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Research Article

Analysis and Evaluation on the Harmfulness of Sports Dance Based on Intelligent Computing

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With the rapid development of motion analysis and editing technology, more and more animation technologies based on real human motion analysis are widely used in games, medicine, film and television, sports, and other fields. The role of this technology in the teaching system of sports dance arrangement cannot be ignored. This paper studies the application of intelligent algorithm in injury analysis of sports dance choreography and puts forward a smooth and natural motion editing method which is more in line with the characteristics of human motion. The square spherical surface intelligent algorithm is used to naturally transition the rotation posture of each frame of human joint, and the action modification of computer-aided dance choreography system is more in line with the real action of human body. Simulation results show that interframe data can be used for the same type of dance. Different types of dance arrangement can adopt the method of inserting a new framework between the two dance movements, so as to finally meet the needs of sports dance coaches and students to observe their own dance movements in an all-round way, so as to facilitate the arrangement and modification of sports dance movement design. It provides a certain reference for the application and development of virtual technology in the field of sports and greatly improves the current situation of sports dance teaching equipment. Through animation simulation technology, we can effectively avoid the injury caused by dangerous movements, provide a way of observation and improvement for coaches' dance teaching, and effectively improve the training effect. Compared with traditional dance choreography methods, the intelligent algorithm in this study can make the animation display of sports dance more coherent and realistic and effectively solve the needs of current events observation and modification in sports dance choreography. It can produce complex movements with simple movements and help teachers arrange and teach sports dance. Avoid the accidental injury caused by the limitation of time and space in traditional teaching and realize the modernization and intelligence of physical education teaching.

1. Introduction

In recent years, three-dimensional animation technology has been developing and progressing continuously. The analysis and simulation technology of human motion in this field is a hot topic for computer technology researchers [1]. Human motion is complex and changeable, and simulation is difficult. In order to analyze the real human motion, sensors are usually used to record, and then the recorded motion data are driven by computer [2]. However, this kind of motion analysis has certain limitations. It can only analyze simple motion data, and the obtained data has low universality and cannot meet the user's demand for motion change [3]. Therefore, it is necessary to further use the motion editing technology to parameterize the motion, complete the seamless transition and overaction between the motions, and assist the simulation animation. Based on this, this study studies the motion editing application of intelligent algorithm in the field of sports dance arrangement. On the basis of introducing and expounding the theory of human motion editing, this paper puts forward an intelligent algorithm to optimize the connection of motion segments in the arrangement of sports dance. In order to ensure the fluency of different types of motion data frames in different dances, in the conversion of different types of actions, the editing mode of overlapping point interframe data is adopted, and the editing mode of inserting new frames is adopted in the connection of the same actions. Finally, the purpose of action observation and adjustment in the intelligent arrangement of sports dance is realized.

In traditional sports dance teaching, choreographers usually manually identify and label dance movements frame by frame, which is heavy workload, time-consuming, and laborious. At present, the application of sports analysis and editing technology in the field of sports is less, mainly concentrated in the fields of games, film, and television. The intelligent algorithm in this study can make the animation display of sports dance more coherent and realistic and effectively solve the needs of current events observation and modification in sports dance choreography. It can produce complex movements with simple movements, assist teachers in the arrangement and teaching of sports dance, avoid accidental injury caused by the limitation of time and space in traditional teaching, and realize the modernization and intelligence of sports teaching.

This study is mainly divided into three parts. The first part describes the application status of motion analysis and motion editing technology in various fields. The second part is to meet the needs of sports dance choreography in this study. An intelligent algorithm connecting dance movements is proposed, and a dance action processing and action editing method is constructed. The third part is to simulate the effect of intelligent algorithm in sports dance choreography, get the experimental results, and analyze them.

