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## Research on application of computer auxiliary system in the design and creation of dance

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### ABSTRACT

With the development of information technology, computer as a modern tool gradually goes into millions of households. And in 21st century, the digital era has arrived completely with the multimedia technology being more widely applied in each field. The arrival of information age makes the development updated at every time, which not only promotes the economic and cultural development, but also offers a more relaxed and convenient platform for the development of dancing art. As an art form that is closely integrated with the new era, digital dance is more ornamental, and more interactive. Besides it has the advantage of saving resources. Digital dance attracts more and more attention due to the above advantages. In the creation of digital dance art, as a new development direction, the three-d computer auxiliary system makes digital dance more intuitive, which can not only optimize the project, but also expand the developing space of the digital dance. Being as a cognitive tool, multimedia integrates the diagram, text and voice. And digital educators have begun to pay close attention to this auxiliary teaching tool. In the field of dance art, the usage of computer 3D auxiliary system to create dance can develop dance art better and faster. And the researchers of dance art can understand the field of dance art more conveniently through this tool; and as a kind of innovative ideas, the combination of digital concept and dance art marks that the development of dance has entered a new stage.

### KEYWORDS

3D auxiliary system; Digital dance; Model.



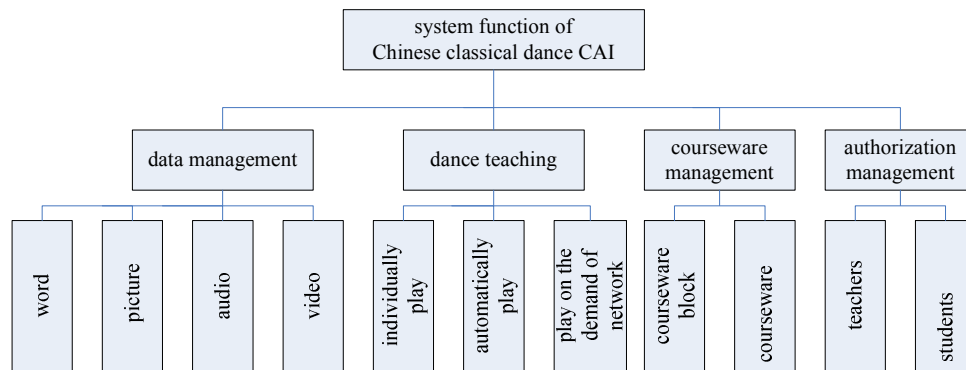
**INTRODUCTION**

Studying from the broad sense, the digitalization of dance includes not only the digital production, but also transfer the dance in digital way<sup>[1]</sup>. In the studying the digital technology of dance, the high-end development of the technology can be treated as a large-scale industrialization process and project system. First, it needs to be carefully planned, and then skillfully operated by professional staff. And those who participate in the planning and creating need to have the background of professional technology. Dance movies and music TV in digitalization of dace have their commercial uses; in addition to commercial uses, and digitization of dance is of scientific significance, with prospective value in the subject study. It can make contribution to discipline construction of dance. In the premise of the visual requirements, digital dance required to be more interactive. In dance creation, 3D computer auxiliary system is all sight. From artistic creator's point of view, this visual mode is more convenient; from a choreographer and actor's point of view, the operation process is more optimized, and more convenient for the interaction between directors and actors<sup>[2]</sup>. The advantages of computer 3D auxiliary system can meet the visual and interactive requirements of digital dance.

**INTRODUCTION OF THE SYSTEM**

**A brief introduction of the system**

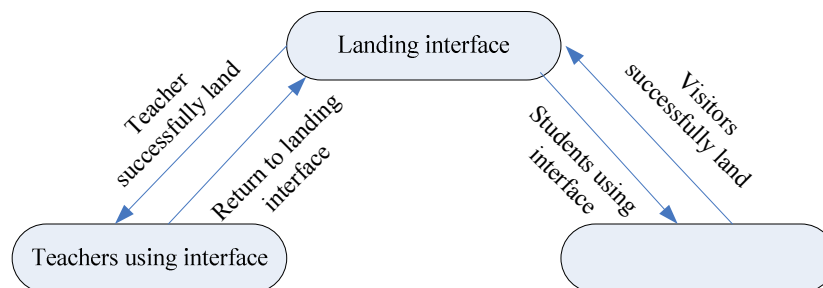
The 3D computer auxiliary system used in this study is used for the creation of dance and is a software system of choreography. The system is designed based on 3DS MAX 3D software, using three kind functions of 3DS MAX 3D software, respectively, camera motion, motion capture and ray tracing. Through these three kind functions, edit and integrate character models and dance movements in the database to form a three-dimensional visual dance product. And creation process is shown in Figure 1. The dance works completed in the way has strong sense of the lens and the stage scheduling, and can well simulate the stage design and personnel scheduling in the dance scene. The validity of the simulation makes evaluation and modification of the designing dance simple and easy to operate<sup>[3]</sup>. The database used in this study is SQL database.



