Design and Research of Virtual Reality Course Management System Based on Artificial Intelligence

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Abstract. Today, artificial intelligence and virtual reality are rapidly developing as a new technology, and major universities and training institutions have opened relevant courses one after another. However, the traditional course management system cannot meet the needs of virtual reality technology. Therefore, the virtual reality course management system based on artificial intelligence has become an important technological breakthrough to solve this problem. The purpose of this article is to study the design of a virtual reality course management system based on artificial intelligence. This article first, on the basis of fully understanding the core concepts of virtual reality, transforms the curriculum management needs into actual functions for design, and designs the three key functional modules of the design and research of the virtual reality curriculum management system based on artificial intelligence in detail. At the same time, the software architecture and database of the system are rationally designed, the system is designed and explained, and the key points in the main functional modules are explained in more detail. Finally, combined with the artificially designed virtual reality curriculum management system based on artificial intelligence, the application technology, education application and application experience analysis are carried out through questionnaire survey. The results of the questionnaire show that 47% of students are "very willing" to join the immersive virtual reality classroom teaching, and 40% of students choose "more willing", indicating that students are more willing to accept the management system model.

Keywords: Virtualization, Virtual Machine, Virtual Reality, Course Management System,

1. Introduction
As a new generation of virtual reality information interaction technology, it is developing rapidly, and many universities and educational institutions have begun to learn virtual reality content [1-2]. The bold efforts to apply artificial intelligence and virtual reality technology in education, as well as the analysis of the educational application value of solid virtual reality classrooms, will continue to promote the development of educational technology and the modernization of education [3-4]. But for this new course, the traditional management system can only be used to assist teaching [5-6]. Due to the large gap between this course and traditional courses, traditional management systems cannot
solve the unique problems of virtual reality courses [7-8]. Therefore, taking into account the characteristics of virtual reality courses, the specially designed and developed artificial intelligence-based virtual reality course management system will help to solve the difficulties of teachers in correcting students’ virtual reality work and correct the shortcomings [9-10].

In the research on the design of virtual reality curriculum management system based on artificial intelligence, many scholars at home and abroad have conducted in-depth discussions on it, and have achieved very impressive results. For example, Jang RY created a sharing platform for students based on mobile VR. The subject-generated content platform provides real VR learning experience opportunities [11]; Albabish W created a virtual learning environment based on virtual reality, allowing children with autism to interact with the virtual environment to enable them to make continuous changes and dare to interact with others communicate and cultivate their ability to adapt to society [12].

This article first describes the overall architecture and functional modules of the artificial intelligence-based virtual reality course management system, and then designs the Unity homework correction module, VR-related WeChat tweet management module, and VR resource display module in detail. The key points in the module are designed in more detail. In addition, this research designs the database tables related to the main functional modules and gives a detailed description of the main data. Finally, by letting students experience the system of this study, fill out the relevant questionnaires, collect data, and analyze the questionnaires to understand how students experience the virtual reality course management system and their acceptance of the virtual reality course management system.

2. Design and research of virtual reality course management system based on artificial intelligence

2.1. Structure design of virtual reality course management system

The users of this system are teachers and students. It adopts MVC’s B/S design function and three-level structure. All system data and information are stored in databases and servers. The user only needs to open the browser on the computer to operate. The browser on the computer side is the presentation layer, and the business layer is the operating module of the system. The browser runs on modules that rely on server support, and the data information of each function interacts with the data layer database.

(1) System module design.

The main functions of the virtual reality course management system are login coding module, correction module, R VR-related WeChat tweet management module, R VR resource display module, announcement module, performance equivalent, and this is the functional module of the system.

The three key points of the Unity virtual reality course management system are: Unity correction and correction, VR WeChat tweet management, and VR resource display module.

Unity homework correction module helps teachers to correct Unity homework, including homework function, view student homework scenario function, view scenario script function and direct entry.

VR-related WeChat tweet management module teacher and a resource platform for one person, including the use of Sogou’s tweet crawling function, data storage function, and the function of displaying text on the page.

The VR resource display module provides a PC-side solution for virtual reality experience, including tutorials for making three-dimensional resources, the function of displaying resources on the PC-side, and the uploading and downloading functions of resources.

(2) Unity job review module design.