2. Related Work

Motion analysis technology is initially only used in specific fields such as medicine and gradually expanded to animation, games, and other fields in the later development [4]. Human motion analysis is mainly to measure and track the human body's motion trajectory in three-dimensional space through sensors. After recording the data into abstract data through computer technology, it is applied to the virtual human body model to drive the virtual human action [5]. Motion analysis is usually aimed at specific human body, but in practical application, it needs a large number of data fragments of different scene characters. Simple action analysis technology cannot meet the actual needs, so action editing technology was born to make use of and modify the analysed actions, so that the analysed actions can be applied to a variety of scenarios while maintaining the original characteristics, improve the reuse rate of action analysis technology, and reduce production costs [6]. Bruderlin first proposed the editing method of signal processing for motion data, which controls motion action from different levels. Liu et al. proposed an algorithm for point recognition of visual odometer. After finding the rotation parameters by spherical intelligent algorithm, the method of adaptive exterior point removal by reprojection was carried out [7]. Wang and Zhang studied the trajectory planning of the robot. After establishing the motion model, the polynomial data algorithm was used to measure the trajectory of the robot. The simulation results show that the trajectory is the same as the actual trajectory [8]. Lu et al. optimized and integrated the pixel problem in video coding. According to the motion estimation of data algorithms with different subpixels, the speed and efficiency of subpixel calculation are improved dynamically, the data speed is improved, and the algorithm is simplified [9]. Yang et al. proposed a compensating data algorithm combining fast matching and prediction of adjacent blocks to improve video frame rate and depict real motion trajectory [10]. In order to improve the time-consuming problem in motion vector estimation, Zeng et al. proposed a feature extraction and description algorithm based on B-SUFR. On this basis, binary coding was introduced to improve the speed of motion estimation [11]. Liu et al. proposed a 2-Otsu distance measure function optimized by the firefly algorithm to detect and eliminate the shadow of moving objects [12]. Aiming at the problem of pedestrian position estimation and detection, Gong et al. put forward a method of combining aggregate channel feature algorithm with extracting motion feature. After classifier training, an evaluation model was established to realize the complementary estimation and judgment of pedestrian static and dynamic position in video [13]. Tian et al. used the moving object feature algorithm to weaken the background and extracted the key frames according to the scale invariant feature distribution of the moving object and the entropy value of the video frame, which realized the low miss detection rate of the dynamic video [14].

As a research hotspot and difficulty in the field of video surveillance, the behavior analysis of moving human body is a high-level processing link in the field of computer. It is based on the detection and tracking of human motion region in video image sequence. First, the moving target in the surveillance video is extracted by moving target retrieval. Then conduct the analysis and research on the behavior of moving targets, so that the video surveillance personnel can effectively find and deal with emergencies. Moving human behavior analysis method is to analyze the behavior analysis and recognition technology involving image processing. It is difficult to learn samples and classify moving behavior. At present, the research on sports human behavior analysis technology is still in its infancy. The main research techniques focus on template matching method and state transition method. At present, there are many studies on improving picture fluency and frame rate and predicting motion trajectory by various ways of motion editing. Especially in film and television, monitoring, and machine operation, but they are seldom used in sports field. Therefore, based on the theoretical results of predecessors, the intelligent algorithm in sports dance arrangement is further studied.

3. Sports Dance Connection Control Based on Intelligent Algorithms

3.1. Introduction to Intelligent Algorithm. Because of its functional requirements, the virtual human simulation of dance action does not need to pursue high fidelity, but also because of the need to simulate and restore the real dance action, the complexity of the action is generally relatively high. Therefore, there are two research routes. One is that the choreographer of sports dance directly conceives the dance action, communicates, and cooperates with the animators after forming the complete dance action process, realizing the choreographer idea by animation, choreographing and modifying the animation. This way requires animation workers and choreographers to cooperate and communicate in depth, grasp the technical essentials of dance movements, and then process them into data that can drive the simulation of human models to make the final dance teaching animation. The other is to simulate the standard dance action in dance video and extract the parameters according to the character action in the video. This method needs to first build the model according to the human body in the video, then extract the parameters of dance action in the video through video processing technology, and then import the data into the human body model constructed before making animation [15]. The research focuses on the seamless connection and natural fluent presentation between movements and movements based on the movement simulation of sports dance, which has the ability to restore complex dance movements.

