Development of Online Dance Teaching System Based on Computer Technology

ShuiLiang Xu(✉)

Jiangxi Science and Technology Normal University, Nanchang 330038, Jiangxi, China
gyx84562@163.com

Abstract. With the development of higher education in China and the development of computer technology, most of the courses in colleges and universities have begun to use computer technology to improve the efficiency of course teaching. Traditional teaching methods can no longer meet the needs of current college students and the trend of educational development. This paper uses computer technology to improve the traditional teaching method and realize online distance dance teaching. This paper uses.NET technology to develop an online dance teaching system. This system has a complete teaching database and a perfect online teaching mode, which expands the channels of students' learning and improves the quality and efficiency of students' learning dance.

Keywords: Computer technology · dance teaching · system development

1 Introduction

Nowadays, traditional teaching methods are generally used in dance teaching in colleges and universities. Teachers use language expression and body language display to teach dance. Dance teaching in this way cannot develop students' innovative ability, and requires high memory ability of students. The use of computer software to assist teaching can help students recall the teacher's guidance and teaching, allow students to exert their creative ability, and improve students' understanding of dance. Students can watch the video repeatedly on the software to deepen the memory of teaching. A dance teaching system based on computer technology allows students to review knowledge and movements anytime and anywhere in their spare time, improving the efficiency of learning. The system constructed in this paper realizes the flexible learning of dance courses and provides students with auxiliary functions of remote online dance teaching.

2 System Framework

2.1 System Function Framework

The system divides users into three types, namely administrators, teachers and students. The system builds the functional modules of the system according to the needs of different users (Fig. 1).

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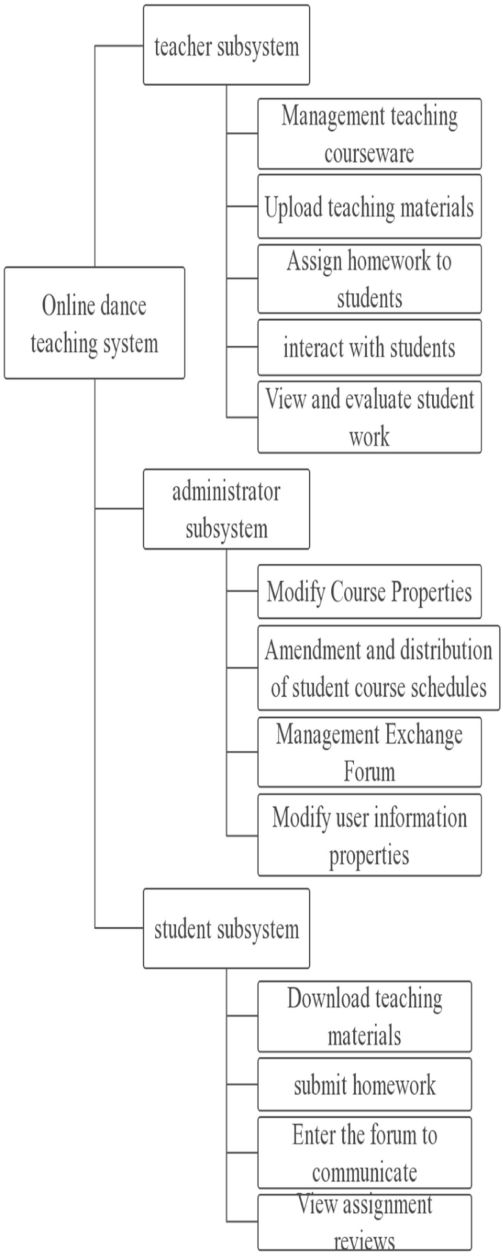

Fig. 1. Functional modules of the online dance teaching system

Table 1. Administrator information table in the database

field definition	Field Type	Field Description
Administration_ID	Long	object identifier
Administration_Username	Varchar	admin username
Administration_	Int	administrator password
Administration_	Datetime	Administrator login time
Administration_	Datetime	Admin offline time

