in response to the above-mentioned problems, this article proposes a teaching aided teaching system based on the NET model and takes the ideological and political course as an example to study the system implementation.

2. NET technology architecture

2.1. NET platform and castle framework

NET platform is Microsoft XML Web services developed by Microsoft, which allows applications to realize network communication and data sharing through the Internet and provides a standardized development platform for developers to develop windows applications, web applications, and mobile applications on the Internet. Castle is an open-source project under the NET platform, which integrates all development kits for rapid development of enterprise-level applications, including data access framework ORM to dependency injection container, and then to the MVC framework and AOP of the web layer. We can use Castle to quickly build an enterprise-level application framework, greatly reducing development time [2]. Castle includes Active Record and Monorail. Active Record is a database operation mode, which corresponds a data table in the database to a model class, and a record in the data table corresponds to an instance in the model, which makes the operation of the database change from the original SQL mode to Base on the object model, the business logic layer access and data access are independent of each other, which improves the system development rate and increases the transparency of the database to the system development.

2.2. JSP technology

JSP, or Java server page, is a dynamic page technology standard advocated by Sun Microsystems based on Servlet. It inserts Java program code and JSP tags into traditional web pages, namely Hypertext Markup Language (HTML) files, and implements Html Java extensions in the grammar. Compared with Servlet, it simplifies and facilitates the design and modification of web pages. JSP executes on the server side and returns an HTML text to the user [3]. The client can browse through the browser, and it separates the web page logic from the web page design display, thereby supporting the reuse of component design, making web-based application development easier and more convenient rapid. At the same time, it can be used across platforms to facilitate the transplantation, expansion, and maintenance of applications.

3. System Design

3.1. System architecture design

The system will make full use of resources such as computers and the Internet to establish a complete, sophisticated, reliable, and healthy computer-assisted teaching system centered on students' autonomous learning. The overall design framework of this design is set to three layers. As shown in Figure 1.
3.1.1. Environment layer. Build a PHP development environment through the PHP module of Dreamweaver, and then compile the functional part of the Web module of the auxiliary teaching system and design the basic environment for the establishment of the HTTP site. Start the developer mode of the WeChat public platform. Establish a back-end relational database in the cloud database and establish the network key and token code necessary for its association. Use WampServer to install the development environment on the cloud server and load the server manager.

3.1.2. Interface layer. Edit the custom menu of the WeChat public platform through the WeChat public platform developer mode and use the custom menu of the WeChat platform as the main interface for the system to implement functions. Use the developer document in developer mode to enable keyword response, third-party docking interface, and third-party website and platform docking tokens and keys.

3.1.3. Logical function layer. The logical function layer includes the development of corresponding functions in each environment and the association of the final function modules with the main interface. Use cloud database technology as the system background database to store user information and functional information, and then use the WeChat platform development port to associate the web module written by Dreamweaver with the cloud database, and upload the website to the cloud server, so that the system has the basic functions under the Web module, at this time, part of the functions of the auxiliary teaching system can be realized through the Web [4]. Connect with the web module of the cloud server in the developer mode through the WeChat web development tool.

3.2. System function module design
As shown in Figure 2, the ideological and political network teaching system is mainly divided into education management module, publicity management module and interactive management module. The education management module is mainly used for the teaching of teachers, the arrangement of homework after class, the arrangement of online examinations and the independent study of students. Teachers can upload teaching resources through the teaching management module, including WORD
files, PPT courseware, videos, and other materials, and can conduct online Q&A discussions with students, as well as publish homework and online exams; students can download teaching materials and online through the teaching management module ask the teacher a question [5]. The publicity management module is mainly used to publish and publicize the news and content related to the ideological and political education of students on campus. It is mainly divided into three sub-modules: red topics, organization activities and links to collaborative websites. The red theme is mainly to publicize the positive deeds of the school and society, as well as the publicity and interpretation of the party's policies and the speeches of the main leaders; the organization activities are mainly to publicize some practical activities of ideological and political education carried out by the school; the link to the collaboration website is Links to the homepages of other websites of the school, including the school's academic affairs office, employment office, admissions office and other websites, play the role of network interconnection of the information platform. The interactive management module is used for students' online consultation with teachers and students' after-school communication.

![Image of System functions]

**Figure 2. System functions**

After the user enters the correct username and password, he successfully logs in to the system, and the user can complete the functions of adding, modifying, indexing, searching, and guiding content of the video through the video management module. On the forum management module, users can categorize videos and modify messages [6]. The user management module allows users to perform related operations, such as adding, modifying, deleting users, or deleting messages.

3.3. **System front-end design**

The front desk of the system mainly includes an information display module, a user interaction module and an information recording module, and its functional structure is shown in Figure 3. The display
module is used for information, video display and hotspot video ranking, and the interactive mode is used for users to interact online and can interact through forums to post discussions and send emails. The record module is used to record the user's personal information, exchange records and submit reflective reports.

3.4. System Course Big Data Algorithm

Let S be the set of pixel pairs with specific spatial connections in the target area R, then the co-occurrence matrix P can be defined as:

\[
P(g_1, g_2) = \# \{(x_1, y_1), (x_2, y_2) \in S \mid f(x_1, y_1) = g_1 \& f(x_2, y_2) = g_2\}
\] (1)

The numerator on the right side of the equal sign in the above equation has a certain spatial relationship. The gray value is the number of pixel pairs of \(g_1\) and \(g_2\), and the denominator is the total number of pixel pairs (# represents the number). The P thus obtained is normalized. The two-dimensional Gabor filter composed of Gabor function can filter the input signal in different scales and directions and has characteristics like biological vision systems. The general form of the two-dimensional complex Gabor function is:

\[
g(x, y) = h(x', y') \exp[2\pi j(Ux + Vy)]
\] (2)

Where \((x', y') = (x \cos \theta + y \sin \theta, -x \sin \theta + y \cos \theta)\) is the coordinate in the new coordinate system after the Cartesian coordinate system is rotated by the angle \(\theta\). \(U, V\) are the two axis components of the radial center frequency of the filter.

\[
h(x, y) = \frac{1}{2\pi \sigma_x \sigma_y} \exp \left[-\frac{1}{2} \left(\frac{x^2}{\sigma_x^2} + \frac{y^2}{\sigma_y^2}\right)\right]
\] (3)

We set \(\sigma = \sigma_y\), \(\sigma_x = \lambda \sigma_y\), \(\sigma_x\), \(\sigma_y\) to be the variances relative to the x axis and y axis, respectively, and the aspect ratio to be \(\lambda\). There are:
\[ h(x, y) = \left( \frac{1}{2\pi \lambda \sigma^2} \right) \exp \left[ -\frac{1}{2} \left( \frac{x/\lambda}{\sigma^2} + y^2 \right) \right] \] (4)

When \( \lambda = 1 \), \( g(x, y) \) has an invariant form of circular symmetry.

4. System Test

Figure 4 shows the system's course management interface, which is mainly used for teachers to manage teaching course information, including classrooms, course introductions, course teachers, course syllabus, teaching videos and courseware [7]. You can view, modify, copy, and delete the relevant information of the teaching course according to different needs.

![Course management interface](image)

**Figure 4.** Course management interface

5. Conclusion

Aiming at the boring content of the current college ideological and political education websites, the monotonous and stereotyped expression of the website, the lack of teacher-student interaction, and the unsatisfactory teaching effect, a NET-based ideological and political network teaching system is developed and designed in this article. The system stores many two-way interactive video materials, so that students can order video learning materials on their own. Experiments show that the system interface is displayed normally, and all functions can respond correctly. The system has achieved the expected results and met the design requirements.

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