In traditional animation, not every frame is handled by the designer alone. Typically, keyframes are designed by the animation designer first, and then the assistant manually draws and supplements a large number of intermediate frames between keyframes. Traditional animation production methods are cumbersome and heavy workload. With the development and progress of network computer technology, today's animation production does not need to consume so much labor. The intermediate frame can be supplemented by data technology in computer technology. In the early stage, this technology was only used for interframe shape, but later developed to complete more frames by directly setting parameters. Nowadays, intelligent technology can realize any parameter difference between two frames. However, in practice, it is necessary for animators to further fine tune the parameters to avoid motion distortion and stagnation [16].

Data algorithm is very important in animation production, which determines whether the final action is smooth and smooth. Common data algorithms include intelligent, spherical intelligent, and quaternion spherical intelligent. In choreography of sports dance, the main object is human movement, which needs to determine its spatial position according to the coordinates of human root joints in the scene and record the movement parameters. Therefore, intelligent algorithm is generally used to calculate the spatial position of data points. The principle of intelligent algorithm for calculating displacement of human root node in space is shown in Figure 1, $\overrightarrow{v_1}$, $\overrightarrow{v_2}$, and $\overrightarrow{v(t)}$ are a geometric vector; $|\overrightarrow{v_1}| = |\overrightarrow{v_2}|$ and $\overrightarrow{v_2} - \overrightarrow{v_1}$ are the other side of the triangle composed of $\overrightarrow{v_1}$ and $\overrightarrow{v_2}$; and the size of $\overrightarrow{v_2} - \overrightarrow{v_1}$ is constantly changing, so the length of $|\overrightarrow{v_1}|$ and $|\overrightarrow{v_2}|$ must be greater than $\overrightarrow{v_1} + t * (\overrightarrow{v_2} - \overrightarrow{v_1})$. When $0 < t < 1$, the direction of the intelligent vector $\overrightarrow{v(t)}$ is along $\overrightarrow{v_2} - \overrightarrow{v_1}$, and the intelligent vector can be expressed as $\overrightarrow{v(t)} = \overrightarrow{v_1} + t * (\overrightarrow{v_2} - \overrightarrow{v_1})$.

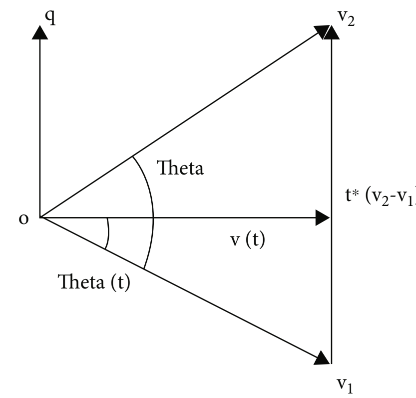

Figure 1: Vector analysis of intelligent algorithm.

The vector analysis of intelligent algorithm is shown in Figure 1. In addition to the determination of the coordinates of the human root joint, the recording of human motion also requires the data of the rotation angle of the joint orientation. In human motion analysis, the spatial orientation of the human joint is generally described by Euler angle. But the expression of Euler angle is not suitable for data between two directions, and the change of Euler angle cannot match the change of rotation angle directly. Therefore, quaternion which is more suitable for human action is chosen here to replace Euler angle to represent joint rotation. A quaternion is a super complex of a real number unit. It has three imaginary units that coincide with the coordinate representation of the three-dimensional space, providing another rotation description that is completely different from the Euler angles and matrices. Although the quaternion is slightly weaker than the first two in terms of intuitiveness, it is more suitable for animation. Its spatial complexity is less than 4×4, and the calculation is simple. It is suitable for the calculation of various angular displacements in three-dimensional space, and it is one. The species did not see smooth data, which satisfied the smooth and smooth requirements of human dance movements required in this study.