In the function module of the teacher user, the teacher user can mainly manage and upload teaching resources, assign homework, and interact with students. After entering the user name and password in the system to log in, the teacher can follow the page prompts to enter the teaching courseware management and upload page. After the teacher uploads the courseware materials, they can wait for the administrator to review. After the administrator approves it, the courseware will be transferred to the system and pushed to the students. If the courseware is damaged or transmitted incorrectly, the system will remind the teacher, and the teacher can choose to upload it again. Teachers can also assign exercises after logging in. Teachers can ask students to turn in text assignments, photo assignments, or video assignments. Students can receive reminders when the teacher uploads the problem request to the current assignment list. Teachers mainly interact with students on the forum interface of the system. When teachers want to explain dance movements to students through videos, teachers can enter the dance display interface and record their own explanation videos.

Student users can download courseware materials, submit homework, ask questions and interact with teachers in the system. Students complete registration and log in through identity verification. Students enter the latest course interface released by teachers according to the information reminded in the software, and download courseware and materials in this interface. Students can check the course schedule and inquire about the information and related materials of each courseware. Students can view unfinished assignments in the system, complete the assignments online and go straight for submission. Students can check whether uploaded assignments have been viewed and marked. Students can enter the forum interface to send posts, ask questions to teachers, check the status and number of posts online, and make marks.

Administrators can modify and maintain user information and data information in the system. Enter into the system to change the data information by entering the data subsystems with different functions according to your own needs (Table 1).

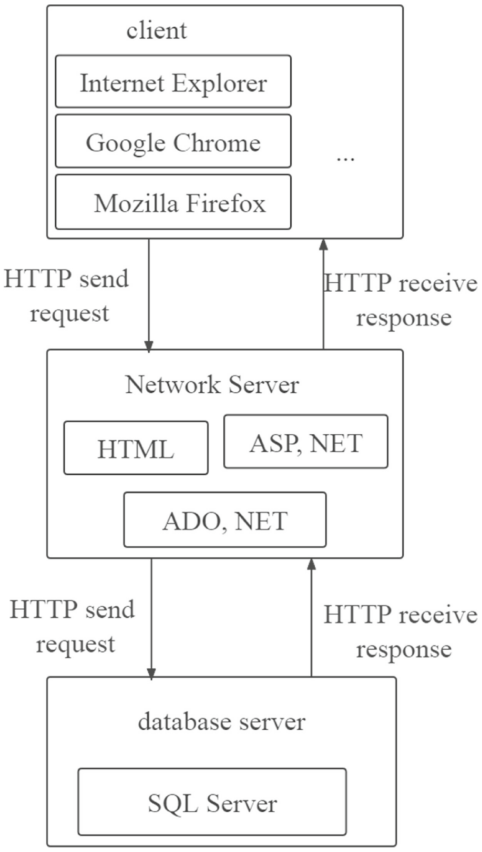

Fig. 2. System Architecture

2.2 System Architecture

The online dance teaching system constructed in this paper uses the B/S architecture. The B/S architecture used in this system divides the system into three parts, namely client, network server and database server. The client will determine whether the communication protocol of the browser used by the user to browse the system is consistent with the server port of the backend. Different browsers have automatic firewall settings, and the browser should consider the matching between the two when setting the protocol with the network server. The network server is in direct contact with the back-end database server, and is mainly responsible for implementing system functions, such as information query, online learning for students, and uploading of courseware resources by teachers. The use of the three-tier B/S architecture is convenient for users, and the client does not need to install the corresponding software (Figs. 2 and 3).

