Real Time Broadcasting Method of Sports Events Using Wireless Network Communication Technology

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Abstract. With the increase of time, the problem of image quality reduction caused by unbalanced network load will appear in the real-time broadcasting of sports events. A real-time broadcasting method of sports events is designed by using wireless network communication technology. Audio and video decoding and coding are divided into two independent threads working at the same time, which can make the frame rate reach the HD standard and enhance the stability of the encoding and decoding process. The GAN model is used to enhance the rate conversion. In the inter frame mode, integer transformation, quantization, reordering and entropy coding are performed on the residual block to complete the coding of the macroblock, which is stored or transmitted through the NAL layer. Wireless network communication technology is applied to distribute the number of channels in the space of mutual interference and balance the load of relay network. For the viewer, after receiving the streaming media data block, analyze the RTP packet, decode the video data, and then play the video. The test results show that the real-time broadcasting method of sports events using wireless network communication technology can improve PSNR, reduce the distortion of video sequence and ensure the stability of output picture.

Keywords: Wireless network communication technology · Sports events · Real time broadcasting · Audio and video decoding · Broadcasting service · Network transmission

1 Introduction

In recent years, China's sports broadcasting industry has shown a blowout development. Major online sports platforms such as Tencent sports, PP sports and broadcasting bar have purchased a large number of sports event broadcasting copyrights, such as Cup events represented by World Cup and track and Field Championships and regular events represented by NBA, Premier League, French open and Australian Open. China's sports event broadcasting is developing towards standardization and scale. In China, the right of real-time broadcasting of sports events has long been mainly controlled by traditional radio and television media, whose interests are monopolized and monopolized seriously. With the wide application of streaming media and other technologies, the rapid

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popularization of the new communication mode of Internet real-time broadcasting, the boost of policies, and the strong development momentum of network real-time broadcasting of sports event programs, great changes have taken place in the way and habit of spectators. Compared with traditional TV platforms, network broadcasting can not only provide more personalized and rich sports broadcasting services, but also expand the business model of sports event broadcasting industry, including paid viewing, copyright distribution, member ordering and video advertising, which further promotes the development of sports network broadcasting industry towards a healthy, large-scale and industrialized road [1].

The greatest value of sports event program communication lies in its timeliness. It is very important to master the technology and right of real-time broadcasting of sports event programs. Although the sports event broadcasting program is not the sports event itself, it is closely connected with the sports event. It comes from the real-time record of the sports event by the camera. It is the most intuitive expression of the ongoing sports event composed of a series of continuous pictures. It is not essentially different from the language, painting and photos of sports themes. In the past, the right and technology of real-time broadcasting of sports events programs were controlled by traditional media such as radio and television stations. However, with the wide application of streaming media technology, the popularization of the Internet and Internet access equipment, the combination of new technologies and the introduction of positive policies, this unreasonable phenomenon has undergone great changes. The programs of real-time broadcasting of sports events on the network have been pursued by more and more viewers. The core of sports broadcasting is the event content. There are great differences in the broadcast volume and user base between popular events and regular events. It is also directly related to whether the platform can provide users with high-definition, smooth and synchronous sports event broadcasting services. The key reason for the realization of network real-time broadcasting lies in the emergence and wide application of streaming media technology.

Traditional sports events are broadcast in real time through radio, cable or satellite broadcasting. Due to the growth of user scale and the demand for the improvement of service quality, it is urgent to optimize the real-time broadcasting method of sports events, so as to better improve the quality of service and user experience. In today's information explosion, users' time is occupied by a variety of services. Now users use a service from active inquiry to passive recommendation. The sports events are made into radio signals, cable TV signals, satellite signals and other program signals, and then these recorded signals are broadcast to the public. The public receives signals and watches the real-time broadcasting of event programs through television and other equipment. Streaming media technology refers to the technology of using streaming transmission to obtain continuous media data from the Internet. Through streaming transmission, users can watch programs in real time on the Internet. There are more and more data in the real-time broadcasting of sports events. The broadcasting service must consider a series of problems, such as the stable operation of the system, dynamic capacity expansion, the convenience of deployment, the efficiency of development, cost and so on. Therefore, using technical means to achieve real-time broadcast of live video has become the focus of current researchers. Reference [2] studied the bit rate adaptive algorithm for streaming