Since there is a theorem that a rotation sequence is equivalent to a single rotation, it can be said that in a three-dimensional space, any one rotation can be expressed as a single rotation around a certain axis of space. The quaternion q is used to indicate that the rotation of a vector is$q = [\cos \alpha/2, n \sin \alpha/2]$, where n is the unit vector axis and α is the rotation angle of the vector. In order to facilitate the data operation, the quaternion is used to represent the Euler angle obtained by the motion analysis step. After the data operation, in order to ensure the correct format of the motion data in the intermediate frame, it is necessary to restore the quaternion to the Euler angle expression to drive the normal operation of the data file. Suppose there is an Euler angle $[\alpha, \beta, \gamma]$, rotating α around the x-axis, β around the y-axis, and γ around the z-axis. The Euler angle is converted into quaternion q which can be expressed as equation (1). The quaternion corresponds to the Euler angle one by one in the range of $(-2\pi, 2\pi)$.

$$q = r_x r_y r_z = \begin{bmatrix} \cos\frac{\gamma}{2}\cos\frac{\beta}{2}\cos\frac{\alpha}{2} - \sin\frac{\gamma}{2}\sin\frac{\beta}{2}\sin\frac{\alpha}{2} \\ \cos\frac{\gamma}{2}\cos\frac{\beta}{2}\sin\frac{\alpha}{2} - \sin\frac{\gamma}{2}\sin\frac{\beta}{2}\cos\frac{\alpha}{2} \\ \cos\frac{\gamma}{2}\sin\frac{\beta}{2}\cos\frac{\alpha}{2} - \sin\frac{\gamma}{2}\cos\frac{\beta}{2}\sin\frac{\alpha}{2} \\ \cos\frac{\gamma}{2}\sin\frac{\beta}{2}\sin\frac{\alpha}{2} - \sin\frac{\gamma}{2}\cos\frac{\beta}{2}\cos\frac{\alpha}{2} \end{bmatrix}. \quad (1)$$

The transformation from quaternion to Euler angle needs to be completed by means of coordinate rotation matrix in three-dimensional space. After the quaternion $[w, x, y, z]$ rotates δ around any coordinate axis, the rotation matrix $P(\delta)$ can be obtained. The transformation from quaternion to Euler angle can be expressed as equation (2). In this case, Euler angle and quaternion correspond one by one within the range of $(-2\pi, 2\pi)$.

$$\begin{cases} \alpha = \begin{cases} a\tan 2\left(yz - wx, \frac{1}{2} - x^2 - y^2\right) \text{ if } \cos\delta \neq 0, \\ a\tan 2\left(xy - wz, \frac{1}{2} - x^2 - z^2\right), \end{cases} \\ \beta = \arcsin 2(wy - xz), \\ \gamma = \begin{cases} a\tan 2\left(xy - wz, \frac{1}{2} - y^2 - z^2\right) \quad \text{if } \cos\delta \neq 0, \\ 0. \end{cases} \end{cases} \quad (2)$$

The principle of spherical intelligent of quaternion is shown in Figure 2. This method can achieve smooth data between two quaternions. Assuming that the two unit quaternions in the sphere are q_1 and q_2, and the range of parameter k is $[0, 1]$, the speed of data change in the data process is determined by the size of K. An angle α is formed between the two unit quaternions, then, the quaternion linear spherical data from q_1 to q_2 is expressed as follows.

$$\text{Slerp}(q_1, q_2; k) = \frac{\sin(1-k)\alpha}{\sin\alpha} q_1 + \frac{\sin k\alpha}{\sin\alpha} q_2. \quad (3)$$

However, it should be noted that when q_1 and q_2 are very close, the $\sin\alpha$ value will be very small when calculating according to formula (3), and there may be calculation errors, so a simple intelligent $q = kq_1 + (1-k)q_2$ is used to calculate at this time. The angle $\alpha = \arccos(q_1 \times q_2)$, q and $-q$ represent the same orientation in quaternions, but when they are used as Slerp parameters, they may get different results. Therefore, it is necessary to calculate the value of $q_1 \times q_2$ before data to ensure that it is a nonnegative number, so as to determine the symbol of q.

