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Video Analysis Technology and Its Application in Badminton Sports Training

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ABSTRACT: Based on the continuous development of computer vision and graphics technology, pattern recognition and image processing technology, intelligent video analysis technology combines these related technologies to establish a mapping relationship between image description and surveillance image. Intelligent video analysis technology has a wide range of applications, such as in military and economic fields. In the process of badminton training, when the trainer explains the action essentials for the athletes, the video replay and analysis management methods are less difficult, lack of science and intuition and it is difficult to meet the trainer's demand for sports performance evaluation. The analysis and recognition process of badminton video are studied. Based on particle filter prediction, adaptive threshold algorithm is used to achieve adaptive separation of moving targets. The particle filter technology is used to track the trajectory of the athletes and the motion model is constructed. Based on this, the position of the important joint points in the subsequent motion video frames is predicted, so as to track the subsequent motion video frames. When the motion recognition in the badminton training video is used, the conditional random field method is mainly used, which makes the motion recognition rate higher and the false separation rate lower.

1. INTRODUCTION

As an important fitness exercise, badminton plays an increasingly important role in daily life. In many competitive sports, badminton sports competition is widely welcomed. The development of science and technology has a certain impact on the training of badminton. To some extent, the competitive achievements of badminton have an important relationship with the development of science and technology. An important way to improve the performance of the competition is to strengthen the training of athletes. In the process of training athletes, the use of modern scientific research results can bring greater convenience. As an important medium, badminton training video can analyze the athlete's personal qualities and competitive tactics. In recent years, related technologies such as intelligent recognition technology, computer vision technology and morphology have been developed rapidly, and traditional methods relying on visual analysis will gradually be replaced by video analysis systems. The application of video analysis technology in badminton training can provide convenience for badminton sports events, explore more reasonable sports training methods and effectively train, thus laying the foundation for improving the level of competition.

The advancement of science and technology has brought convenience to sports training, which has made people pay more attention to applying relevant technology to sports training programs, so as to improve the performance and quality of sports training more efficiently and quickly. In some sports training processes, when the trainers explain the action essentials for the athletes, they mainly use less difficult video replay and analytical management methods, which lack scientific and intuitive features and it is difficult to compare and evaluate relevant points more realistically. There is also a lack of

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interactivity and it is impossible to truly meet the basic assessment requirements for training outcomes and athletes' movement norms. In the badminton training, by recording the video and analyzing the motion video, the training parameters of the athlete can be extracted. By constructing the model and carefully observing the training action, further analysis of the training parameters is completed, and the final analysis result is obtained. It characterizes the advantages and disadvantages of the badminton athletes' training movements; for these analysis results, the athletes can more intuitively understand the shortcomings of the sports training process, so as to correct the corresponding shortcomings according to the coach's training guidance, improve the quality of badminton training.

2. VIDEO ANALYSIS TECHNOLOGY AND RELATED APPLICATIONS

Computer vision technology is the origin of intelligent video analysis technology. Video analysis technology combines image processing technology, computer graphics, pattern recognition technology and other technologies. The main goal is to establish the mapping relationship between image description and monitoring image. Intelligent video analysis technology has broad application prospects in military and economic fields, and has potential economic value. Industry, academia and related management departments have attached great importance to it and relevant research is being carried out.

In recent years, with the rapid growth of video analysis technology in the market of public security, commercial, military applications, etc., the research and development of intelligent video analysis systems has been increasing and a large number of intelligent video analysis products have begun to emerge in the market. Under the current circumstances, the main practical application areas of video analytics products include monitoring of important items and important vehicles, and personnel monitoring in key areas. The application in badminton training has not been widely adopted.

In the badminton training, the application of video analysis technology to assist the badminton training teaching, mainly to solve the problem of the relationship between the athlete's visual-ontology-muscle movement, analyze the success and failure of the badminton competition and improve Auxiliary explanation of the effectiveness. The basic skills of badminton include gripping, serving, picking up, leveling the ball, high ball, hitting the ball at high altitude, killing the ball, hanging the ball, hitting the ball on the net, hitting the ball, hitting the ball, etc. In the training of sports training, video analysis needs to present the technical action essentials to the students, including the force mode, the action sequence, the joint movement, etc.; the scenes of the technical action are presented to the athletes.

