

Research on the Inheritance Method of Minority Music and Dance Art based on Motion Capture Technology

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Abstract. As a multi-ethnic country, every minority has a long traditional culture. The folk music and dance of ethnic minorities are the representatives of the traditional culture of ethnic minorities. How to better apply information technology to the protection, rescue and excavation of minority cultural heritage? This has become a hot topic in the field of culture and information technology. The emergence of motion capture technology has effectively broadened the protection of national dance culture. It also provides a new alternative means for the development and reuse of national dance culture. This paper studies the process of dance digital protection method based on motion capture technology and guides the collection of swing dance. At the same time, a concrete application example of applying animation data to create animation is given. Based on motion capture technology, the digital development method of folk dances of ethnic minorities is discussed. The national dance dataization work is the product of the mutual promotion and common development of culture and science and technology. It will help promote cultural digital construction projects.

Keywords: Ethnic Minorities, Music and Dance, Motion Capturing Techniques.

1. Introduction

As a multi-ethnic country, every minority has a long traditional culture. The folk dance of minority nationalities is the representative of the traditional culture of minority nationalities [1]. The state has paid more and more attention to the protection of minority dance cultural heritage. How to better protect, rescue and excavate minority dance cultural heritage [2]. And how to apply information technology to the protection, rescue and excavation of minority cultural heritage. These have become a hot topic in the field of culture and information technology [3]. Traditional photography, recording and video recording. Although it is easy to collect and easy to make, it is not possible to record the dancer's physical movements in detail [4]. It is even more difficult to talk about scientific research and application to choreography. In response to this problem, we start from the dance characteristics of ethnic minorities. Using motion capture technology to extract the three-dimensional spatial data of dance poses to truly preserve the artistic essence of each dance. It provides a precise digital platform for the protection research, creation and film restoration of minority dances in the future [5]. This has opened up a new field for the protection of intangible cultural heritage, and has far-reaching significance for the protection and scientific development of national culture.

The emergence of motion capture technology has effectively broadened the protection of ethnic dance culture. It also provides a new alternative for the development and reuse of ethnic dance culture [6]. The action library production process for the virtual characters of folk music and dance focuses on the analysis of the action classification and its correspondence under the dance grammar. The theory of action style identification based on the emotion model is discussed [7]. This paper proposes a method to realize the action connection by defining the characteristic action unit attribute and the associated constraint, and gives the application framework of the method in the action scheduling system. The motion capture system records human motion information for analysis and playback [8]. The captured three-dimensional data can be as simple as recording the spatial location of body parts, or as complex as recording the delicate movements of facial expressions. This paper studies the flow of three-dimensional digital dance protection method based on motion capture technology and guides the collection of waving dance. At the same time, the specific application examples of animation using capture data are given. Based on motion capture technology, this paper discusses the digital development of minority folk dance. It provides a theoretical reference for the academic circles to further study the digital development of minority folk dance.

2. Materials and Methods

Motion capture technology was first used in early Disney animation. With the continuous development of science and technology, motion capture technology continues to improve. And it is widely used in many fields such as virtual reality, game design and motion simulation. In order to further develop the folk-dance culture of ethnic minorities, it is necessary to transform the traditional methods of preservation and development and vigorously develop digital technology [9]. Optical motion capture technology is currently the most widely used and most developed type of capture technology. The performers of optical motion capture have a wide range of activities, and there are no restrictions on cables and mechanical devices. But the price is more expensive and the post-processing cycle is longer. The actor can perform freely and is very convenient to use. Its high sampling rate can meet the needs of most high-speed motion measurements. The three-dimensional data of ethnic dance obtained by motion capture technology can be used to construct the database of ethnic dance, choreography of dance movements and interactive games.

Data repairing can remove noise points and smooth trajectory by the post-processing function of the software in the acquisition equipment. According to the animation curve, the errors and omissions in the action are corrected one by one, and the fluency and accuracy of the action are guaranteed. Geometric modeling was first developed in motion capture technology. The path relationship number, the overall network density and the central potential are analyzed. As shown in Table 1.

Table 1. Motion capture modeling structure analysis

The internet	Number of nodes	Number of relationships	Central potential
Meeting information	1245	2134	0.597
Interactive information	1396	2468	0.645
Weighted summation	542	3159	0.7631

Motion Capture Technology In the real 3D scene, the measured data is collected and processed by using sensors with different functions. According to the movement form of the object to be collected, it is saved by means of an image or the like. Then through the scientific analysis and processing of computer technology. Thereby the accurate spatial coordinates of the object are obtained. The performer's limb movements can be recorded in detail. The skeletal system can be rendered, with multiple shape parameters that can be used to define the bone representation to create the appropriate model. An action animation is divided into multiple keyframes in the animation storage file. Each key frame stores specific action data, which are actually various transformations of the skeleton relative to its parent. In all the cameras placed, the corresponding processing of reflective marker points is carried out in advance according to the requirements. To ensure that it can accurately shoot and form a complete image.

Through continuous playback and capture, the dancer's body is constantly changing in space position. It can even record the facial expressions of dancers. In motion capture and animation of dancers, the skeletal structure of dancers is usually represented as a skeletal chain composed of multiple skeletons. With the increase of social relationship between nodes, the shortest path between nodes and the average distance of the whole network are decreasing, as shown in Figure 1.

