Music Solfeggio Learning Platform Construction and Application

Qiao Zhou, Baihui Yan
Jiangxi Science & Technology Normal University, Nanchang, Jiangxi, China
`66840748@qq.com`

Abstract—To better develop the music learning, this paper completes the design and realization of a music solfeggio teaching system by combining with practical teaching conditions of the music academy. Firstly, it elaborates the main functions needing to be possessed by solfeggio teaching system by starting from actual demands of the users, puts forward overall design scheme of the system, and gives detailed design to main function module and database of the system. Secondly, it analyzes and researches theoretical basis of the solfeggio teaching system design, and proposes the construction scheme of teaching knowledge point repository and question bank system, including solfeggio repository information setting and system paper constructing strategy. It is indicated by the system analysis results that: this platform design provides an effective learning and inspection means to the implementation of solfeggio teaching. Thus, it draws the conclusions that: learning system of this paper can directly serve for course learning of the students majoring in music, and it has important practical significance and application value in promoting development of the music education informationization.

1 Introduction

Solfeggio is a compulsory foundation course for the students majoring in music, it has very close relation with other music courses during music learning, and they are intertwined and interrelated in teaching content and teaching method. Thus, it has particular important position in music teaching and learning, and arouses more and more concerns of music educators, music learners and numerous amateur music lovers. Just because of this, solfeggio course learning quality shall directly affect cultivation of the music quality ability of the students and determine comprehensive music quality of a person during the whole music learning process [1]. In the modern society, along with development of the times, various new techniques emerge continuously, especially for the development of digital music technology which makes the music culture in contemporary music environment showing pluralistic development, and cognitive competence of the students improves constantly as well. However, the traditional teaching model shows vicious circle in teaching process, teaching progress of

the teacher is slow, learning efficiency of the student is low, and this teaching method is hard to reach the expected effect requirements in such aspects as music teaching efficiency, student exam results and music practice ability training. So to speak, the traditional solfeggio training giving priority to teacher cannot satisfy the increasingly developed music culture requirements any more [2].

Staged achievements of the research on this topic can not only widen the views of music teaching and academic research, but also lay a favorable foundation for digital music resource, especially for college music course and digital teaching resource construction. Thus, it can exploit new space for development of discipline tools of the National Engineering Research Center for E-Learning of the Central China Normal University.

2 Literature Review

In recent years, digital music teaching has been used in music teaching of our country gradually, and it is used in music education field of colleges and universities as an important aided teaching method [3]. However, it is not realized really to apply solfeggio teaching software in actual classes, especially for extension of action effects of the software to the learning, examination and exercises in different stages during teaching process. The author gives comparison and analysis to the music teaching software used widely currently, inspects the current computer music teaching status and analyzes characteristics of the current computer digital education software, which has very important guiding significance to research of this paper. Next, brief introduction shall be given to several kinds of common computer music teaching software, as well as analysis and comments.

Auralia: Auralia is a professional training solfeggio software produced by Rising Company of Australia, it possesses comprehensive functions and can be suit for students in various learning hierarchies, and it can not only be used in classroom teaching for facilitating teaching work of the teachers, but also be fit for self study and exercises of music lovers [4].

Earpower: Earpower is a teaching software used in music listening training, and the main function lies in the training on such various knowledge points as musical interval, musical scale, chord and melody. Simultaneously, the system possesses favorable interface, abundant and various interactive modes and training methods, especially that such various interactive channels as piano, stave and music ray can be set for training [5].

The aforementioned several kinds of solfeggio software possess features of rich teaching content and various knowledge point training modes, they can make students participating in teaching activates more actively at the same time of enriching teaching methods of solfeggio course, and the way of combining software teaching with traditional teaching method further makes for teaching content grasping of the students. However, we also discover some disadvantages and insufficiencies of the software in practical teaching process along with their wide application. Thus, the research in this paper bases on construction of the interactive solfeggio teaching reposi-

tory suitable for music discipline education and music quality education of our country, so as to provide teachers and students with the window for autonomous resource management and learning and make it possible to introduce the music appreciation works with Chinese multi-ethnic characteristics as many as possible [6].

