

# Simulation and analysis of dance teaching action based on multimedia technology

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**Abstract:** Motion simulation is an intelligent technology with strong vitality and application advantages. If it is applied in dance teaching, it will realize the simulation of dance teaching environment and teaching difficulties, help the learners to better understand the main points of dance movements, feel the deep aesthetics of dance, promote the psychological adaptation of students, and contribute to the development of new dance movements. Therefore, in the current innovative dance teaching process, we should pay attention to the use of motion capture technology, virtual simulation technology and multimedia technology to drive the development of dance teaching wisdom.

**Key Words:** Multimedia technology; dance teaching; motion simulation; virtual reality

Motion capture is a technique that converts human motion information into data that can be recognized by a computer. The data captured can transform the movement of a human body in a real 3D into data of a virtual 3D in a computer. Through the visual processing of the collected movement information of the dancers and the virtual human model and the skeleton model, the image of the virtual human leading dance is displayed and saved on the visual terminal, provides the power support for the dance teaching wisdom innovation.

## 1. BASED ON MULTIMEDIA TECHNOLOGY DANCE TEACHING ACTION SIMULATION ANALYSIS ADVANTAGES

Through the use of multimedia technology to broaden the teaching channels, the use of short video students like the current way of the course involved in the basic action points, focus, difficulty, and the formation of the play, and other information is further condensed, and made into multimedia courseware, the complex dance movements using technical means to generate slow motion, and then step by step to coherent, this allows students to more clearly understand the main points of each dance action, but also more intuitive action after decomposition.

If dance is a work of performance, then the human body is the material of the work. The expression of dance is realized through the rhythmic movements of human limbs, and the application of multimedia technology, sound and picture can be well synchronized, so that the organic integration of hearing and vision, language can not describe the unique meaning of dance and rhythm with the help of multimedia technology and direct and intuitive presentation, of course, this kind of presentation also contains strong emotions. Based on the different understanding of each student, the traditional dance teaching method that relies on the teacher's words and example is difficult to make students feel deeply like multimedia technology, and, the application of multimedia technology is more in line with the thinking characteristics of the students who grow up in the information age. As children who grow up with electronic products, the use of multimedia technology can better stimulate their interest in learning, moreover, the multimedia image can be played repeatedly in the mobile intelligent device, which is beneficial to deepen its understanding, memory and physical experience, and further consolidate the learning effect.

Most of the traditional teaching methods are teacher-led. Most of them are indoctrinated by the teacher on the platform, and the students are passively accepted under the stage. Furthermore, the dance class is easily restricted by the site and environment, can not fully reflect the visual image of teaching, and dance movements often need to repeat a number of explanations and face-to-face in order to achieve the corresponding results, in the long run, students can not help but feel monotonous, boring, boring, sometimes also because of some high-level movements can not understand, resulting in boredom. Because of its quick update, large amount of information, rich color and fresh dynamic picture, multimedia can effectively attract the attention of students, so that students

can fully feel the charm of dance teaching, in addition, multimedia technology can effectively disassemble the movements, make the abstract movements concrete, and help students to deepen their understanding of dance movements and stimulate their deep will, change from passive to active, completely reverse the situation in the classroom, the formation of good teacher-student interaction.

The traditional sports dance teaching emphasizes the teacher's leading position, the teacher holds the content and the rhythm of the class, the student only needs to obey the teacher's arrangement and the command. New digital technology can effectively change this situation. First of all, students can arrange their own study time. Teachers have been uploaded before class teaching video, students can choose their own good time to learn. Second, students can control their learning progress. Using new digital technology, in the process of self-learning, students can fast-forward to master solid movements, for more difficult movements can be repeated through repeated play, practice slowly. Furthermore, the learning content can be extended independently.

Sports dance involves a wide variety of dance, such as modern dance, contemporary dance, ballroom dance, tap dance. However, the existing teaching materials for promoting dance demonstration are only one or two works, and a large amount of related dance knowledge needs to be expanded if the teaching contents are to be in place and learned well, add more relevant dance content to cater for students' interest in learning, thus improving the efficiency of teaching. With the development of modern network technology, the dance video materials on the network are more and more abundant. The convenience of network sharing also brings convenience for students' study. Through the establishment of dance resources database, students can more easily watch video resources, expand the field of vision and learning; can also use the spare time to do research and learning dance content do not understand or interested. The establishment of the dance resource bank will really extend the learning of group dance from inside class to outside class, so that students can get a larger amount of information in a short time and give full play to their sense ability to receive and process information, enhance understanding and memory.

## **2.THE CONSTRUCTION OF DANCE TEACHING ACTION SIMULATION SYSTEM BASED ON MULTIMEDIA TECHNOLOGY**

Motion capture system was first used in motion picture, and gradually extended to athlete training system, sports analysis and so on. Motion capture system is mainly composed of sensors, signal acquisition equipment, data transmission, data processing and other parts, there are mechanical, electromagnetic, optical, through the use of high-precision, good stability of the optical motion capture system, dance data input into the three-dimensional motion software, and through the virtual display engine, can be perfectly displayed.