**Figure 1 : System function of dance creation**

**Software development platform**

The platform of development system used in the present study is 3DS MAX software, and the concrete interface is shown in Figure 2. There is movement, room simulation and material shading technology in 3DS MAX 3D software, with which the computer 3D dance creation function can be realized. In terms of a purely technique, 3DS MAX software used for this study is developed by Autodesk company, and an additional plug-in should be designed on the basis of the software. The plug-in is developed by maxscript language, and requires to use external data export interface and to better reflect the interactive of the users.



**Figure 2 : 3DS MAX software platform**

3DS MAX software is convenient for using and has powerful function. One of the important parts in using computer 3D auxiliary software to make dance design is the stage design. 3DS MAX software can provide the material editor, lighting effects and many other practical and necessary functions. The software can create worlds and objects in the virtual 3D space and the virtual world and the virtual objects are extremely realistic with the same size with the actual size<sup>[4]</sup>. Environmental effects function can make out the performance space, props, virtual set even the actors from the director's; lighting effects is also convenient to edit the light and the additional effect. From the computer screen through the software from different angles and different positions, lights lighting effects can be visually displayed and the vivid image makes lighting design more convenient. The software can simulate the stage design easily and rapidly and also help the stage designers who create and practice the work to simulate the spot effect with fewer efforts. Besides it is characterized by being easy to modify.

### Construction of database

According to the basic role of model base and the effects it should embody, the design of database structure can be realized. The database platform used in this study is realized by sql language<sup>[5]</sup>. As a functional language, SQL is designed specially for establishing a database. In the sql database, the tables are collected to make up a database which is defined by one mode or a plurality of modes. Each table is composed of rows, and each row and column corresponds to a data item, which not only makes the data easier to edit but also is convenient for effective classification by data types. Microsoft SQL Server database used in this study is 2008 Enterprise edition. First create a database, and denote it as "dance". Build tables to in the "dance" database, and then establish reference relationship between the each involved column and each item in the table respectively, and the building of reference relationship should be constrained depending on the integrity. For example, in the "stageelement" table, "light" is corresponding to table "light"; in table "person", "coat" column is corresponding to table "coat", and "color" column to "Colour". These tables include stage and the character elements, and is stored in IMAGE data type to finish the final relational tables of database, which is shown in Figure 3.

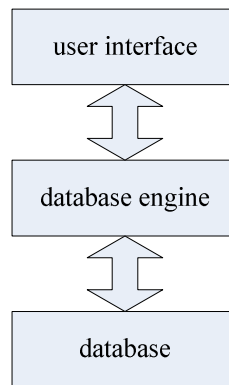


Figure 3 : The SQL database of the model

### Construction of movement model

In the simulation of movements, head, limbs and trunk can complete the dance moves through three-dimensional pictures<sup>[6]</sup>. The space of human movements is separable, and Rudolf Von Laban thought that it can be divided into three axis and three planes. And different kinds of dance will have different classifications, such as the famous "three bends" dance in the Chinese folk dance; In Chinese classical dance, there are many basic movements such as "exploring the sea", "lying fish", and "swallow flying through the forest"; the West ballet dance also has detailed classifications. In the dance choreography, the movements are also changeable, with not only simple geometric shapes such as lines, and round shape, but also complex dance graphics such as "two dragons spit must", "rolling of flowering Chinese cabbage" etc., which are particularly prominent in China folk dance. Figure 4 and Figure 5 show the processing flow of movement material of Ballet.

