

Research on the Construction of College Music Teaching Cloud Platform Based on Data Mining Technology

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Abstract

As far as music teaching is concerned, music appreciation class can be said to be an effective means to arouse students' interest in music in music teaching, and to make this interest more intense and unsustainable. Through the combination of network information and computer application, the cloud platform obtains powerful learning information and corresponding materials by sharing data information, and displays them to readers intuitively by means of pictures or videos, so that readers can understand the knowledge they want to know more clearly, thus improving the learning quality. Using data mining technology, it is hoped that the recognition of music style will become a practical work. There is no doubt that the development of cloud computing and data mining technology has opened up a new way for contemporary education and teaching. This paper makes effective use of information means such as database and education cloud, and deeply explores the music curriculum model based on cloud computing and data mining technology, so as to provide better information services for schools, teachers and students.

Keywords: *Data mining technology, College music teaching, Cloud platform construction*

I . Introduction

With the integration of global social culture and the progress of technology, music education has increasingly become an interdisciplinary subject integrating musicology, pedagogy, ethics and related technical sciences. For music teaching, music appreciation course can be said to be an effective means to arouse students' interest in music in music teaching and make this interest stronger and unsustainable [1-2]. Through the combination of network information and computer application, the cloud platform obtains powerful learning information and corresponding materials through the sharing of data information, and visually displays them to readers in the form of pictures or videos, so that readers can more clearly understand the knowledge they want to understand and master, so as to improve the learning quality [3-4]. Today, people's dependence, demand, creation and communication on music have reached an unprecedented breadth and depth. Nowadays, with the rapid development of information technology in society, we use information technology in music teaching to provide students with both visual and auditory experience, which can get twice the result with half the effort[5]. Network and information technology can integrate high-quality teaching resources all over the world, break the limitation of traditional classroom hours, and realize all-weather and all-round "teaching" and learning [6]. Cultivate good reading and good reading habits, and at this stage has gradually entered all kinds of colleges and universities, as the main means of auxiliary learning, then the application in music theory teaching in colleges and universities has also entered the practical operation, just like the actual application in the teaching of "Western Music History" [7-8].

At present, people have done less work in computer recognition of music style. The objects of big data sources have also become more and more complex, from different types of databases to video data, multimedia data, sensor networks, social networks and large-scale e-commerce [9]. Using data mining technology, it is hoped that the recognition of music style will become a practical work. There is no doubt that the development of cloud computing and data mining technology has opened up a new way for the development of contemporary education and Teaching [10-11]. The new generation of information technology cloud computing is a supercomputing mode based on the Internet. In the remote data service center, thousands of computers and servers are connected together, which can provide high-performance computing. Users can access the data center through computers, notebooks, mobile

phones and other ways to calculate according to their own needs [12-13]. As an indispensable medium between music curriculum theory and curriculum practice, music teaching mode can not only effectively guide curriculum teaching practice in theory, but also formulate effective operation flow and implementation countermeasures for specific curriculum practice [14]. Therefore, it will be of great practical significance to apply cloud computing to traditional data mining, which will bring new opportunities to big data mining services under complex network environment [15].

II. Application and Implementation of Cloud Platform Mode in Music Theory Teaching in Colleges and Universities

A. Integrate Music Education Resources

According to China's current national conditions, the music education resources are still relatively scattered, and because the teaching experience has not been shared, the resources in the whole music education system are relatively scarce and can be used for reference. The cloud platform realizes the secondary development and application of teaching material resources, and effectively meets the needs of students' cooperative learning and active inquiry. It is an important way to develop and integrate educational aspects. It can effectively combine the data resources generated in the process of educational informatization, provide good basic service support for educational informatization, establish an efficient, open-source, up-to-date and intelligent educational resource platform, and effectively alleviate many shortcomings such as uneven distribution of teaching resources in different regions, slow update speed, low sharing degree, and inability to acquire, collect, integrate and analyze user data. In this case, in the mature period of educational software, we can collect the national music resources through Internet information and computer technology, establish a database of music teaching resources, put them on the cloud server and integrate them in a shared way. The questionnaire will be distributed from October 2019 to April 2020 by mailing the paper version, publishing the online version of the questionnaire and communicating with the school's educational administration department. As of May 1, 2020, a total of 650 questionnaires have been distributed, 621 have been recovered and 588 valid questionnaires (excluding invalid questionnaires such as incomplete information and the answer is the same option). According to the recovered questionnaires, the paper and electronic data are uniformly entered into the questionnaire star of the network questionnaire statistics tool to directly obtain the survey results and analyze the data results.