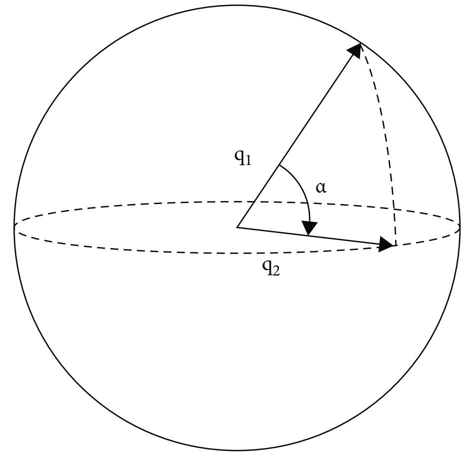

FIGURE 2: Graphical representation of quaternion spherical intelligent.

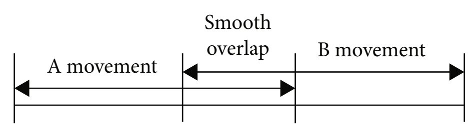

FIGURE 3: Overlapping data between different types of dance movements.

The graphical representation of quaternion spherical intelligent sensor is shown in Figure 2. The purpose of this study is to ensure the fluency of sports dance, focusing on the relationship between sports and movements. Therefore, this study needs to divide them according to whether the dance movements of connection operations are similar or not. Similar dance movements are classified as the same type of movements. The first and last frames of the two motions overlap each other, and the overlapping data frames are smoothly adjusted, as shown in Figure 3. Different dance movements are divided into different types of movements. At this point, you need to use an intelligent algorithm to insert a new frame between the two types of motion. The new frame is only related to the last frame of the previous action and the first frame of the next action, which contributes to the smooth transition of the dance action, as shown in Figure 4.

For the same type of dance action connection, such as the connection of similar step changes in dance, the abovementioned overlapping data method can be used to perform a smooth transition between actions. It is assumed that the dance action A and the dance action B are the same form of motion, wherein the total number of frames of the A action is m, and at this time, n frames of data are extracted from the end frame of the A dance action and the start frame of the B dance action. Therefore, the data of the end frame of the A-segment dance action is $A(m-n+1), \cdots, A(m)$. The starting frame data of the B-segment dance action is $B(1), \cdots, A(n)$. The n-frame data extracted in each of the two dance moves is subjected to overlapping data. But there are two kinds of calculation involved here. The intelligent algorithm is used for the spatial position change of human root

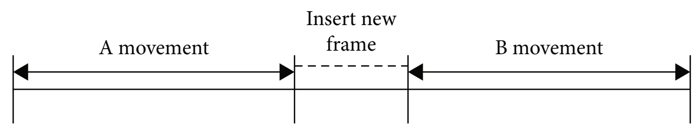

Figure 4: Insert a new frame between the same type of dance action.

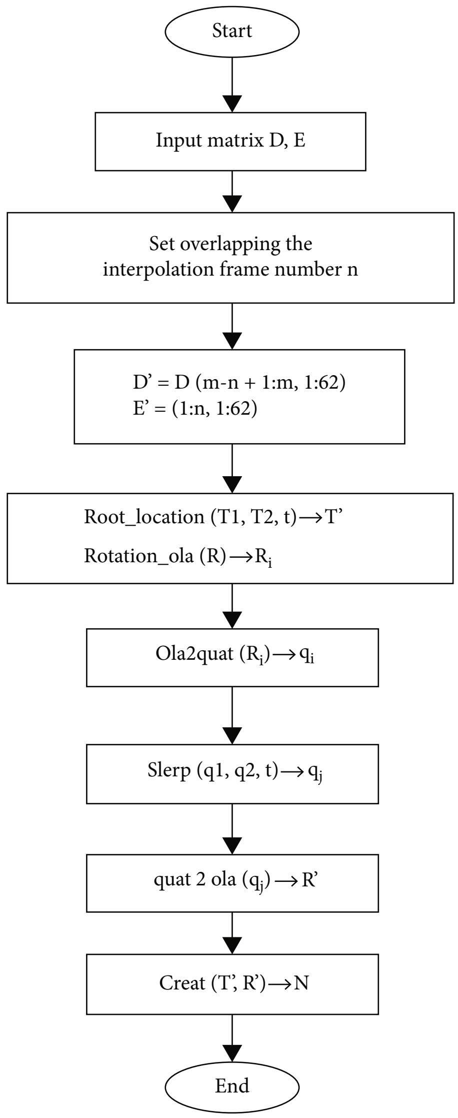

Figure 5: Repeated interframe data matrix processing flow chart for dance action connection.

