Development and Application of Sports Video Analysis Platform in Sports Training

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Abstract. The sports video analysis platform can accurately extract the training parameters of the trainer, build a model with personality differences based on the actual training actions, conduct an in-depth analysis of the training parameters, and fully display the standard degree of the trainer’s actions in the analysis results. Trainers and coaches can have a comprehensive and intuitive understanding of the problems in sports training through sports videos and analysis results. Coaches can adjust their training plans based on the analysis results. Trainers can make corrections to sports actions, thereby promoting the quality of sports training constantly improving. This article mainly elaborates the development of the sports video analysis platform in sports training from the three aspects of hardware structure, function and target tracking model. At the same time, simple performance tests of the platform are carried out, and then the platform is applied to common long jump, race walking, badminton and gymnastics, I hope to have a certain reference significance for the effective development and promotion of sports video analysis platform.

Keywords: Sports Training, Sports Video Analysis Platform, Sports Quality

Introduction
The improvement of the quality of life and the improvement of living standards have changed the status of sports competition in people's hearts. People no longer regard sports competitions as the exclusive use of athletes, and they begin to use sports competitions as their daily exercise items. In order to obtain better sports performance, some people will participate in special sports training. Traditional sports training mainly relies on oral explanations by coaches. With the popularization and application of technologies such as computers and big data, sports videos are gradually being developed and used in sports training. The emergence of sports video analysis platform makes sports training more scientific and rich, and has a positive effect on the improvement of the level of sports competition of trainers. Therefore, it is very important to develop a sports video analysis platform with high reliability and stability.

1. Development of Sports Video Analysis Platform In Sports Training
(1) Development of sports video analysis platform First, hardware structure development. The most critical part of the hardware development of the motion video analysis platform is the digital processor
[1], and the popular TMS236351 can be used. The digital processor includes fast buffer storage area, operating system space, and four external storage interfaces in terms of storage space. Digital signal processing includes fast buffer storage area, operating system space, synchronous dynamic random access memory, multimedia interface, universal asynchronous transceiver A, universal asynchronous transceiver B. The dynamic random access memory of the processor can store data spontaneously in emergencies to avoid data loss due to accidents such as power outages and crashes. The hardware structure development system includes external memory, video collection and processing module, synchronization control chip, external media structure, power module, etc. The storage bus allocates all sports videos to the corresponding storage address, and uses peripheral components and processors to complete storage. Storage bus it can also transmit the video to the collection and processing module for the purpose of video analysis. The function of the synchronous control chip is to adjust the network bandwidth [2]. The power module is the basis on which the motion video analysis platform can work, providing power support for the processor and storage bus, and realizing video collection, transmission and analysis. The power-off sequence of the motion video analysis platform is storage bus→processor→video collection processing module, so as to ensure the stability and safety of components and modules during operation to the greatest extent. The core output terminal of the entire analysis platform is the multimedia interface. In order to obtain the complete video content, when analyzing the motion video, it should first determine whether the processor and the multimedia are successfully connected. Second, function development. The basic technology for the realization of the motion video analysis platform function includes Directshow and image quality technology, which can extract background information from the video, and at the same time segment the video image in time domain, extract the video moving target based on the segmentation result, and finally synthesize a panoramic image reflecting the overall motion. Filtering out the static background mainly uses the inter-frame difference method to achieve the effect of suppressing the background. When automatically tracking key parts, it is necessary to use Kalman and color block matching filtering, and at the same time, the trainer's motion parameters can be obtained. Third, the development of target tracking model. The key link of the sports video analysis platform in target tracking sports training, the main data in the video analysis comes from the target tracking process. The shooting conditions are uncertain, the background of the sports video and the target will also change due to the different shooting angles [3], the target analysis data will be different due to the difference in the angle of view, and the final analysis results obtained will also reflect the data differences. On the one hand, this kind of inconsistent data has a great reference value for sports competition, and it can more comprehensively show the posture of the trainer during exercise. Therefore, multiple trackers must be frequently used in the target tracking process to ensure the integrity of the collected data. The two models of behavior observation and basic motion will be reflected on multiple target trackers [4], and the tracking results will be formed after the tracker interaction and sampling. The behavior observation model is to refine the basic movements of the trainer, and the basic movement model is to extract the law of the movement target. The target tracking model can realize the simultaneous tracking of multiple dynamic targets, and it can realize the purpose of tracking the target point comprehensively. Target determination→video selection→intercept and mark target→create new thread→target tracking→frame processing→mark the target on each frame→save frame tracking log→play end, if the end of the play is affirmed, select the output result, if the end of the play is denied, It can loop to mark the target on each frame → save the frame tracking log → end of playback. (2) Performance test of sports video analysis platform When collecting sports video information, it is necessary to borrow embedded equipment and carry out further detection of sports video. The carrier is the interface of the sports video analysis platform to ensure the rationality of the set sports video parameters. The video information is collected and collected. The visualization mode can achieve the goal of human-computer interaction. Platform performance indicators are shown in Table 1. Compared with traditional methods, the recall rate and extraction rate of existing key frames are relatively high, which means that with the advancement of technology, the results of motion video analysis are more accurate. After the difficulty of key frame extraction gradually increases, the recall rate will also increase. When
the key frame is at the position of 300 and 500, the extraction rate of the platform designed in this paper is close to 100%. When the difficulty increases to 1000, the extraction rate and recall rate will be slightly reduced, the extraction rate and recall rate it is positively correlated. Table 1 Platform key frame performance indicators

| Frame   | Traditional method | Research method |
|---------|--------------------|-----------------|
|         | Recall rate        | Extraction rate |
| 100     | 75.26              | 95.62           |
| 200     | 80.69              | 96.52           |
| 300     | 89.69              | 99.89           |
| 500     | 81.23              | 98.25           |
| 1000    | 85.95              | 94.98           |