The complete content of the standard action can be clearly presented through the close-range video. The presentation methods mainly include contrast, decomposition, slowdown, superposition and auxiliary functions such as angle and trajectory. For complex technical actions, the difficulty of learning is increased. It is more important to superimpose, contrast and decompose these videos. In the teaching and training session, it is more necessary to have more refined learning and purpose links. Auxiliary function of angle and trajectory. At the same time, in conjunction with the video interpretation function, it can provide convenience for athletes' self-training. In the badminton sport, depending on the characteristics of the ball and the purpose of the ball, there will be a variety of technical actions; it is necessary to comprehensively present the motion scenes and details of the technical action. It is necessary to set a certain number of video material packages in the video analysis software and present a variety of typical technology use scene videos to realize the functions of contrasting, highlighting, superimposing, slowing down, decomposing, and assisting the video.

3. DESIGN OF VIDEO TARGET TRACKING MODEL FOR BADMINTON TRAINING

In some video analysis systems for badminton training, there are some shortcomings. In order to obtain better video analysis results, certain measures need to be taken to improve the video analysis system. The main steps of the badminton video analysis model are as follows: Firstly, the video analysis needs of badminton training should be comprehensively analyzed to truly grasp the functional requirements of the video analysis system. Secondly, in order to complete the collection and storage of the badminton training video data. Target tracking task, when designing the video analysis system model, the digital processor needs to be used as the core module. Finally, based on the connection between the digital

processor and the multimedia structure, badminton training is constructed based on the Markov chain. The video target tracking model selects the appropriate development platform and the compilation and debugging tools to complete the development of multi-target dynamic tracking and video synchronous playback functions, and analyzes the experimental simulation results.

Image processing technology has been continuously developed, video analysis technology has been continuously improved, and the development direction of badminton training has gradually become scientific and intelligent. In the video processing technology, the analysis of the video frame sequence can complete the feature collection and information recovery of the badminton training action, correct the irregular badminton training action, thereby improving the training efficiency and skill level. When designing and developing a video analysis system, an embedded control chip can be used to realize motion video information communication and real-time monitoring. Through the access to the Internet of Things environment, the integrated control of the badminton sports training video information is realized, thereby effectively guiding the sports training. This paper mainly studies video analysis technology and its application in badminton training. In the video analysis design of badminton training, hardware and software design are the key parts, which are created on the basis of video information collection and analysis system hardware. Training video analysis system design for analysis. Under normal circumstances, video analysis for sports training is mainly based on embedded design. As the interference continues to increase, the automatic control and scheduling of the video analysis system will be distorted, resulting in reduced control capability. The workflow of the video analysis system for badminton training is shown in Figure 1:

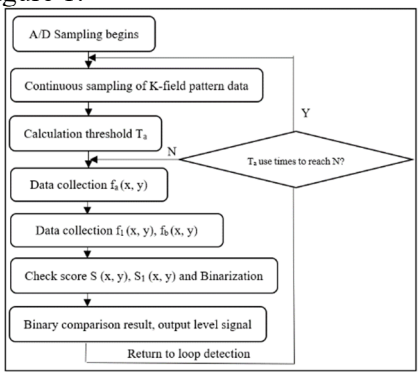

Figure 1 Work flow of the badminton training video analysis system

In the workflow of badminton training video analysis, the target tracking of sports training video can provide basic data for analysis content, which is the key link of video analysis workflow. Due to the changing shooting conditions, the background and target angle of the badminton training video are changed. Different visual angles will produce different target analysis data, resulting in differences in analysis results. In the badminton sports competition, these differentiated data It can reflect the different postures of athletes and therefore is valid data. To obtain these differentiated motion data from different perspectives, multiple target trackers are needed to perform multi-angle and multi-target tracking on the badminton trajectory, so that the motion data can be collected in all directions. The badminton training acquisition model based on multi-target tracker is shown in Figure 2 below:

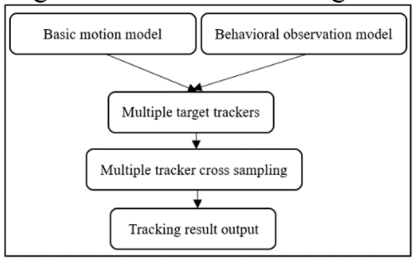

Figure 2 Multi-target tracking acquisition model for badminton running training

It can be seen from the above multi-target tracking acquisition model that the multi-target tracking model of badminton training video consists of two refined sub-models, a basic motion sub-model and a

behavior observation sub-model; wherein the main task of the basic motion sub-model is to complete the pair The trajectory of the regularity of the badminton goal is extracted as a whole; the main task of the behavior observation sub-model is to complete the target behavior refinement of the basic motion model. In the badminton training video target tracking model, multiple target trackers are installed on two sub-models, and the target trajectory is tracked and sampled to obtain tracking data. Two types of target trackers are installed on the basic motion sub-model: tracking common behavioral targets and high-speed moving targets, respectively.