### **2.1 Overview of motion capture systems**

The motion capture object is the movement of the model, special markers "Markers" are pasted on the joints of the model, and then the location of these markers in space is sampled using the capture Lens of the motion capture device, this generates a set of motion data that the computer can recognize. With the movement data, we can go into the 3-D movement software and create 3-d models of the human body in the 3-D movement software. Each 3-D model is a Polygon mesh model, trying to simulate the standard body of the dancer, the facial features also adopt the main facial features of all nationalities. After the human model is established, clothing model should also be established. After the above model is built, it is necessary to create a three-dimensional skeleton, and accurately correspond with the model, for the next step skin preparation. The skin, that is to combine the skeleton and the model, to make the model and the skeleton correctly bound together, at the same time, to make the binding of various clothing and accessories well, and then import the data collected by the motion capture system, combined with the skeleton in the three-dimensional movement, it drives the three-dimensional model to generate the movement. These actions can be easily imported into the virtual presentation platform, can also be rendered into a video file for the presentation, saving, and so on, to prepare for subsequent applications.

## **2.2 Dance data collection and formation of three-dimensional movements**

Dance data collection is the first link in the digital protection and display of dance, and it is the basis of data processing and application. Virtual Display Platform is through the collection of all kinds of dance material, by the performance of actors, through the acquisition of data motion capture equipment, and into three-dimensional motion software can identify the data, finally through the virtual display engine to show the dance content perfect.

### **2.2.1 Collection of dance materials**

Through visiting dance experts and folk dancers, we use advanced digital recording equipment, such as digital cameras, digital cameras and other equipment to collect dance material, and finally obtain a complete material library.

### **2.2.2 Digital dance material**

Using the collected dance materials, through the analysis of dance experts, select the typical movements of various kinds of dance, and let the dancers rehearse, and finally record the dancers' movements using the motion capture system, make the dance data digitized, carry on the digitization conversion to the dance data.

### **2.2.3 Build a 3D model of the dancer**

According to the normal body proportion of men and women in the 3DSMax three-dimensional model, according to the characteristics of various dance costumes, clothing model. Each model has two sets, one is a fine model, in 3DSMax software for clothes, hair dynamic calculation, not for the virtual display platform demonstration, but to generate a 360-degree range of video files, the other is a simple model with a small number of points and surfaces applied to the virtual reality platform. In 3DSMax, the model is divided into UV and mapped, and the standard material is created for the model. In 3DSMax, the built-in Biped skeleton is used to build the moving skeleton for the model, and the Skin command is used to bind the model. Here we need to according to the characteristics of the dance, focus on the model of the bone binding weight distribution.

### **2.2.4 Combine motion capture data with 3-d motion**

Through the Motion Builder and 3DSMax software, the dance data collected by the motion capture system are bound with the established 3D motion model and skeleton to add motion to the 3D model of the characters. So far, the completion of data collection and dance movements, in 3DSMax software, the movement data, texture and model files exported to FBX format.

## **3. BASED ON MULTIMEDIA TECHNOLOGY DANCE TEACHING ACTION SIMULATION ANALYSIS**

In order to better realize the multi-media dance teaching action simulation, the designer is also required to design a virtual dance action key frame database based on the minimal human skeleton model of the robot, to store related arrays. Because of the complexity of dance, there are many action keys in the database, this also needs the design staff to be able to do a good job of multimedia dance teaching movement simulation simulation virtual database table design, to ensure the orderly progress of related dance work.

The virtual database can record the parameters and the key frames of the dance movement effectively, and can make the humanoid robot move according to the pre-programmed program, thus accurately realize a number of dance work, for the control of humanoid robot also has a certain positive significance. The designers set up virtual human model and skeleton model to set up the key points of the skeleton, and configure the dancers with motion capture equipment to match the key points of the motion capture equipment with the key points of the skeleton and synchronize the movements It collects the body and movement information of the dancers equipped with motion capture equipment, transmits the collected data according to the motion capture equipment, calculates the performance parameters, and arranges the work of each motion capture equipment.

In the virtual human dance movements, the smoothness of its movements will have a direct impact on the possibility of various dance movements. The particularity of the virtual human's dance movement is that it is an action sequence composed of some key movements, and there is still a very big movement difference between the two adjacent dance movements. If the smooth processing is not done well, it will lead to the dance movement in the adjacent key movements to join the parts of the large-scale changes, resulting in frame skipping phenomenon, and will give people a sense of distortion. By designing the application of transition function, it can effectively transition the dance work and promote the smoothness of the movement to be further enhanced, in this way, the movement of the humanoid robot can transition smoothly in the dance process, and the different movements can also be smoothly linked, so as to fully meet the needs of the real state of the robot dance movement. It requires designers to do well in the functional design of humanoid robot's dance movement, and to set the reasonable selection of threshold and the smoothness of the robot's movement effectively, in this way, the transition speed and the transition smoothness can be controlled effectively, which can ensure the continuity and fluency of the humanoid robot's dance movement.

Firstly, we need to analyze the basic rules of robot dancing and the basic methods to realize the dancing work, and build the key frame database based on the analysis results, then the intermediate frame transition function is used to realize the dance work of the humanoid robot. Through the further research, it can also realize the automatic extraction of key frame algorithm in 2D video, and can directly transform 2D key frame into 3D key frame, in this way, the workload of the humanoid robot dance simulation can be greatly reduced, and it can make all kinds of specific dance movements by two-dimensional video trend three-dimensional virtual human.

#### **4 CONCLUSION**

Make full use of VR virtual simulation technology to help students have a sense of being in the theater stage. However, the space, venue, and the distance between the audience are not the same, according to the different environment of the dance to re-arrange the movements, the dancers for emotional mobilization. Based on the application of multimedia technology, dance teaching in the new field of further awareness and development, and provide students with a better teaching environment, will cultivate a vision, height, thinking of high-quality students.

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