The survey object's preference for music: The purpose of this questionnaire is to study the students' needs and evaluation of music education, so whether they like music is the first question of preference. What deserves our attention is that more than 90% of the students love music, as shown in Table 1.

Table 1 Respondents' Preference For Music

Option	Subtotal	Proportion
A. Like it very much	258	44.04%
B. Like it	274	46.45%
C. General	57	9.53%
D. Don't like it	0	0%

The main ways for respondents to enjoy music: for example, the questionnaire data show that 57.15% of the main ways for students to enjoy music in their daily life choose the Internet; The second is music appreciation class, accounting for 16.68%; The third is tape and record, accounting for 12%, as shown in Table 2.

Table 2 the Main Ways for Respondents to Enjoy Music

Option	Subtotal	Proportion
A. Music appreciation class	99	16.68%
B. Tape and record	71	12%
C. Networks	335	57.15%
D. Television media	57	9.53%
E. Concert	15	2.39%
F. Others	15	2.39%

When making choices, teachers should first collect and arrange high-quality resources based on teaching progress and teaching contents. For the integration of resources, it is necessary for every educator to make selfless dedication,

upload the music knowledge he has to the cloud service according to his own education mode and combining with examples, and then develop software by technicians and share data in the form of App or webpage, so that every educator can learn better and more diverse teaching concepts.

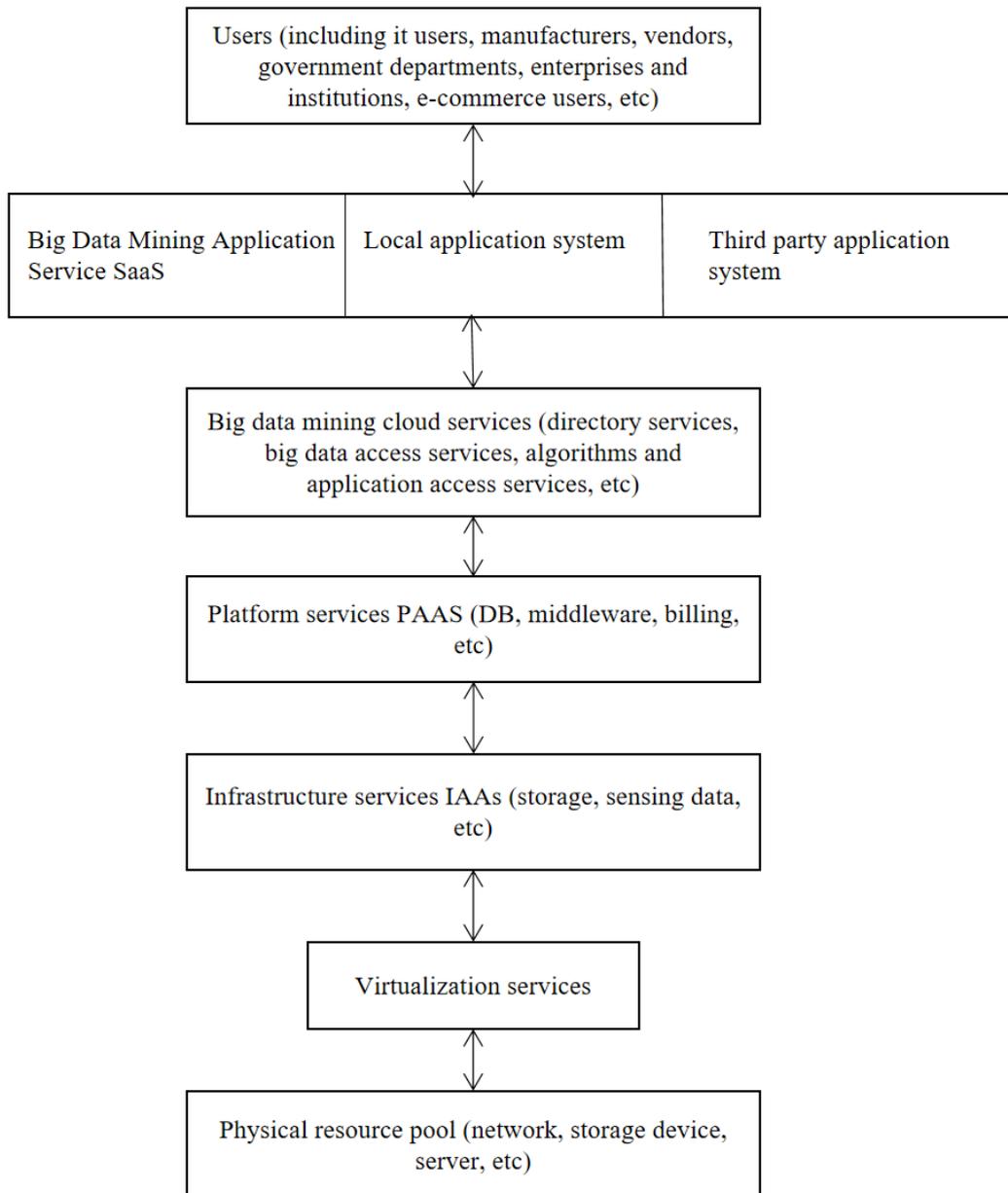
B. Application in the Teaching of Western Music