media live broadcast scenarios. Based on the rate adaptive algorithm, the retransmission service can adapt to the time-varying characteristics of the channel by dynamically switching the video rate. Taking live video streaming as the background, aiming at improving the quality of user experience, and fully considering the delay requirements of services and the characteristics of transmission environment, a bit rate adaptive algorithm based on PID control is proposed. Reference [3] proposed a video transmission quality oriented opportunistic routing algorithm vor-mg based on multi person cooperative game to optimize video transmission quality and transmission overhead. The edge quality gain model of video packets is established; Multi platform video data transmission is modeled as a multi-user cooperative game; Each video packet is copied and forwarded based on its Nash optimal solution. However, the above method cannot guarantee the video stability of real time. To solve this problem, based on wireless network communication technology, this paper proposes a real-time broadcasting method of sports events to meet the requirements of customers for video quality and receive more video requests at the same time.

2 Real Time Broadcasting Method of Sports Events Using Wireless Network Communication Technology

2.1 Decoding of Broadcast Video of Sports Events

Streaming media coding mainly includes audio coding and video coding. Its purpose is to compress audio and video into a certain media format with appropriate coding and compression technology to reduce the occupation of traffic in the transmission process of streaming media. The decoded data is written into the audio and video cache block through the structure cache pointer. In the encoding thread, the audio and video data frames are read through cyclic query of cache block size for encoding. The video consists of one frame of images. After the image is divided into pixel blocks, it can be found that the brightness difference and chroma difference between adjacent images are small and the correlation degree is very high through pixel block scanning and pixel block search. The logical sequence of video decoding is to obtain the input video coding data, find and open the decoder according to the coding information, and finally input the input data into the decoder for decoding.

The decoding module first calls the stream information analysis function to input part of the data into the function, and the function will get the relevant video information through the input data stream. Buffer technology is an application level audio and video quality control technology widely used in audio and video broadcasting system at present. Through the setting of buffer, it can reduce the loss of audio and video data, smooth the jitter in the process of encoding and decoding, and improve the encoding and decoding performance and stability of broadcasting system [4]. The flow framework of the decoder forms a complementary structure with the encoder, and the decoding principle is shown in Fig. 1.

When the encoded code stream enters the decoder, the decoder performs entropy decoding and reordering on the received compressed data to obtain the residual coefficient, quantization coefficient and other relevant information of the macroblock, and

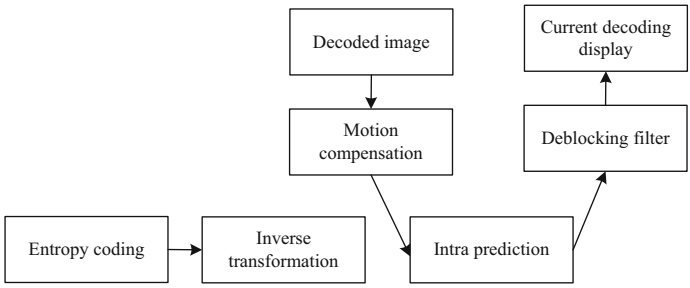

Fig. 1. Principle of decoding

performs inverse quantization and inverse transformation to obtain the residual macroblock. Through the obtained video information, assign a value to the structure object, and provide the required data information for operations such as finding and opening the decoder. In order to apply for cache space in the system for the received video data, this paper sets the size of the application space to the size of 25 video frames. Then, through the obtained video stream information, find the corresponding decoder for the H.264 video stream, and perform the H.264 decoding operation. The QP table stores the QP value of the video image macroblock in memory, and its label starts from left to right. Because the size of macroblocks is usually 16 × 16, the calculation formula for the number of macroblocks per line is:

$$p_1 = \frac{u_1}{16} + 1 \tag{1}$$

In formula (1), p_1 represents the number of macroblocks in each line; u represents the width of the video image. Further, the total number of macroblocks is, and the calculation formula is:

$$p_2 = (u_2 + 15)\frac{u_1}{16} + 1 \tag{2}$$

In formula (2), p_2 represents the total number of macroblocks; u_2 represents the height of the video image.