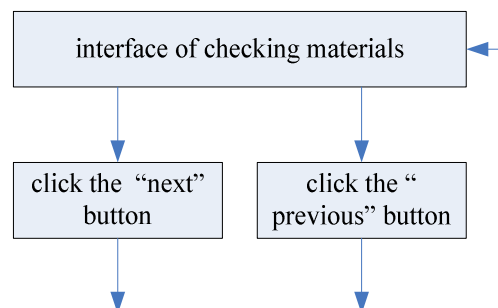
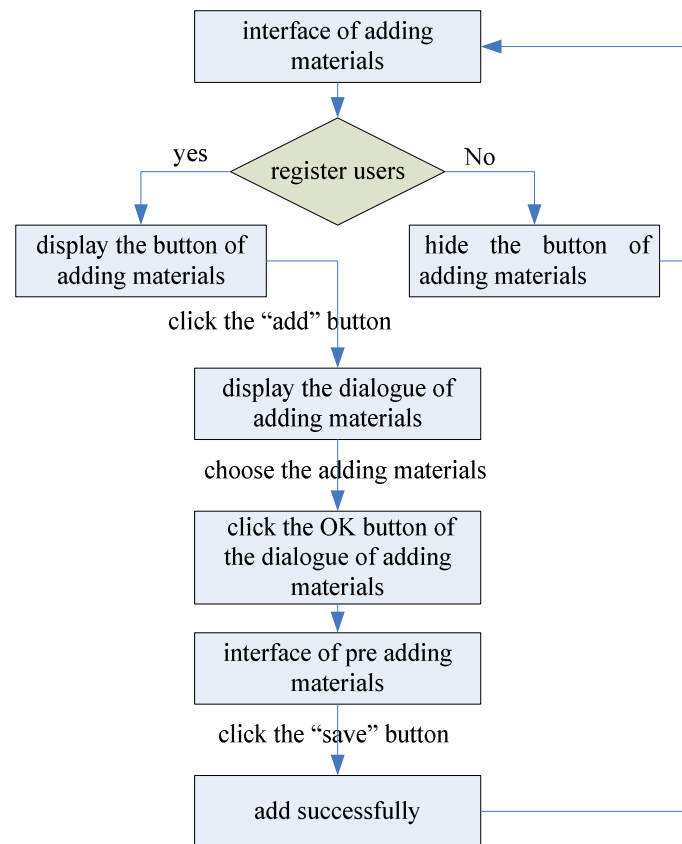


Figure 4 : Processing of checking materials



**Figure 5 : Processing of adding materials**

### Construction of character models

In system designed in this paper, there are rich dance movement models and various types of character model<sup>[7]</sup>. In designing the characters, gender, age, dance, height and even shape of the characters are respectively stored in the database. Users can, according to the requirements of the choreography as well as the dance content and dance style, select dancing figures purposely. After selecting characters, designing the details of the figures can be made and clothing, accessories, etc. in the database can be found for the user to choose and use.

There are totally 10 representative images models in the database. Low precision models are chosen to be stored in the database with the number of sides being in the range of 2000-6000 to ensure the relatively small capacity of the database. Each figure is stored in the form of Max, and the storing content includes material, character movements and clothes material which are produced by the 3DS MAX software. In the designing the movement, first ask the professional dancers to display the actual dance moves, and then track and capture the movements with motion capturing system, so that the motion trajectory can be recorded. Of course, users can use existing dance moves which only needed to be selected from the database; they can also choreograph by themselves according to the actual needs. If the users create new movements which do not exist in the database, then they can upload the new dance moves to the server. And there is public server for the newly created dance works online, which is easy for updating the created dance movements in the system, more convenient for users and makes the characters and dance movements more perfect.

### THE SIGNIFICANCE AND VALUE OF THE RESEARCH

In the background of traditional dance, graphics and image can not only outline the performing environment, but also beautify the stage, so that they appear frequently. With the auxiliary design of computer, digital dance usually can set up a virtual environment, which can act as a background, and be around the dancers at the show. Changing the dancers' stage into 3D environment is not just the structure change on the traditional sense. The audiences enjoy three dimensional performances instead of one, and they can have different sensory enjoyment from every perspective, fusing the environment and the dancers with each other on real sense. The art of dance is limited in visual effect and dynamic presentation of the image has the time difference. And with faster presentation, performing time can be shortened. From the point of view of the performers, it can improve the visual action guide. As a system to optimize the project, dance creation system can show the performing effect in advance while the project is still in process. For the planners, the earlier, the creation space more perfect; As the auxiliary system in dance teaching, dance creation system has many values, such as the value of artistic creation, the teaching value and the commercial value. And for the students, it can make the learning of the dance form and space

scheduling more intuitive. Application of dance creation system can enhance the beauty of dancing form, and has positive effect for the dance on the characterization and expression of the subject.