In the application before music teaching class, it is necessary to clearly mark the knowledge points that students need to master in this class in preparing lessons for each lesson, and analyze the knowledge areas that need to be understood. In the same style of music melody, the same melody feature fragments will appear repeatedly, and the features represented by this melody feature fragments are considered to play a great role in the formation of music style. In addition to sorting out the materials and uploading them to the cloud platform, it is necessary to note some questioning information in the class for learners to consolidate and master. With these auxiliary explanations, each learner can clearly know the key points of this class and the knowledge that needs to be mastered, and avoid the deviation of learning direction caused by the inability to master key knowledge during self-study, thus improving the learning quality. When the frequency of a certain melody feature segment in the selected style music training set reaches the set threshold, we call this melody feature segment frequent mode. In using the cloud platform to improve teaching, teachers do not impart knowledge to students in the way of indoctrination, but let students take the initiative to learn with tasks through the guidance task list. In the application of real-time classroom explanation learning, it is necessary to make it clear that students are the main body of the whole discipline, around students' learning, mainly guided by teachers, and teachers and students cooperate with each other for interactive operation to improve the learning effect.

III. Architecture of Cloud Service Platform for Network Big Data Mining

A. Physical Resources

Some hardware devices that cloud computing service providers can provide to support the normal operation of computers can be expensive high-end servers, low-cost high-density servers, mass storage devices, high-performance computing devices and other hardware infrastructure. The migration of cloud computing in the field of education is called "educational cloud", which can more effectively combine the data resources generated in the process of educational informationization, provide good basic service support for educational informationization, and thus construct a more efficient, up-to-date and intelligent educational resource platform. In order to realize the service architecture of the cloud computing service platform for network big data mining, the architecture shown in Figure 1 is proposed, which mainly includes the following layers.



Architecture of network big data mining cloud service platform

To solve the problems of uneven distribution of educational resources, slow update, low sharing degree and difficulty in collecting, integrating and analyzing user data to the greatest extent. Cloud computing platform management, resource scheduling, job scheduling and other high-load services are the inevitable choice of the core business of cloud computing and the core equipment of the whole cloud computing system, which are mainly used to improve the data processing capacity of cloud computing data centers.

B. Virtualized Resources

Virtualization technology is the technical basis of cloud computing. This layer uses virtualization technology to fully virtualize the underlying physical resources (including servers, storage and network equipment), and turns computing, storage, applications and services in cloud computing into resources. Based on the influence of mobile communication technology on students' learning, living and entertainment, the art education research group of

colleges and universities developed a mobile terminal-oriented music teaching cloud platform, which realized the effective accumulation, storage, management and retrieval of music teaching resources, and exerted the functions of knowledge expansion and resource sharing of the network music teaching cloud platform. The network can transmit global music information in time, which is dynamic and open. The integrated music resources of the cloud platform cover a wide range, complete contents and different styles, which can meet the different learning needs of different students. These resources can be dynamically expanded and configured, and cloud computing can finally be logically presented in the form of a single whole. The music teaching cloud platform is divided into video acquisition module, agent management and system management according to its functions, as shown in Figure 2.