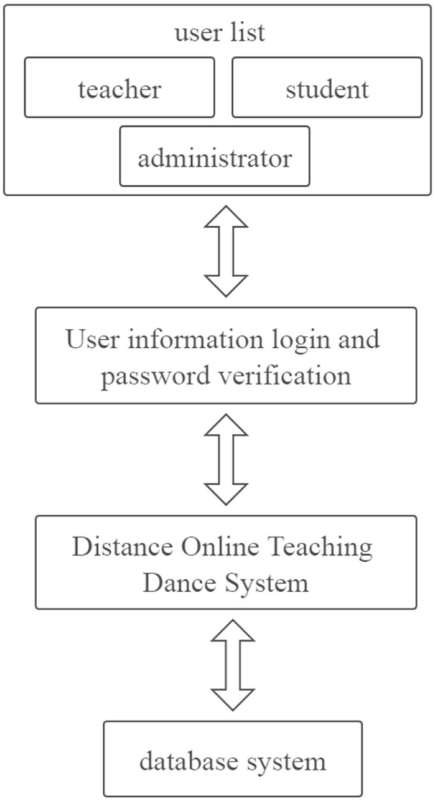

Fig. 3. Operation process of the online dance teaching platform

3 System Function Realization

In order to improve the user's experience and improve the efficiency of system operation, video compression should be performed in the system. The video compression algorithm used in this system is principal component analysis algorithm. The principal component analysis algorithm is a modern statistical analysis algorithm that can compress data. The principal component analysis algorithm can compress the data as much as possible without losing the original data, reduce the redundancy of the data, and reduce the storage space of the data. To carry out the principal component analysis algorithm, first set the original data as $X = \{X_1, X_2, X_3, \ldots, X_p\}$, the specific formula is as follows:

$$X = \{X_1, X_2, ..., X_p\} = \begin{bmatrix} X_1 & \cdots & X_{1p} \\ \cdots & \cdots & \cdots \\ X_{n1} & \cdots & X_{np} \end{bmatrix}$$

After that, the original data should be standardized to avoid the trouble caused by the principal component analysis of the data difference, and the standardization matrix Z should be established. The specific formula is as follows:

$$Z_{ij} = \frac{(x_{ij} - \overline{x_j})^2}{S_j} i = 1, 2, ..., n; j = 1, 2, ..., p$$

$$\overline{x_j} = \frac{\sum_{i=1}^{n} x_{ij}}{n}$$

$$S_j = \frac{\sum_{i=1}^{n} (x_{ij} - \overline{x_j})}{n - 1}$$

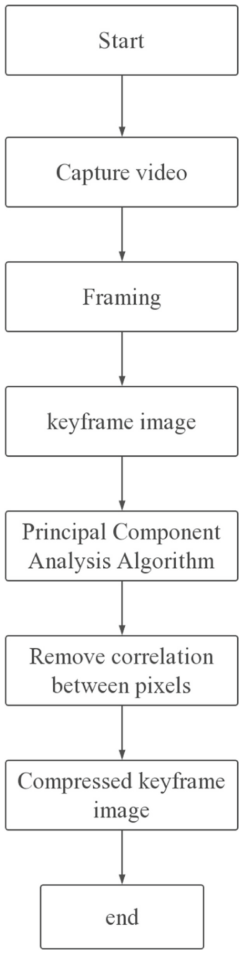

Fig. 4. Video compression step by using the principal component analysis algorithm

Then the correlation coefficient matrix of the standardized matrix Z, as follows:

$$R = ZZ^T$$

Next, we need to calculate the characteristic equation of R, that is:

$$|R - \gamma I_p| = 0$$

According to the above formula, p eigenvalues can be obtained, and finally the principal components can be calculated. The formula is as follows:

$$\frac{\sum_{i=1}^{m} \gamma_j}{\sum_{i=1}^{p} \gamma_j} \geq 85\%$$

The algorithm will project the original data according to the dimensions of the principal components to realize the compression processing of the original data (Fig. 4).

4 Conclusion

This paper builds an online dance teaching system, in which students can review the dance teaching content according to the courseware video, submit various forms of homework, and communicate with teachers. The system also improves the user experience in many aspects, including the use of an efficient B/S system architecture and the principal component analysis algorithm to compress the video, and all of these operations can enable users to get a more smooth experience in the system. This system has a strong use value for the students who need to learn to dance.

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