joint, as shown in formula (4), and the quaternion spherical intelligent algorithm is used for the rotation angle change of human joint, as shown in formula (5). $T(k)$ represents the position coordinates of human root joints in dance action overlapping frames, P_j^A represents the coordinates of human root joints in the last overlapping frame of dance action in segment A, P_j^B represents the coordinates of human root joints in the first overlapping frame of dance action in segment B, $\alpha(k)$ is an data parameter, its range of value is (0, 1), and K is $[1, n]$, which can be adjusted according to the actual display effect. $q_i(k)$ represents the rotation angle of human joints in each frame at the overlap of two dancing movements, $q_i^A(k)$ represents the rotation angle of the I -joint of the k-th frame at the end of the overlap of the A -segment dancing action, $q_i^B(k)$ represents the rotation angle of the I-joint of the k-th frame at the beginning of the overlap of the B-segment dancing action, formula (6) is the calculation method of data parameters in the calculation of human joints rotation data, and $\alpha(k)$ is in the range of (0, 1). After calculating the quaternion $q_i(k)$, it is necessary to convert the numerical value into the description form of Euler angle, write it into the computer data file, and run the choreography of virtual human dance action.

$$T(k) = \alpha(k)P^A(m - n + k) + (1 - \alpha(k))P^B(k), \tag{4}$$

$$q_i(k) = \text{Slerp}\left(q_i^A(m - n + k), q_i^B(k), \alpha(k)\right), \tag{5}$$

$$\alpha(k) = 2\left(\frac{k+1}{n}\right)^3 - 3\left(\frac{k+1}{n}\right)^2 + 1. \tag{6}$$

For different types of dance action connection, i.e., smooth transition data, in choreography of dance action, it is similar to the connection between a ground walk action and jump action. Because of the large difference between the two actions, a new frame is needed to insert between them to complete the smooth transition of action. Suppose that the dance action A sequence and the dance action B sequence are two completely different but connected action forms, where in which the total number of frames of A dance action fragments is m, at this time, the data of the last frame of the A dance action fragment and the first frame of the B dance action fragment are extracted. Therefore, the last frame data of A dance action can be expressed as P_m^A, and the front frame data of B dance action can be expressed as P_1^B. The data extracted from the front and back dance actions can be calculated. As the same connection as the previous dance movements of the same type, there are also two data algorithms involved here: intelligent algorithm is used for the spatial position change of human root joint, and quaternion spherical intelligent algorithm is used for the rotation angle change of human joint. $T(k)$represents the coordinates of human heel joints that are always done in the K-frame dance during the data transition. The range of $\alpha(k)$ is $(0, 1$). The calculation method of spatial position changes of human root joints is as follows (7). In order to make the transition of dance action appear more natural, the data of all frames can be properly translated in the B-segment dance action, to achieve the effect of smooth transition, after the translation of the B-segment dance action as shown in the style (8), in which the moth can be freely adjusted according

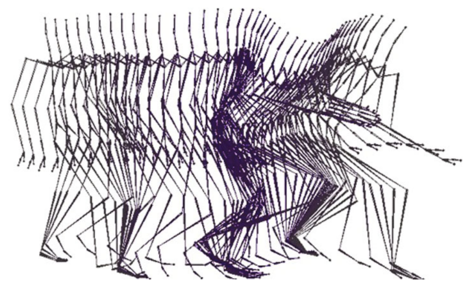

Figure 6: Effect diagram of interframe smooth data of the similar dance connection at overlap.