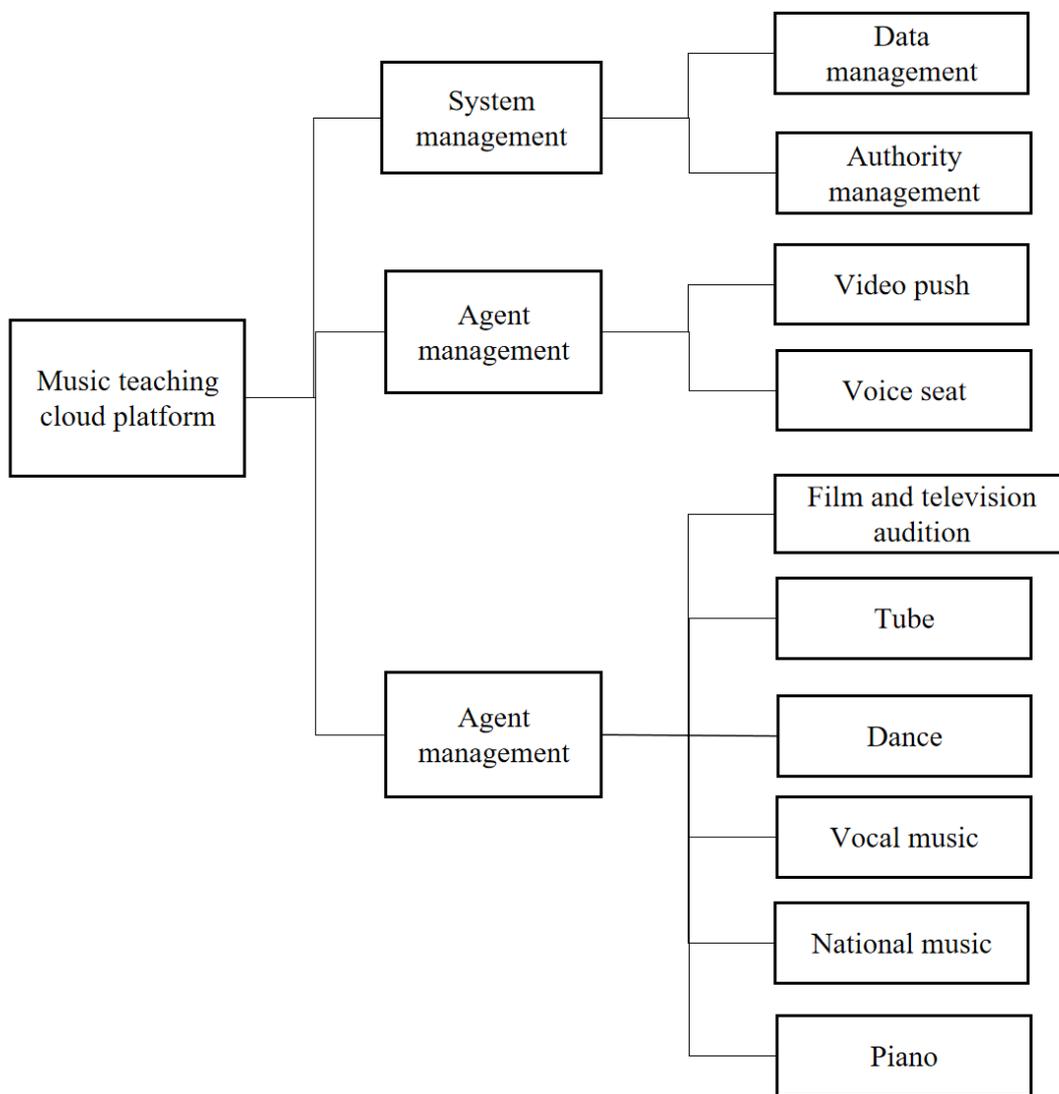


Fig.1 Platform Function Module

Users can access the music teaching cloud platform through smart phones, and obtain the required video paragraphs by selecting menus, so that they can watch the course videos, course PPT and related works of each course.

C. Infrastructure Services

The infrastructure service layer corresponds to IAA s infrastructure as a service. It provides users with basic computing resources such as computers (physical machines and virtual machines), storage space, network connection, load balancing and firewalls through computer networks. In the overall architecture of information management layer based on data mining, the user system includes two parts: student and teacher system. The main function is to search learning materials quickly and conveniently through the search engine system based on the

open source project Lucene. At the same time, the search information will be recorded effectively. The power amplifier adopts a unique design. The output power for different frequencies is a function of the working voltage of the amplifier tube. By changing the working voltage of the amplifier tube, the output power is adjusted, thus greatly improving the efficiency of the amplifier tube and increasing the output power. In the infrastructure, the whole system interacts around the user interface, that is, a series of teaching activities are carried out closely around users, in which users play a vital role. As shown in figure 3.