After obtaining the frame information corresponding to the video, apply to the system for decoding frame cache, which is set as the cache of 24 frame decoded video frame size, and set the pixel space format, frame size, resolution and other parameters of the cache block. Find and open the decoder according to the obtained stream information, and then send the audio AAC encoded data to the decoder as an input cycle for decoding. The PCM data decoded by the decoder is stored in the structure object, and finally the data is stacked into the decoding buffer to provide audio data for subsequent audio and video synchronization, audio playback and other operations. Finally, the recorded frame position is used to determine the corresponding decoder ID, and enter the initialization decoder process, assign and initialize the decoding structure cache, allocate memory space, and then open the decoder, read the video stream and start the cyclic decoding process. Then the prediction block is reconstructed according to the header information in the code stream, and the final decoded image is obtained after block filtering.

2.2 Adaptive Adjustment of the Broadcast Code Rate

The stability of sports event video playback is also one of the important factors affecting users' viewing experience. Too frequent quality level switching or large switching will affect users' subjective perception experience. Reasonable rate switching can make full use of the network bandwidth and improve the viewing experience of users. Therefore, this paper proposes an adaptive rate adjustment strategy. Firstly, select the corresponding encoder and set the relevant video coding parameters and audio coding parameters, and pass the set information through avcodec_ find_ The encoder () function finds the corresponding audio and video encoder, fills in the format of the audio and video data area after opening the encoder, compares the audio and video time information after setting the corresponding time benchmark, and obtains whether video coding or audio coding should be carried out at the moment, so as to enter the corresponding coding process. Because the past information also has certain reference value in the process of rate decision-making, in the research of some rate adaptive algorithms based on reinforcement learning, it is still considered to introduce a limited number of environmental information sequences collected in the past to represent the state for action decision-making. However, due to the limited sequence length of the introduced state sequence during each training, some key information in the past will be lost. This paper uses Gan model to strengthen bit rate conversion. In inter frame mode, firstly, the macroblock is obtained through motion estimation and motion compensation, and the residual is obtained by subtracting from the macroblock of the current frame. Then, the residual block is encoded by integer transformation, quantization, reordering and entropy coding, and stored or transmitted through NAL layer. The feature extraction network receives the input sequence with the length of 16 carrying the past key information, operates the sequence using the batch normalization algorithm, and then transmits it to the one-dimensional convolution network to extract the key information. The state characteristics of CNN network output are an important part of subsequent strategy network and value network input. The hidden features and the state features output by CNN network are spliced to generate a new feature expression, which is used as the input of strategy network and value network, as shown in formula (3).

$$\alpha_t = \chi(\beta_t, \gamma_t) \tag{3}$$

In formula (3), t represents the time; α_t represents feature expression; χ represents a discriminator function; β_t represents the hidden features; γ_t represents the state characteristics of the CNN network output.

The discriminator network is used to judge the probability that the newly generated hidden feature comes from the sample with positive reward value, so that the generator can generate the hidden feature vector with positive reward value and remember some environmental information lost due to limited sequence length, such as the control range of sports event broadcasting delay. The function uses 500K data by default, and the purpose of reading in size is to ensure that the video and audio information contained in the streaming media data can be completely analyzed, which is the later avcodec_ find_ Functions such as decoder () provide reliable guarantee. The FLV format has the advantages of small volume and fast data encapsulation. In order to keep the time information and frame sequence of audio and video from confusion, video coding and

audio coding are combined into the same thread. In the audio and video coding thread, it is first determined to enter the video coding cycle or audio coding cycle according to the time reference and current timestamp information of H.264 and AAC. The reference time is set as {264.00, where h is set as {9001}. Copy the policy parameter amplitude of the current policy network to the periodic sampling data, and calculate the advantage function to update the policy network. The policy network update method is as follows:

$$w = \varphi\left[\min\left(bc, (1-\delta)b'\right)\right] \tag{4}$$

In formula (4), w represents updating the network target; δ represents super parameter; b represents the strategic parameters of the value network; c represents the clip advantage function; b' means to limit the update range of the network. The update thread calculates according to the collected samples, and uniformly updates the network parameters of each thread agent.