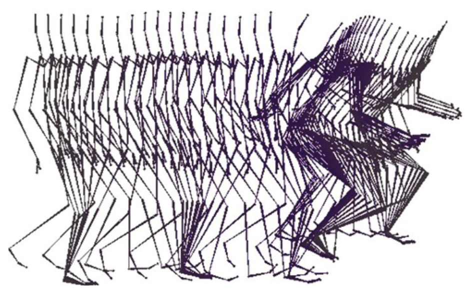

Figure 7: Effect diagram of data between two frames at the beginning and the end of the similar dance connection.

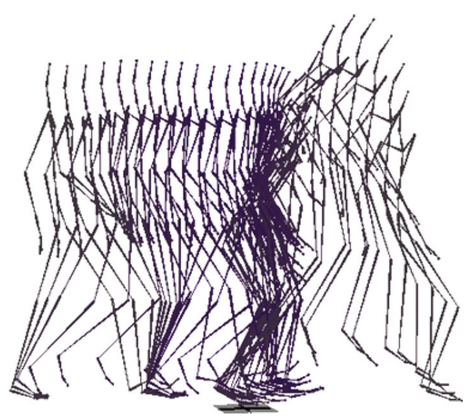

Figure 8: Effect diagram of interframe smooth data of the different dance connection at overlap.

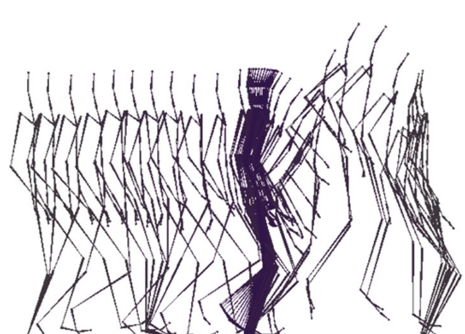

Figure 9: Effect diagram of data between two frames at the beginning and the end of the different dance connection.

to the animation effect. For the rotation angle data of human joints, the calculation method is shown in formula (9). $q_i^A(m)$ represents the rotation angle data of human joints in the last frame of dancing action in A segment, $q_i^B(1)$ represents the rotation angle data of human joints in the front frame of dancing action in B segment. The range of $\alpha(k)$ is $(0, 1)$. The calculation method is the same as the formula (6) mentioned above. Similarly, the data obtained at this time is in quaternion form. In order to run the computer program normally, it is necessary to transform it into the initial Euler angle data and input the program to drive the choreography of the virtual human dance action.

$$T(k) = \alpha(k) P_m^A + (1 - \alpha(k)) P_1^B, \quad (7)$$

$$P^B(k)' = P^B(k) + \left(P_m^A - P_1^B\right) + \Delta, \quad (8)$$

$$q_i(k) = \mathrm{Slerp}\left(q_i^A(m), q_i^B(1), \alpha(k)\right). \quad (9)$$

4. Experimental Design and Analysis

4.1. Data Matrix Processing Flow. The experimental data format of this study is ASF/AMC, and the experimental tool is MATLAB. Therefore, the analysed experimental data need to be processed by data matrix. First, Matlab is used to process the input dance action analysis data, converting AMC into matrix form and the Matlab tool, to achieve intelligent, other motion editing processing process and the matrix into AM C file output. The output of motion data is into the Maya tool to generate human dance animation.

The specific matrix processing flow is shown in Figure 5. This process is mainly to process the analysed data into matrices, and then perform intelligent operations on the data in the form of matrices to complete the smooth transition and seamless connection between dance movements. First, we need to calculate the position of human root joint by intelligent. Input the data coefficient t and the data $T1$ and $T2$ representing the movement of the root joint position, and get the output value T', representing the moving vector value of the data point. The rotation angle data of human joints are calculated. First, the rotation data R is input, and then a rotation data matrix M is obtained by processing the ASF file, and the corresponding rotation Euler angle Ri is obtained. The Euler angle data is transformed into quaternion form, and a quaternion q_i with the same rotation angle is obtained without input of Ri in a matrix M. Spherical intelligent is performed between two quaternions. The data coefficients t set before input and q_1, q_2 obtained in the previous step are input, and the quaternion q_j is output. At this time, all the quaternions are converted into the Euler angle form, and the q_j in the previous step is input to obtain the output value R', that is, the Euler angle corresponding to the quaternion. The previously calculated human root joint movement data T' and the Euler angle R' after the data algorithm finally constructed are constructed into a data matrix N, and the system is output.