3   System Requirement Analysis

To solve the problems existed in teaching and examination processes of the course Solfeggio and develop a more practical music teaching software, it is crucial to give requirement analysis in the earlier stage of system development. Net, comprehensive analysis is given to user requirements of the system according to system performance requirement and logical structure.

3.1   System performance requirements

It needs to determine basic performance requirements of the system in the initial stage of system development, which has important significance to the determination of system design scheme. By aiming at the teaching software applied in music solfeggio course teaching specially, requirements of the system in performance aspect are as shown in table 1 below:

Table 1. System Performance Analysis

Performance Requirements	Content Introduction
Accuracy	This teaching system possesses such functions as learning, test and course management, and it requires accurate content display as to knowledge points, system paper constructing management and examination, especially that examination module is required to be objective and fair, which is the basic requirements of the system to accuracy.
Fault Tolerance	The system shall possess certain fault tolerance mechanism, and it can give corresponding operation alert as to the error arisen in operation process of the user. For example, when arising system login error, it shall give corresponding handling mechanism when clicking error with key.
Usability	This system faces to teachers and students in music major, and the system users are non-professional computer personnel, so simple operation is required in the aspects of installation, test and maintenance of the music solfeggio teaching system to facilitate use and maintenance of the users.

3.2   Logic structure design of the system

The system adopts the C/S structure development mode combining foreground application program with background SQL server database, and uses C#38 as the development language. According to the requirements of music solfeggio teaching system, this project needs numerous user operation interfaces, the WinForm interface application program under NET platform is selected firstly for its internal use in local area

network, and the program is specially responsible for interacting with operator, receiving input and displaying output. In this system, the core technologies needing to be solved are how to access data via the most reasonable means and how to reach specific objective by selecting data components and by aiming at different demands [7]. Schematic diagram of the data access part in this system is as shown in figure 1.
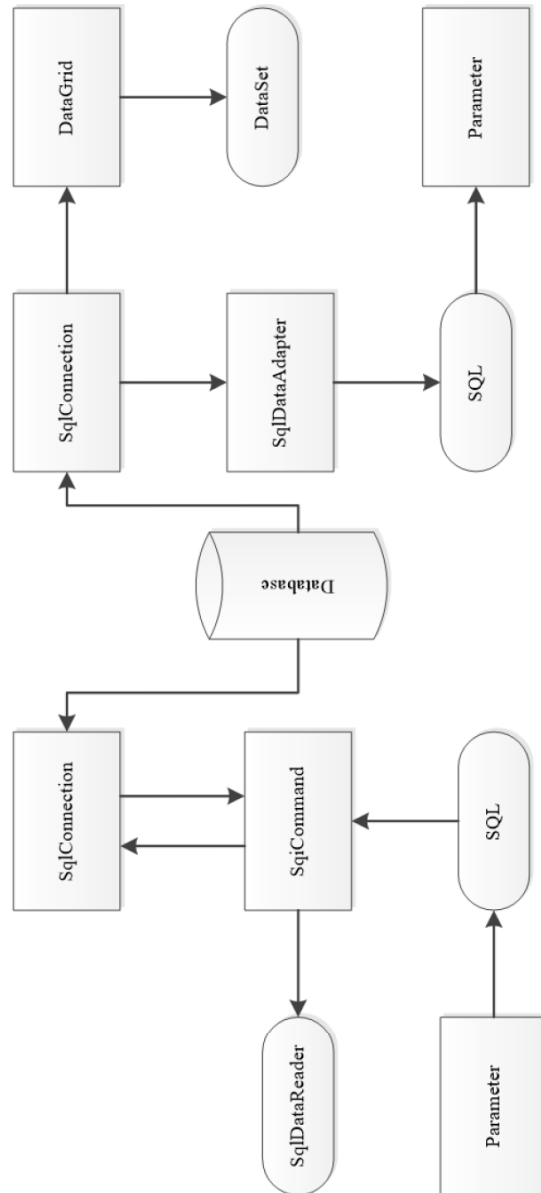