2. Practical Application of Sports Video Analysis Platform in Sports Training

(1) Race walking Supporting legs cannot bend is the most critical rule of race walking. The support will gradually change from one foot to two feet. During race walking, "empty" cannot occur [5], that is, the toes of the back kick cannot touch the ground with the heel of the swing leg. Leave the ground before. Through the sports video analysis platform, it can be found that the center of gravity and the step length of the race walking trainer are moving forward. The key to whether the race walking is standard or not is the hip joint, because the race walking regulations clearly state that the knee joint must be strictly straight during race walking. In actual race walking The hip joints of race walkers will swing up and down and rotate back and forth. This situation is very similar to the forward movement of the wheel. It is precisely because of the support of the hip joints that race walking trainers can achieve the knee joint and leg straightening, and also to the greatest extent. The upper allows the race walking step frequency and stride length to increase, especially the increase in stride length is more obvious. Therefore, trainers can have a more comprehensive understanding of race walking ideologically and improve their own technology by watching race walking videos.

(2) Long jump Long jump includes four parts: run-up, take-off, flight and landing. It is the most common jumping sport. Through the motion video analysis platform, it is possible to synthesize the panoramic image of the long jump technology, combine a single long jump technology into a continuous image [6], and decompose the key technology images at the same time, and present the dynamic images in a static manner, and complete the technical details and movement trajectories of the long jump. It is shown that the panoramic image is more comprehensive and intuitive than the information presented by the sports video, which can prompt the trainer and the coach to have a static analysis of the actual completion of the long jump, and help the trainer better master the technical points of the long jump.

(3) Badminton it is difficult for trainers to rely solely on the coach's explanation to create a connection between muscle movement, proprioception and vision. With the help of a sports video analysis platform, this problem can be better solved, and the understanding of badminton trainers can be deepened through effective analysis and auxiliary explanations. Grip, serve, online shots, high-altitude shots, underhand shots, lobs, smashes, etc. are all basic badminton movements. The coach can use the sports video analysis platform to analyze key technologies such as joint movement, force method, and sequence of actions. The movement is shown to the trainer, so that the trainer understands to choose the corresponding movement technique in the specific scene. The sports video analysis platform can present complete and standard actions in close-up videos by slowing down, decomposing, superimposing, or comparing them, and at the same time exerting its trajectory and angle functions, so that trainers can master more difficult and more complex Technical action. In addition, the sports video analysis platform has a video interpretation function, and trainers can start independent learning. There are differences between the purpose of hitting the ball and the characteristics of the ball itself, and the corresponding technical actions will also have some
differences. The sports video analysis platform can comprehensively analyze and display the technical
details and the sports scenes corresponding to the technical actions. The platform can set a specific
technical action video material Package, which presents a variety of representative technical
application scene videos one by one, with the help of the unique auxiliary, highlight, slow down,
decomposition, overlay, comparison and other functions of the video platform, it can not only let the
trainer master the technology itself, but also promote its flexible application of technology.

(4) Gymnastics The sports video analysis platform records and analyzes the training process of
gymnastics trainers. Trainers and coaches watch the training process together, which helps them to
have a deeper understanding of the technical movements of gymnastics. Trainers and coaches can also
watch the video. Technical doubts are discussed to help trainers master standardized gymnastics
techniques in a relatively short time and ensure that they can complete gymnastics with high quality.
For example, in gymnastics, after the trainer completes the push of the horse, most of the body is in an
upside-down position, and will tilt slightly to the right. Some trainers will put their hands at too large
an angle, which will complete the push and shoulder action. It has a certain negative impact, and it is
easier to disperse its thrust. The video analysis results can allow the trainer to have a reasonable grasp
of the distance between the two hands.

Three, conclusion To sum up, the application of the sports video analysis platform in sports
training has a great help to the trainer's technical mastery and application, and has a high feasibility,
because the platform software has a rich technical video resource library, which are all it is a typical
action technique of various sports, and it has been classified. It includes multiple video functions such
as zoom out, zoom in, forward, reverse, increase speed, decelerate, decompose, superimpose, and
compare. At the same time, it has a video interpretation function for technical actions., Can be
installed on mobile phones, tablets and other electronic products, with high applicability. Therefore,
applying the designed and developed sports video analysis platform to sports training is a
breakthrough to the traditional sports teaching mode, which is conducive to the improvement of sports
training quality.

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