Martial Arts Training 3D Human Body Motion Simulation and Video Analysis System

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Abstract: With the development of the information age, information technology is used in all aspects of life, and the development of information technology in modern life has been applied to martial arts training. Introduce digital technology in martial arts training, develop a three-dimensional human motion simulation and video analysis system for martial arts training, and provide scientific and technological support for the talents who learn martial arts in China. Through the three-dimensional human body simulation to simulate the basic routines of martial arts, while displaying the basic routines of martial arts in a three-dimensional and intuitive way, it can also help learners to practice difficult movements, and is more conducive to let martial arts people innovate on martial arts, so that more People like this sport. The paper mainly analyzes the three-dimensional human motion simulation and video analysis system of martial arts training, and carries out specific analysis and overview for reference.

1. Introduction

As a kind of traditional culture in our country, martial arts requires us to continue to inherit and develop and grow. In the context of modern information, the three-dimensional human motion simulation and video analysis system is used in the process of martial arts training to provide technical guidance to learners. Although there are some shortcomings, new training is compared with traditional training methods. The method is more efficient. Let scholars learn martial arts clearly and intuitively to show coherent technical movements, which can simulate new technical movements in reality or ideal state. In the process of application, the trajectory of athletes in 3D human motion simulation is mainly demonstrated in quantitative way. . These techniques are cited in martial arts training, which has created a new training mode for martial arts training and education resources. It has certain significance in martial arts training.

2. Overview of key system functions

2.1 Video analysis

The main function of the video analysis system is that digital video can be maximized in martial arts training. In training, it can provide convenient and quick visual feedback means, and a platform for technical communication between scholars and coaches; after training, Provide more in-depth technical actions and analysis of the completion of the action by the analyst. And this feature requires more steps to provide a more detailed section. First of all, it is the motion video foreground map synthesis, which is to turn the action into a static action analysis, so that you can completely control the progress of the action. Secondly, it is said that the superimposition and contrast of the motion video is mainly to extract the outline of the most accurate movement among the scholars and then superimpose it on another motion video, so that the two contours are compared, so that it can be found. The difference between the two. Third, the acquisition of human body motion attitude parameters, mainly based on video human motion tracking technology, to obtain the angle of the joint angle of the motion trajectory of each key point of the moving human body, is called the human body posture parameter, and is based on such a biological activity. analysis. [1]

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2.2 3D human motion simulation

The difference between 3D human motion simulation and video analysis is mainly because it is composed of digital technology, mainly based on simulation technology, human motion biomechanical data and real human motion verses, and realistic simulation of martial arts in three dimensions. Training is very instructive. It is mainly possible to formulate motion modification and technology, motion programming simulation, and comparison between simulation motion and training video from three aspects. These three functions can be used to formulate actions that suits them according to the actual training system, which is more convenient for learning; it can be based on the optimal actions and layout of the system push, so that it can promote better learning of the action; Displaying the same action on the same screen shows the gap between the standard and the scholar, making it easy to change in time.

3. The purpose and technology of 3D human motion simulation and video analysis system

3.1 Main purpose

The main purpose of the three-dimensional human motion simulation and video analysis system is to achieve two advances and transformations in the martial arts training method. Mainly based on the method of human observation to the human motion measurement method based on high-precision video capture and analysis; based on the experience training analysis method to the human motion simulation based on human motion simulation simulation, mainly from the traditional simple coaching teaching Kind of training.

3.2 Main core technologies

Mainly can achieve sports body extraction, sports body tracking, motion modeling and motion simulation. The human body extraction is mainly based on the adaptive dynamic background construction method to realize the human body target of interest in the sports video with more complex background. The movement of the human body is mainly used to record the technique of the movement during the movement of the scholar. Motion modeling is mainly responsible for 3D reproduction of the actions of recording martial arts scholars. Motion simulation is mainly based on the dynamic principle to achieve the optimal motion process calculation under different boundary conditions. The formation of these technologies can promote the rapid learning of difficult martial arts movements among scholars. [2]

4. Comparison of 3D human motion simulation and video analysis with traditional techniques in martial arts

4.1 Traditional technology

The visual media used in traditional martial arts teaching can not fully display martial arts routines, and there are also bad methods in the way of saving hair. For example, there is no way to fully demonstrate all the martial arts moves. And to a certain extent, the written materials are not conducive to the learners' understanding of the martial arts routines, and the written materials are more suiTable for scholars with rich experience. In addition, there is only one perspective in the 2D teaching system, but in general, martial arts scholars will have two angles of action, which will increase the learning difficulty to a certain extent.

4.2 3D human motion simulation and video analysis

3D human motion simulation and video analysis are mainly three-dimensional, able to capture motion, which for beginners, it is very clear that their actions are there. This will enable scholars to learn difficult martial arts movements more quickly. The action of the learning process can also be recorded in real time, and the problems that the learner has in the process are found in the process, and the corresponding program can be formulated to perform the martial arts exercise in combination with the actual situation, so that the learning efficiency can be improved. Compared to

traditional martial arts training techniques are very efficient. [3]

5. Advantages of 3D human motion simulation and video analysis

5.1 Shortening the process of establishing an action representation

The establishment of action plays a very important role in the whole martial arts learning process. All three-dimensional human motion simulation and video analysis learning must first implement the following teaching through the establishment of actions, which is the leader in the whole teaching process. Appeared in order to be able to establish a complete technical concept of martial arts routines. The methods for establishing action representations have been mentioned in the previous article. They are mainly divided into the learners' own feelings to obtain the technical information in the martial arts routines, and the degree of understanding of the martial arts routines with the coaches. This new 3D human motion simulation and video analysis can convey martial arts movements to learners accurately and correctly.