2.3 Balance the Load of Relay Network Based on Wireless Network Communication Technology

In the wireless LAN environment, when the streaming end establishes a link with the server and receives streaming media data, the streaming end will wait for too long. The wireless network communication technology is used to balance the broadcasting network load and optimize the first frame delay of sports event broadcasting. The whole network is composed of multiple connection points (APS) responsible for data collection and transmission. Each sub network has its own AP, which is responsible for the collection and transmission of video data in its own process. The sub network APS are connected in a chain [5]. The data of the broadcasting system in this paper is mainly stored in the related system database and non related database credits. In order to ensure the high availability of the database and avoid the failure of single node MySQL and credits, this paper has carried out cluster deployment for both MySQL and credits. The sub network of wireless network is a star structure, and each ordinary node needs 1 hop to transmit data to AP [6]. The data transmission process can be regarded as a queuing process. It can be obtained that the average transmission delay of nodes is the queuing delay plus the service delay, which can be expressed as:

$$h_{xy} = \frac{1}{2\left(s_{xy} - g_{xy}\right)} \tag{5}$$

In formula (5), x, y represents two transmission nodes in wireless network communication; h_{xy} represents the time delay from the node to the control center; s_{xy} represents the data transmission rate; g_{xy} represents the average data generation rate.

To optimize load allocation and scheduling in wireless communication networks, it is modeled as an average delay minimization problem. Where, the objective function is averaged after summing the delay of each node in all subnetworks in the chain network, representing the average [7] of the delay of all nodes in the whole network. To achieve the goal of minimizing task response and completion time, the task life cycle is indicated. Suppose that the time point when the task request arrives is T_2, the time point when all

the video files are successfully sent to the user side is T_1, the following relationships exist:

$$T = T_1 - T_2 \tag{6}$$

In formula (6), T represents the life cycle of the task.

This means that the duration from the time the system receives the request to the time the system satisfies the request is the life cycle of the task. Since the requested content is usually based on the number of videos, within the task cycle, the sports event broadcasting system also needs to realize the process of loading the video file from the auxiliary storage device and routing and transmitting the video file. In addition, the first constraint among the constraints is the minimum allocation of resources. In order to ensure that the data queue of the node will not overflow and ensure the stability of data transmission. The second constraint is to restrict each node to use at most one channel at the same time. The third constraint is to consider the limit of the number of AP interfaces in the sub network. The cluster built in this paper contains a total of 6 nodes, 1 management node, 2 data nodes and 3 SQL nodes. For the configuration file, it should be noted that "[ndbes mgmd]" represents the configuration block of the cluster management node, "[ndbd]" represents the configuration block of the data node, "and" [mysqld] "represents the configuration block of the SQL node. "Hostname" is the IP address of the node. The fourth constraint is to consider that the number of channel allocation of sub networks in the space of mutual interference will not exceed the total number of channels that can be used, which can be determined by the equivalent interference data. The data node is mainly configured with MySQL configuration file "my. CNF". You need to specify the root directory of the data node, the path of data storage, and the IP address of the server where the cluster management node is located. In order to facilitate troubleshooting, you can store the storage log file in the specified directory. The last constraint indicates that the resources allocated to each node in a subnet should not exceed the total resources available to the subnet. The implementation process of balancing the broadcast network load based on wireless network communication technology is shown in Fig. 2.

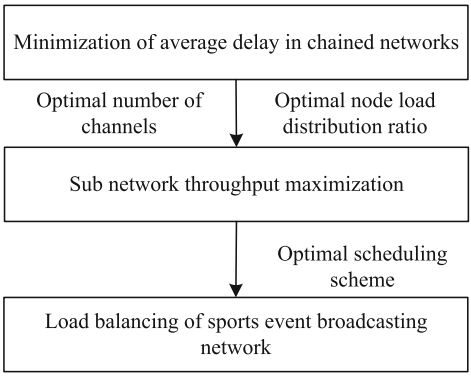

Fig. 2. Implementation process of load balancing in the broadcast network

As the number of channels in a wireless network increases, the throughput of the network increases, because the number of channels increases, the communication resources in the network increases. As can be seen when the number of nodes is small, this difference is not very big, because the communication resources in the network are enough to support the communication requirements of a small number of nodes, and when the number of nodes is large, the advantage of the number of channels will be reflected.