Dance creation system provides processes which adopts three different technologies, and is easy to operate for the users through pre planning, medium-term operation and post rendering. As an art, in the pre planning, the experienced designing experts are often needed to design movements by imagination. But in the process of teaching, the mode of presentation cannot be so vivid which increases the teaching difficulty for the teachers. Therefore dance creation system is such a software platform that itself is based on digital media. And it can create dancing mode model through the prophase design conception, establish the database of three-dimensional models the, and make organic combination of the database, broadcast media and playing form. Under this background, the choreography system can make the thoughts of choreographer come true immediately.

## APPLICATION PROSPECT

With the development and the progress of the times and the increasing level of digital technology, dance creation is begun to have deeper meaning and content which cannot be only understood as performance and skills.

### **In large-scale choreography**

With the development and the progress of the times, there are more and more high-technologic contents of the dance creation system, which leads to a richer art function of large stages. In creation of large dance, dance creation system can not only reduce the financial and material resources of the creative team, but also can effectively save the dancers' time and energy. The user can select the required actors according to the actor models in the database, and then further produce a variety of types of actors. By adding the real data on the basis of simulation, the basic framework of choreography can be simulated; at the same time, according to the needs of dance works, dance creation system can also create a needed atmosphere for the stage, by infinitely enlarging or narrowing the spatial background of the stage. Besides it may make the simulation design of performing elements on the stage. Edit the above simulated object, action and environment and combine them into animation. It will contribute to design the stage scheduling for the director. From different angles, the director can see the changes of lights and scenes, which will help the director to play out his or her imagination in the greatest degree. And with the aid of computer, the ideas and the design of the director can be vividly simulated, presenting the most ideal art image and spatial effect to the audience. Computer auxiliary system can be more refined according to the change of stage effect. And with the rapid development of the computer technology, the creation of dance also gradually develops toward modernization and high-tech with the promotion of computer technology.

### **In digital dance teaching**

With the promotion of quality education, dance quality has been widely spread and it has become a culture that is widely recognized and received by public. In the school, it has become one of the aesthetic education courses. But in real life, because the realistic condition is limited, some schools have the problem of single method of teaching. In dance teaching, most teachers use the method of explaining theory and personally demonstration, and students study through mechanical imitation. In the learning process, the students have developed the habits of doing what the teacher has told them. The teaching mode and method is too single, and lack of cultivation of imagination and creativity for students, which is easily lead to reduce the students' enthusiasm of learning. In dance teaching, teachers make demonstration personally and emphasize imitation, but have done little in connecting the reality, which is easy make students feel bored. The above existed practical problems can be solved by the auxiliary dance teaching through computer's processing various kinds of information. Through the dance creation system, what wants to be expressed can be adequately simulated which will help students to study dance from different visual points. While visual impact is deepened, dance composition can bring the emotional experience. And the cultural connotation of dance works can be experienced from all aspects. In addition, students can also do it by themselves by using this system, playing out the subjective initiative through sensory cognition, and making continuous innovation on the basis of traditional the imitation.

Whether in dance teaching or in the choreographing, dance creation system is actively promoting the dance career. Through the intuitive, vivid image, the teachers can accurately express the teaching content; Students can be natured by art and can have the feeling of being personal on the scene. Then their thinking processes become more active by multiple sensory stimuli and they will receive the education of beauty under unconscious influence. Besides the system will help the students to understand the teaching content and improve the interest of learning making the dance teaching be able to really nature the soul and show the individuality of the students..

## CONCLUSIONS

With the development of information and technology, multimedia technology has been applied widely and the introduction of digital concept provides a more relaxed platform for the development of the dance art. As an art form closely integrated with the new era, digital dance has been receiving more and more attention. In the creation of digital dance, as a new development direction, computer 3D auxiliary system makes digital dance more intuitive and be able to widen developing space of digital dance while optimizing the project. Being as an cognitive tool, multimedia integrates the

diagram, text and voice. And digital educators have begun to pay close attention to this auxiliary teaching tool. In the field of dance art, the usage of computer 3D auxiliary system to create dance can develop dance art better and faster. And the researchers of dance art can understand the field of dance art more conveniently through this tool; and as a kind of innovative ideas, the combination of digital concept and dance art marks that the development of dance has entered a new stage.

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