Fig. 1. Relation Schema of Data Access

In general conditions, SqlCommand control can be used in executing SQL statements without return record set, e.g. such operations as user information addition, modification and deletion, and it can also be used in executing SQL statements with return set, e.g. operations of student scores inquiry and statistics. It can read data via SqlDataReader object, call the Select order in SQL statement with Fill method, update change of the record in each day with Update method, and call the implied Insert, Update and Delete orders automatically [8].

By taking the data access principle introduced above as basis and combining with characteristics of this system, the whole system can be divided into the logic structure as shown in figure 2.
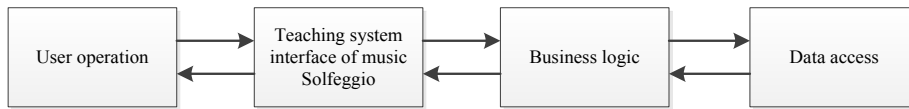

Fig. 2. System Logic Structure Diagram

4   Realization of the Music Solfeggio Teaching System

Based on overall structure design and module function design of the system, this chapter shall further elaborate concrete realization of the main function modules of the system, namely teaching knowledge point repository, question bank, knowledge point learning and test, topic selecting and paper constructing, it also gives out realization method of other main function modules of the system, system user interface and program analysis, and it finally analyzes the considerations for system safety.

4.1   System structure class diagram

Realization of each function module shall be achieved successively by adopting class diagram analysis method and according to functional structure design diagram of the overall structure of the system. By logging in form class (FrmLogin) in the system, one can select to access in system administration form class (FrmAdminMange) and student study form class (FrmSduentStudy) according to user ID. As to the system administration function, the following main classes are set, namely knowledge point management class (KnowledgeMange), test management class (TestMange), user management class (UserMange), score management class ((ScoreMange), class management class (ClassMange) and examination set class (ExamSet). Class diagram is as shown in figure 3.
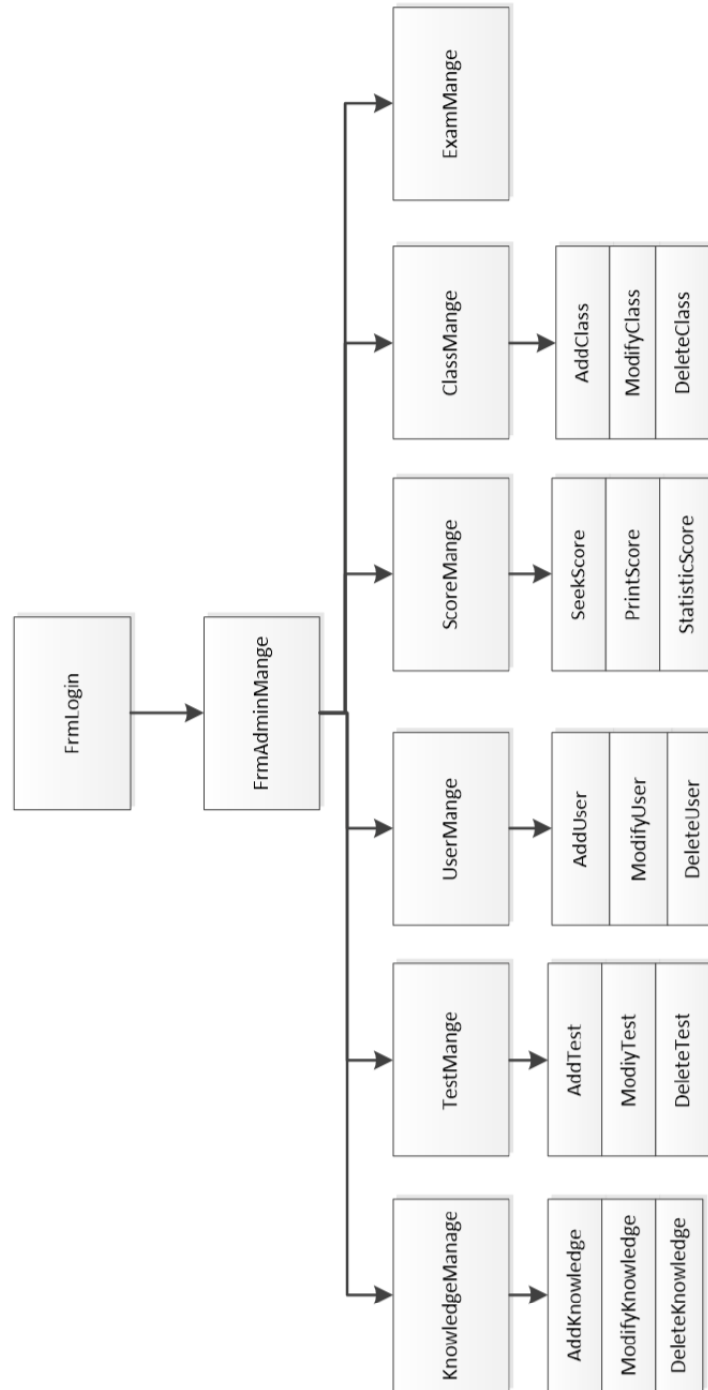
Fig. 3. System Management Class Diagram