4. THE KEY WORK OF VIDEO ANALYSIS TECHNOLOGY IN BADMINTON TRAINING

4.1 Multi-dynamic Target Synchronization Tracking

In the badminton sport, the video analysis technology is applied. In order to ensure the multi-behavior information generated by multiple targets simultaneously, multi-dynamic target synchronization tracking is adopted, which improves the behavior analysis efficiency of the badminton players and the target tracking accuracy of the video analysis system. The specific processing flow of the dynamic target synchronization tracking process is shown in Figure 3:

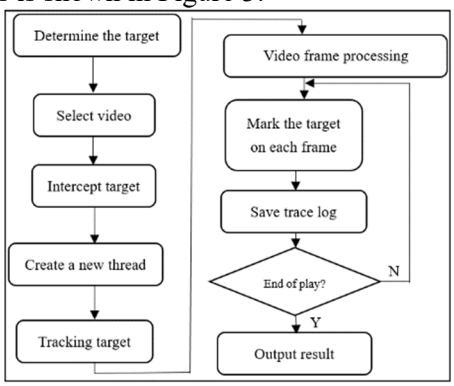

Figure 3 Multi-dynamic target synchronization tracking process

After determining all the targets in the badminton training video, start the multi-dynamic target synchronization tracking process and obtain the behavior of the target by intercepting the multi-target image; mark the target point on the video frame image, directly and comprehensively Track the target point and finally save and output the trace data as a log. Through multi-dynamic target synchronization tracking, it provides guarantee for simultaneous extraction of multi-target data, which effectively improves the efficiency and accuracy of target tracking, and finally improves the accuracy of video analysis.

4.2 Video Synchronization Playback

Effective analysis of the badminton training video is inseparable from the multi-dynamic target synchronization tracking process and video synchronization playback. Among them, the main purpose of video synchronous playback: comparative analysis of the same scene in different badminton training videos. The specific processing flow of badminton training video synchronous playback is shown in Figure 4:

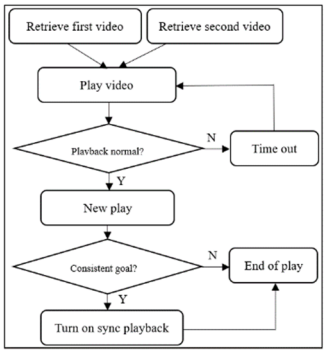

Figure 4 Badminton sports training video synchronization playback process

As can be seen from Figure 4, the badminton training video synchronous playback process includes two function plug-ins: play thread establishment and playback status test. When any one or two of the two badminton training videos cannot continue to play normally, it is necessary to pause the playing state of the video content and re-enter the video playing step. In a state where both videos are guaranteed to play normally, a play thread is created to modulate the target behavior in the two videos into consistency.

4.3 Badminton Player's Motion Recognition

The motion recognition of badminton behavioral video analysis is inseparable from the identification of the target. In the process of sports training, by learning the motion model and the separated basic motion video sequence, the input motion video separation sequence is detected to obtain the conditional random field model. Parameters, the parameter values are compared and classified into the belonging categories. The action recognition process of the badminton player is shown in Figure 5 below:

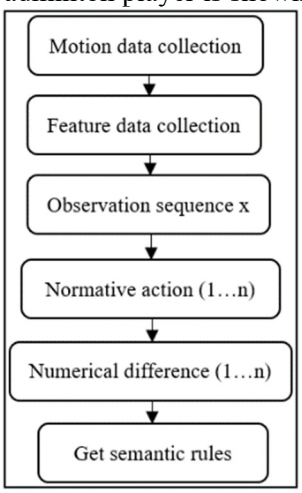

Figure 5 Badminton player's motion recognition process

5. CONCLUSION

In order to further improve the scientific guidance level of badminton training, this paper studies video analysis technology and its application in badminton training. Video analysis technology is a comprehensive manifestation of the development of modern high-tech technology such as modern computer graphics and digital image processing technology. As an important member of daily fitness sports and competitive sports, badminton is widely welcomed. In order to promote the guidance level of badminton training it needs to rely on modern high-tech. In the subsequent research, it is necessary to further evaluate the design results through simulation test and verification; combined with experimental test results, tuning the relevant parameters will eventually improve the accuracy of video keyframe extraction and play a better guiding role in badminton practice.

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