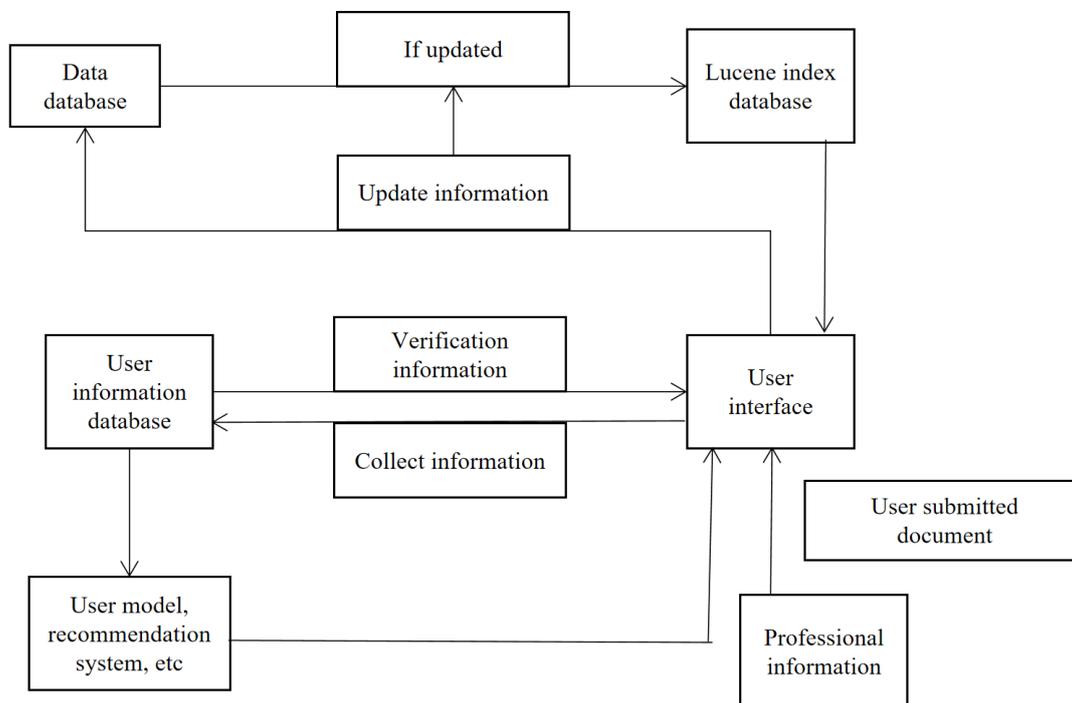


Fig.2 Architecture of Data Mining Interactive Information Management System

According to the above characteristics, we design a style recognition method. The style recognition of the music to be tested is performed between two pre-selected styles. Let's set the two styles as A and B, and the recognition work is divided into two steps:

(1) For the union of the frequent pattern sets A and B of the training sets of a-type and b-style music: for each pattern $K_i (0 < i \leq n, n = |H|)$ in $H = A \cup B$, calculate the trend value f_i of its style. Let r_{Ai} and r_{Bi} be the frequency of appearance of the pattern K_i in the training set of two types of styles a and b respectively.

$$f_i = \frac{r_{Ai}}{r_{Bi} + h} - K \frac{r_{Bi}}{r_{Ai} + h} \quad (1)$$

If the absolute value of f_i is less than the threshold y , the pattern K_i is deleted from H. This is to eliminate frequent patterns that have no effect on the recognition style and simplify H.

Arrange the style trend values of each mode in H in lexicographical order to form a vector α .

$$\alpha = (f_1, \dots, f_m)' \quad (0 < i \leq m, m = |H|) \quad (2)$$

(2) Scan the music s of the style to be tested, and count the number of appearances t_i of each pattern K_i belonging to the set H. According to the same order in step (1), the number of occurrences of the frequent patterns belonging to H in the music s are arranged to form a column vector β .

$$\beta = (t_1, \dots, t_i, \dots, t_m)' \quad (3)$$

Each power amplifier is equipped with an RS232 detection interface on the front panel for detecting the working parameters and status. Instead of special software, it can be directly connected with the super terminal software of the operating system of the PC to detect all the operating parameters of the power amplifier.

IV. Conclusions

With the changes of people's learning, living and entertainment methods brought by mobile communication technology, the music teaching cloud platform for mobile terminals will become an important platform for colleges and universities to carry out music teaching and autonomous learning, and will promote the reform of general music teaching methods in Colleges and universities. Cloud education platform is a bridge connecting teachers and students to communicate and learn. It can meet the equal learning of different people all over the country. It has diversified teaching methods and open teaching resources. For the problems of traditional data mining, this paper puts forward the concept of network big data mining cloud service, and introduces the characteristics of big data and the concept of cloud computing. Effectively use the music education information platform architecture and data mining technology of education cloud to give full play to the three advantages of the platform: unity, openness and flexibility. Of course, cloud education platform is an auxiliary means of learning and education. Because of its powerful resource sharing and diversified data, it is easy to view and study, but it cannot completely replace the role of teachers in the whole music teaching. Through the investigation and analysis of the present situation of music education in colleges and universities, combined with the knowledge characteristics of music education, we applied mobile communication technology to music course teaching, which lifted the geographical and time constraints of music education.

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