4.2 Realization of key technology modules

Knowledge point learning: knowledge points of the solfeggio major are musical scale, musical interval, rhythm, chord and melody, the various chapters are shown as main menus, directory tree is used in showing chapters, and contents are shown by levels. By clicking the chapter icons on menu successively, corresponding knowledge points of each chapter can be shown, and the realization block diagram is as shown in figure 4.

Realization of student test function: this system possesses excellent solfeggio teaching repository, it structures question bank resource simultaneously, and it is more convenient to realize online test function of the system on this basis. It is one of the main functions of this system to allow student user participating in online test, and the function of student test can be completed in the program file <frmStartExam.cs> [9]. The flow chart for student test function realization is as shown in figure 5.

After selecting test, the system shall begin to read personal information and record test time, and student could answer the questions successively before time out; when answering the test questions to the preset total number of questions N, student could select to finish the test; when reaching the specified test time, the test function shall exit.

After login of student user, the system shall read the IsTest field thereinto automatically according to persona information of the user, and judge whether the user should have participated in the test. If IsTest field value is 0, it shall indicate that this user should not participate in the test yet, and the student could call out test paper according to the class and grade by pressing "Test" function button of the system menu so as to realize online test; if IsTest field value is 1, it shall indicate that this user should have participated in this test, and test function of the system shall not be used, while the student could check the current test scores via scores inquiry function.
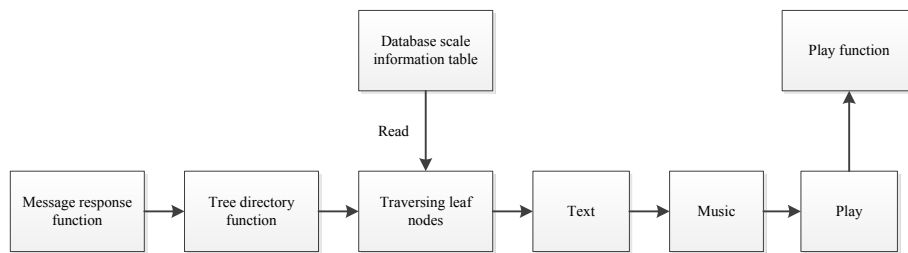
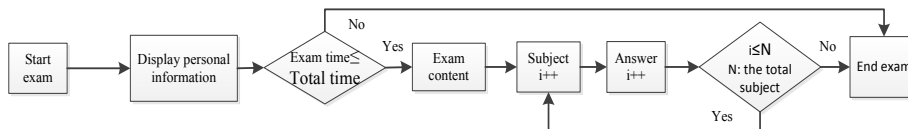**Fig. 4.** Realization Bock Diagram of Knowledge Point Learning