This module is the main function module of the system and also the basic function module. Help teachers read Unity students' scenes and work codes online, and enter comments and grades. Students create work scenes and write script codes according to the teacher’s requirements. When writing script
code, they must add the specified code to the project, that is, the specified API interface, and pass the corresponding parameter information to the interface. After the work is completed, the scene should be published as a Unity Web GL project. After successful publishing, upload the original project file and Unity Web GL project to the specified system location. After a successful upload, the system will perform simple configuration on the page in Unity Web GL, such as adding code to display the user interface and interaction on the page, so that the teacher can browse and control the student’s work online. After the teacher enters the student list page, click the assignment control button to enter the assignment preview page. You can see the worksheet and script code. When controlling the scene, it works the same as regular Unity in the past. You can use the mouse and keyboard to control the objects in the scene. After checking the scenes and scenes of the homework, the teacher can input comments and grades for submission.

For the "Homework Correction" section, there are two sub-functions for teachers to check homework and enter notes and grades, and homework check is the most important part. Students upload tasks from the browser, and the browser saves the task files to the server, and then the background server configures the tasks. The teacher sees the student's homework in the browser, and the browser reads and displays the formatted homework file from the server. Enter the score, the browser will submit the score to the background and save it in the database, and the database will return the saved result.

(3) Backstage management design.

In the process of retaining software user information, the main setting is to define the corresponding relationship between the software and the user, which is done through the corresponding class. If the corresponding relationship is added, it is recorded by adding a new method. Set the corresponding relationship with the job number and pass here. This method randomly defines a user class object variable to query all user information. After selecting, click "Save" to make corresponding records. If software category matching is set, use this method to randomly define items in the software category. Variables, to request all software category information, after selecting it, click the "Save" button to enter the corresponding input for this article.

If you keep the existing data resource maintenance emails, please click the function page to enter the corresponding system sending maintenance page, and you can delete the original emails.

The software licensing system management is defined by submitting the "User" category, and related functions are completed, including adding user numbers, modifying and deleting user numbers. When deleting or modifying an existing user number, you must first query it, and then select the record to be deleted, that is, run the corresponding method through the variable.

2.2. Other designs

(1) Design of operation authority.

In the management mode, different users may receive different operation permissions. For example: the super administrator can delete users, prepare passwords and other functions. And ordinary users can only modify their own user information. Therefore, for different users, the display mode buttons are different. Each function of the system has an action link. In order to increase flexibility, the system will modify the struts2 <s:a> tag so that it can decide whether to display the power button according to the user’s authority.

(2) Design of page access authority.

Because the system uses the SSH architecture, according to Struts2 related technology, access to each page is controlled by an operation, so any operation to access the page can be used as a license. Check whether the user has a license, and check whether the URL of the page operation is in the authority of the user role.

Page flow: JSP page → power configuration control → running execution method → result configuration control → JSP page. The power button on the JSP page is marked with struts and added attributes to specify the operation. The struts.xml configuration file will configure the implementation
class for each operation and configure the place to go after the code execution is completed. This part can be a page or other actions.

3) Pagination design.
Pagination is mainly used to divide the page into different pages when the page is too large to facilitate users' browsing. Due to the widespread use of paging in forums and other places, paging is universal.

The data on the first page is displayed first. When you click the X page, the JSP page will pass the Number page to the corresponding action. First, link Hql statements according to Hql Helper, and the operation calls business logic to require Page Bean data to be displayed on the page. Put the Page Bean on the stack, then return to the JSP page, subtract the value from the stack and display the list. Use the iterative method to answer on the page in order.

2.3. Collision detection algorithm in virtual environment
(1) Axial bounding box (AABB) is a type of bounding box with a wide range of applications. It can be expressed as a cuboid with three sides parallel to the space coordinate axis in a three-dimensional space.

Among them, Point is represented as a structure containing three floating-point numbers. In this way of expression, the area covered by AABB can be defined by the following formula:

\[ R=\{ (x,y,z) | |c.x−x| \leq r_x, |c.y−y| \leq r_y, |c.z−z| \leq r_z \} \]  (1)

(2) Sphere is a kind of bounding box with relatively poor tightness. Its advantage is that it can realize fast intersection test and does not need to consider the rotation transformation of the model when reconstructing the sphere bounding box of the model. At the same time, its expression is relatively simple, generally only the center \( c \) and the radius \( r \) of the given ball are required.

\[ R=\{ (x,y,z) | (x−c.x)^2 + (y−c.y)^2 + (z−c.z)^2 \leq r^2 \} \]  (2)

According to the above data structure, it can be found that the ball bounding box also has the advantages of occupying less memory space. In a 32-bit system, a ball bounding box only needs 16 bytes of space.

3. Experimental research on virtual reality course management system based on artificial intelligence

3.1. Research methods
The questionnaire survey method is a method used to collect data. By sending questionnaires about research topics, let them fill in the answers to understand the situation or solicit opinions. This study designed a virtual reality course management system for students to experience firsthand, and then asked them to fill out a questionnaire about the "experience research of artificial intelligence-based virtual intelligent management system", and finally classified and analyzed the results of the questionnaire.