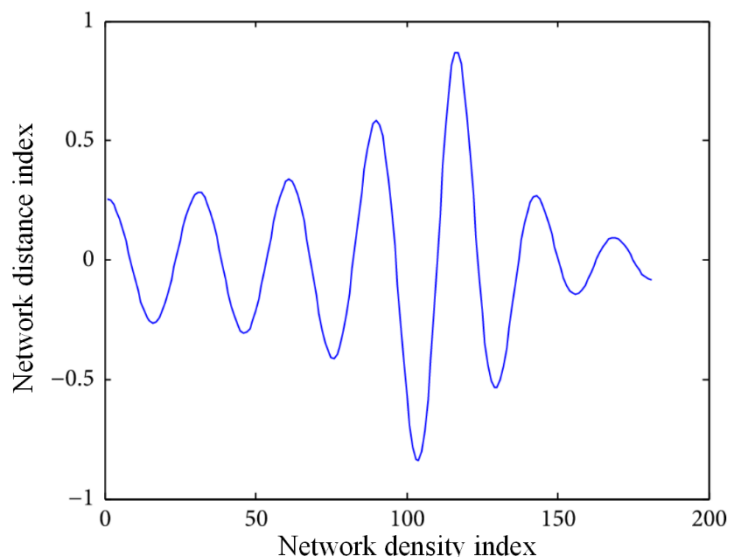


Fig.1 Mobile network node distance analysis

3. Result Analysis and Discussion

In the process of promoting the three-dimensional digitization of national dance, it is inseparable from the strong support of motion capture technology. It is precisely because of the development and application of motion capture technology that it provides conditions for the complete and accurate recording of the realization of the national dance posture. In order to obtain more and more detailed data, it is necessary to bind the three-dimensional data according to the body proportion of the dancer and the skeletal system. Motion capture data ultimately requires a specific model as a carrier to show the spatial performance of the action. Accurate and appropriate models have a significant impact on the binding of motion capture data. After completing the role model with skeleton binding, we can use the three-dimensional motion data of national dance to drive the role model after skeleton binding. In motion capture technology, not only the dancing posture can be accurately recorded as a whole, but also the performer's facial posture can be recorded in detail. In the process of bone binding, we need to pay attention to the influence of weight. That is to say, the skeleton may have different force effects on different parts of the limbs of the human model. Only by ensuring that the strength of these key points is appropriate, can the action of the character model be smooth and natural.

With the strong support of motion capture technology, in the process of promoting digitalization, ethnic minority folk dances should first accurately capture the limb movements of ethnic dancers. Because dancers' body movements are moving, the determination of space points is often used to capture trajectories. In order to ensure that the system can accurately collect data information, the three-dimensional data need to be corrected and processed according to the dancer's body proportion and skeletal system, and the data information should be corrected on the basis of binding the performer's skeleton. Taking the Tujia Waving Dance as an example, in the process of three-dimensional digital dance, it is necessary to focus on the dancers' waving movements. Through the modeling software, according to the actual proportion of the dancer's body, the character model is established. At the same time, according to the Tujia dance costumes, the task model is used for data restoration. The 3D data is then bound to the data of the character model. This will enable the restoration of dance.

The dance performer's physical movements are recorded from different angles and the data is processed. At the articulation of the dancer model, the shape of the skin is affected by multiple bones. In the later processing, data processing is performed by matching the corresponding music. Perfect for multi-angle, multi-faceted dance performances. In order to improve the speed of the motion capture process, various situations are often optimized at the cost of constructing the hierarchical tree. VR simulation modeling improves the simulation of motion capture models by using texture techniques and the like. The modeling is shown in Figure 2.

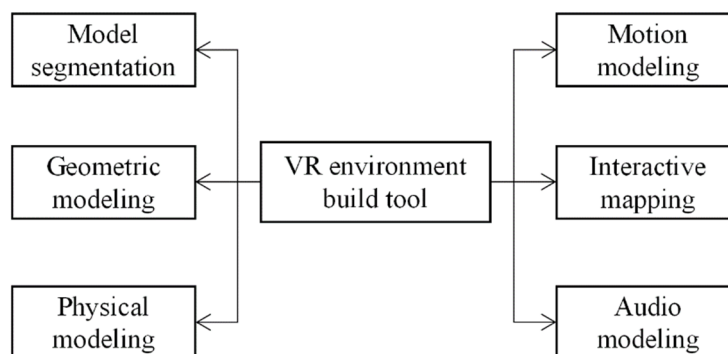


Fig.2 Modeling schematic of VR

In order to achieve good recording results, dance performers are required to perform first in the prescribed area. Simultaneously open multiple cameras in the area. In a bone chain, each link has a pivot point at its bottom. When moving a child bone, it is actually transforming the parent bone [10]. Thereby forming a local transformation matrix of bones in space. By mapping the captured data onto the dancer's three-dimensional character model, a series of animations can be generated using the obtained motion sequence. At the same time, with the corresponding music, the computer can be used to show the dance performance from different angles in an all-round way. In the process of processing, if the software itself integrates the automatic processing kinetic energy, it can be left to the software to carry out and store independently. In the specific data acquisition, due to the inevitable acquisition of a variety of noises, so in the post-processing, the acquisition data must be registered and de-noised.

4. Conclusion

Traditional technology in the development of ethnic minority folk dances has some shortcomings, such as the inability to watch dance movements from multiple perspectives, the difficulty of data reuse and editing. And motion capture technology provides a new method and way for the digital development of minority folk dance. It realizes the preservation and display of multi-perspective, interactive and three-dimensional dynamic minority dance art through the three-dimensional digitalization of ethnic dance movements. This paper mainly studies how to use motion capture technology to realize the three-dimensional digitalization of national dance. Through the application of motion capture technology, the problem of incomplete data in the traditional influence recording method can be effectively avoided. At the same time, it is also possible to provide more analytical data for modern choreography to obtain the original entity of the dance gesture that cannot be accurately reproduced by the traditional method. The three-dimensional dataization of ethnic dances has played a positive role in the protection and resource integration of dance culture and the research and promotion of contemporary digital means to protect dance art. It is the product of the combination of culture and technology to promote mutual development and common development. It will help promote cultural digital construction projects.

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