Fig. 5. Realization Bock Diagram of Knowledge Point Test

4.3 Realization of system question bank management program

The system adopts the first scheme as to the multi-media resource used in solfeggio teaching, uses high-performance server, operates in internal local area network, and possesses quick reading speed and rapid response time. Thus, it is more convenient for resource management. When adding or deleting resource, it only needs to modify the corresponding memory address, so as to inquire and use resources more intuitively and realize the ore convenient operation [10]. Realization block diagram of test questions management function is as shown in figure 6.
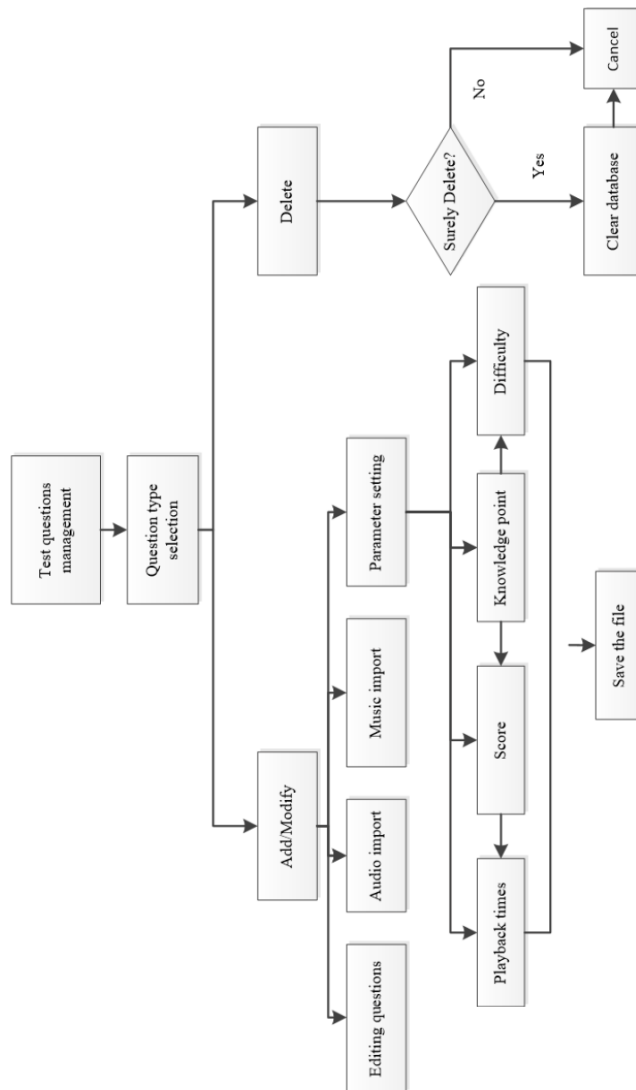

Fig. 6. Realization Block Diagram of Test Questions Management Function

5 Conclusions

Along with development of computer and multi-media technology, the emerging of digital music has already been changing the traditional music education mode quietly, and this change also affects reform of the music teaching mechanism. Based on the development of modern music teaching, this paper gives introduction to the teaching content of music solfeggio course and the theory outline of music major related to the system, and analyzes the method used in constructing digital teaching repository for music major. Secondly, it gives analysis to system requirement with UML, and proposes function and structural design of the solfeggio teaching system. Finally, it builds the high-quality test question database with reasonable distribution of question type, content and difficulty by combining with characteristics of solfeggio subject and music resource compilation theory, and provides concrete implementation steps, which lays a solid foundation for development and perfection of the subsequent functions of the system.

Considering such factors as the restriction of system development time and experimental conditions and the deficiency of development experience, this paper still has many deficiencies, system functions are incomplete, and further perfection and promotion are needed.

6 References

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7 Authors

Qiao Zhou and **Baihui Yan** are with Jiangxi Science & Technology Normal University, Nanchang, Jiangxi, China.