3.2. Questionnaire survey
A total of 200 questionnaires were distributed this time, and 185 valid questionnaires were returned. The questionnaire is mainly distributed to students, including college, undergraduate and graduate students.

3.3. Experimental process
(1) Specify the script.
To make Unity homework, students need to add code that interacts with the Web page, call the JavaScript function of the page, and use the mouse and keyboard to control the C# script of the homework scene objects.
(2) Unity scene keyboard and mouse control.

The teacher reviews the student's work online. It is necessary to control the scene with the mouse and keyboard. The control script is added in Unity, and the script for controlling the perspective should be hung on the camera object.

(3) Unity releases Web GL project.

The teacher checks the students' homework online, and must use the mouse and keyboard to control the scene. The control script has been added to Unity, and the perspective control script must be hung on the Camera object.

(3) Unity launches Web GL.

The Unity project is released as a Web GL project. The publishing process is to find the Web GL creation target in the "Build Settings" option in the "Build Player" window of the editor navigation bar, and then click "Build". When creating a Web GL project for the first time, it will prompt to enter "No Web GL module loaded". You must click the button below to download and install the publishing tool.

(4) Job upload.

In task upload mode, students upload tasks to the specified page. The upload is divided into two contents, one is to upload the Unity Web GL project, and the other is to upload the original project file. The system saves all the work uploaded by the students to the workload file, and names each student workbook with a student number.

(5) Online query.

The result of the Unity task correction function is that the teacher can control the scene and the work code in the student's home, as well as the objects of the scene, and can use the mouse and keyboard to operate the user interface. You can see the information on the page, check the code, and finally give comments and work scores, and then submit.

4. Analysis of survey data of virtual reality course management system based on artificial intelligence

4.1. Data analysis of "is acceptance of virtual reality course management system"

Through the questionnaire survey on students "whether they accept the virtual reality course management system", the data results are shown in Table 1. Among them, 47% of the students said they were "very willing" to join the immersive virtual reality classroom teaching, and 40% of the students chose "More willing", 13% of the students said they were "unwilling", and no student chose "unwilling". This shows that they are more willing to accept new technologies into classroom teaching, and it also shows that students are more willing to accept new classroom teaching models.

| Acceptance       | Proportion (%) | Number of people |
|------------------|---------------|------------------|
| Very willing to  | 47%           | 87               |
| More willing     | 43.8%         | 81               |
| Not willing      | 9.2%          | 17               |
| Unwilling        | 0             | 0                |

Table 1. Acceptance data of virtual reality course management system
As shown in Figure 1, more than 90% of students are willing to accept the virtual reality course management system, indicating that the strong sense of substitution of virtual reality can attract students' attention, stimulate their interest in learning, and make them more willing to accept new technologies.

4.2. "Are you optimistic about the prospects of the virtual reality course management system" data analysis

Through the survey "Is the prospect of virtual reality course management system optimistic", the data results are shown in Table 2: Among them, 45% of the virtual course management systems are very optimistic, 51% are more optimistic, and only 4% of students are not optimistic. The specific results are shown in Table 2.

| Proportion (%) | Number of people |
|----------------|------------------|
| Very optimistic| 44.9             |
|                | 83               |
| More optimistic| 50.8             |
|                | 94               |
| Not very optimistic| 4.3 |
|                | 8                |
| Not optimistic | 0                |
|                | 0                |

Figure 1. The acceptance data of the virtual reality course management system

Figure 2. Is the prospect of virtual reality course management system promising
It can be seen from Figure 2 that a total of 95% of the students are more optimistic about the development prospects of the virtual reality course management system, and the virtual reality course management system is expected to be popular in the near future. The vast majority of students support teaching in the virtual reality course management system. They look forward to the emergence of the virtual reality course management system and are full of confidence in its future development. The vast majority of students are optimistic and optimistic about the future development prospects of teaching in the virtual reality course management system. Of course, due to the still existing technical obstacles of virtual reality, there are still many unsolved problems. I believe that with the continuous development of exciting virtual reality, the virtual reality course management system will also demonstrate the unique advantages and value of the application.

5. Conclusion
The virtual intelligent course management system based on artificial intelligence designed and implemented in this research can be used for course management after the system is developed. Through regular learning, exercises and information reminders, students can realize a complete learning platform. Put learning in the learning environment of virtual reality course management, so as to change the previous learning method only without Internet practice, and improve the learning effect. The system can be applied to professional learning in other related fields. The operating system and dynamic system of the course management system in this study can be applied to online university education, professional skills training, etc., which can increase students' interest in learning and improve learning effects.

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