5.2 Combination of intuitive and quantitative

The research of a new system is mainly to solve the problems in front of the problem in a timely manner, so that the learning time can be reduced to a certain extent, and the action level can be improved. Mainly from the observation method and biomechanical analysis method, it can record the standard degree of all the actions of the learner in the high-tech system of three-dimensional human motion simulation and video analysis. If it is found to be bad, it can be combined with visual and quantitative. In the end, we can also find out the irregularities of martial arts movements and improve them. [4]

6. Three-dimensional human motion simulation and video analysis problems and methods

6.1 Video analysis

In martial arts video images, there are usually two types of motion methods, one is global motion and the other is local motion. Considering that martial arts have certain specialities in motion and video characteristics, a six-parameter affine motion model can be set up to represent:

Where p = (x , y) is the coordinates of the current frame, p' = (x', y') is the coordinates of the point corresponding to p in the adjacent frame, (a, b, c, d, h, g For global motion parameters, a , b , c , d represent rotation and scaling, and h , g represent displacement. In order to be able to reference the value, we also need to add two kinds of miscalculations. The first one is the Konrad algorithm used in the M PEG-4 check model. According to the result of this calculation method, we can get if we want to eliminate the matching value. The interference between noise, local motion and other noises still needs to be applied to the Fisher linear discriminant criterion. According to the estimation rule between the two, the obtained result can be more accurate. Generally, it is necessary to select a rough local area in the image. Try to avoid the possibility that the edge may not be visible. It is not possible to set a feature point P in the image to divide the feature point into an inner point and Outside point, after the point is set, the estimated global motion can be performed between the two points, so that a more accurate estimation result can be obtained. [5]

Video moving object extraction; for this kind of martial arts training, this simple video can be classified into two categories: one is based on the time series attribute as the segmentation basis, as long as it is used to segment the moving object; the other is the spatial attribute as the segmentation moving object. The motion object is segmented mainly according to the region or edge information. Whether it is the time series attribute or the space attribute segmentation, the displayed background and the object will be affected in the accurate value of the segmentation. Therefore, when segmentation is performed, the background and the object can be distinguished to be divided so that the accurate value of the segmentation can be maintained.

6.2 3D human motion simulation

The human body structure is very complex and has multiple dimensions, but in order to simulate the fidelity, we need to consider multiple aspects, but only the control of each process is complicated and difficult. Therefore, using three-dimensional human motion simulation technology to martial arts training, it can play a simulation of motion modification and design and motion programming. In the design process of modifying the action, as long as it is the same as the 3D human motion simulation technology for the action record, and found some irregular movements to rectify, or modify some unsuiTable actions, in order to achieve The best effect value. In order to make a more reasonable action, it can be assumed that in the case of human motion motion (t), it is necessary to modify the posture poster(ti) to obtain a new posture poster'(ti), which can be passed to the computer by the user of size X × Y. The operation selects the corresponding body. In this process, the change of the mouse in the x and y directions is Δ x and Δ y respectively, and the Euler's theorem can be used to assume that the Euler <α, β, γ> in the zyx direction can be used. This rotation has the following relationship:

Among them, d, e, and f are the influence factors, which indicate the influence degree of Δ x and Δ y on the Euler angles <α, β, γ> in the three directions of x, y and z. Thus the setting of the new posture posture'(ti) is completed.

Action layout simulation; according to the actual situation, after the martial arts movements have been modified and designed, it is easy to appear that there is no complete set of actions between individual technical actions, but for the whole set of arrangement actions, at least 10 or more can be formed. Set of motion techniques. Through the use of three-dimensional human motion simulation and video analysis system composed of a set of simulation simulation results can be seen, to a certain extent, it reduces the risk of training, and can help us complete more training-friendly arrangements Program.

7. Conclusion

In summary, the use of three-dimensional human motion simulation and video analysis system provides a new training method for the arrival of martial arts training, and shows the skills and essence of the routine and the general training. At a certain level, it can effectively promote the learning of martial arts. In addition, the intuitiveness and interactivity of the three-dimensional human motion simulation and video analysis system can fully compensate for the shortcomings of traditional martial arts routine teaching. Guide learners to learn efficiently. And the three-dimensional human motion simulation and video analysis system is very environmentally friendly, affordable and convenient, which is in line with the current social development trend. In the end, it will promote the better inheritance of our traditional culture.

References

[1] Hu Yaqi, Yan Guangyu. Research on Application of Martial Arts Video Retrieval Technology [J]. Microcomputer Information, 2011, 27(01): 274-275+290.

[2] Xia Shihong. Three-dimensional human motion simulation and video analysis system for sports training [J]. High-tech and industrialization, 2008 (09): 28.

[3] Deng Yu, Li Zhenbo, Li Hua. Design and Implementation of 3D Human Motion Tracking System Based on Video [J]. Journal of Computer-Aided Design & Computer Graphics, 2007(06):769-774+780.

[4] Wei Juanli. Research and Application of Computer Simulation System Based on Motion Process [J].Journal of Xi\'an Institute of Physical Education, 2006(05):102-105.

[5] Wang Zhaoqi, Zhang Yongdong, Xia Shihong. Three-dimensional human motion simulation and video analysis system for sports training [J]. Computer Research and Development, 2005(02): 344-352.