In the dance action connection, input motion data matrix D and E, set the number of overlapping frames to n

, get the D matrix $m-n-1$ row for overlapping m-row matrix data $D^{'}$. Similarly, the m row matrix data $E^{'}$ overlapping in the E matrix is obtained. After obtaining the motion data matrix N obtained by the intelligent algorithm, it is combined with $D^{'}$, $E^{'}$ into a new matrix, and converted into the AMC file to get smoothly processed dance action fragments.

4.2. Analysis of Experimental Results. According to the previous classification of dance action connection types, this study has done two experiments, one is the connection experiment between similar dance movements of the same type, the other is the connection experiment of different types of dance action with great difference.

In the same type of dance movement experiment, this study takes the connection of different dance gait as the experimental object and compares the dance movement connection effects under two different data methods. Figure 6 is an experimental result of frame data at the overlap of two dances like joints. Figure 7 is an experimental result of inserting a new action frame directly between the first frame and the last two frames at the junction of two similar dance movements. It can be seen that at the overlap of Figures 6 and 7, the connection effect of the two dance movements transitions more and more smoothly. Therefore, it is judged that in the same type of dance action connection, the smoothing data method at the frame overlap is better, and the final animation is smoother and more natural. Similar to dance, the coincidence degree of data effect between two frames at the beginning and end of connection is relatively low. In similar types of dance movement connection, the method of smoothing data at frame overlap is better.

In different types of dance action experiments, this study takes the connection of walking action to jumping action as the experimental object and compares the effect of dance action connection under the two different data methods mentioned in the previous paper. As can be seen from Figures 8 and 9, the data transition coincidence between two frames at the beginning and end of different dance connections is high. Figure 8 is an experimental result of frame data at the joint coincidence of walking posture dance and jumping posture dance. Figure 9 is an experimental result of inserting new action frames directly between the first and last frames at the joint of walking posture dance and jumping posture dance. It can be seen that the connection effect of the two dance movements in Figure 9 is smoother and smoother after inserting the new frame directly into the connection, while the posture in Figure 8 is blocked and sliding steps occur. Therefore, it is judged that in the connection of different types of dance movements, the method of inserting the new frame between the first and last two frames at the connection is better, and the animation effect is more real.

The simulation results show that the original motion analysis data can achieve smooth transition under the dance action connection technology based on intelligent algorithm proposed in this study and can make the choreographed sports dance animation vivid and smooth.

5. Conclusion

In order to improve the arrangement level of sports dance, reduce the harmfulness of sports dance, and improve the recognition accuracy, computer technology is applied to the field of sports dance. This paper presents an intelligent algorithm to optimize the dancer's action connection in sports dance. Intelligent algorithm is used to describe the movement change of human root joint position in dance movement, and quaternion spherical intelligent algorithm is used to describe the change of rotation angle of each joint in different dance movements. At the same time, two different dance action interframe connection modes are proposed. The simulation results show that the smoothing data method at the frame overlap is more smooth and natural in the connection of similar dance movements. In different types of dance action connections, it is better to insert a new frame between the first frame and the last frame at the connection. Experiments show that the intelligent algorithm can effectively realize the smooth and realistic expression of choreography animation in sports dance choreography and help sports dance coaches complete teaching through virtual technology. However, there are still some deficiencies in this study, such as in-depth study of movement analysis data, analysis of its characteristics and classification, mining the relationship between movement data and dance movement types, further simplifying movement connection steps, adjusting movement parameters, and so on.

Data Availability

The experimental data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declared that they have no conflicts of interest regarding this work.

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