2.4 Optimization of Real-Time Broadcasting of Sports Events

On the basis of balancing the load of broadcasting network by using wireless network communication technology, the real-time broadcasting process of sports events is optimized. The data sending and receiving layer realizes the functions of transparent data receiving and sending and NAT circulation. The socket based on UDP is used to provide end-to-end datagram service. The processed data includes signaling messages and streaming media data. NAT traversal solves the problem that users in the subnet cannot provide P2P services. The data transceiver layer sends and receives data through sockets. In TCP/IP, sockets can be divided into streaming sockets and datagram sockets. Messages are sent in the form of HTTP requests. Typical message notifications include three types: cut-off, streaming and recording, which respectively mean that users stop pushing audio and video streams to the relay server, users start pushing audio and video streams to the relay server, and the relay server generates a new relay recording file. When the service server receives the streaming information from the relay server, it starts to record the real-time online number information of the relay. After receiving the streaming information from the relay server, the service server stops recording. The sports event broadcasting node and server adopt the datagram set over UDP protocol. The data transmission of the relay server is divided into two ways: (1) when receiving the data block sent by the relay node, select a fixed a node to send the chunk message directly; (2) Select <node, data block> pair through offer/select mechanism to send data block. Whenever the relay server receives new streaming media data from the relay node, it determines whether the data block with ID number is within the range of (106121). If so, it is required; If not, the data block is not required. The relay micro web page is connected with the back-end service through websocket. The back-end service records the contents of the table below according to the establishment and disconnection of the websocket connection of the relay micro web page. When the websocket is connected, record the basic information of the user's access, such as the user's ID, IP, UA identification, access time, websocket disconnection, including the user's active disconnection and passive disconnection, and record the user's departure time. After the relay server selects the peer nodes that need the data block, if the number of peer nodes is greater than the set value, it will randomly select a node from them to send a chunk message. The specific flow of the offselect mechanism of the relay server is shown in Fig. 3.

Parse the chunk message and read the ID number of the data block and the nodeid of the peer node. In the offer/select phase, the node selects the required data block according to the data block strategy and locks the ID of the data block. In the offer/select mechanism mentioned in the data block scheduling module, buffermaps are exchanged between nodes and peer nodes. After editing the template XML file, jasper uses jasper compile manager to compile it into binary "*. Jasper" file, and then jasper fill manager fills

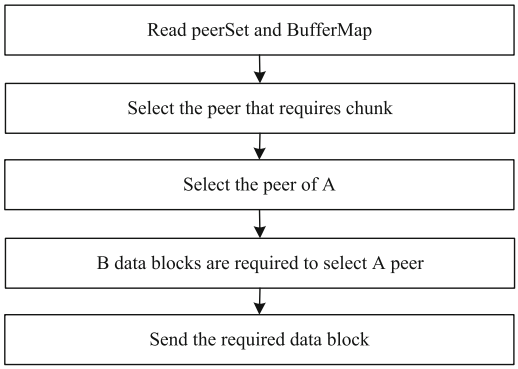

Fig. 3. The OFFER/SELECT mechanism of the broadcast server

the data source into the "*. It should be noted that the database can be either database data or Java Bean. At the same time, each node also maintains a buffermap for its peer node. Whenever an offer message is received, the node will update it. When a node periodically updates its cache, it first detects the time stamp of its neighbor. If the difference between the current time and the time stamp is greater than a fixed value, it indicates that the node has not updated data locally for a long time, it will determine the node as a failed node and delete it from the cache. Finally, you can choose to preview the report file with jasper, print the report with Jasper print manager, or directly export various forms of reports (PDF, HTML, etc.) with Jasper export manager. Such a network management method is more robust. The broadcaster collects video data through the capture device, compresses and encodes the video data in real time through the negotiated coding method, and then encapsulates the data packet in RTP format and sends it to the network. RTMP protocol is an application layer protocol. Therefore, RTMP block stream does not provide priority or similar reliability control to ensure information transmission. Therefore, it usually establishes a connection with a reliable transport layer protocol such as TCP. RTMP block stream ensures that all messages across streams can be transmitted according to the timestamp sequence. So far, the design of real-time broadcasting method of sports events based on wireless network communication technology has been completed.

3 Experimental Study

3.1 Experimental Preparation

The experimental test environment includes hardware environment and software environment. The hardware environment is mainly composed of multiple cloud servers on Tencent cloud. During the experiment, one windows device is used as streaming device, one windows device is used as standby streaming device, and two windows devices are used as streaming devices. The streaming device will be switched every once in a while. The software environment includes the main software environments in the whole system development, deployment and testing process, such as NGINX and keep alive for load balancing, Tomcat container for back-end code operation, Jenkins for continuous

integration, etc. NGINX modular architecture allows developers to freely expand the functions of web server without modifying the core. It can be mainly divided into core module (core), event module (event), protocol module (HTTP), load balancer, etc. The code of each module is encoded together with the core code of NGINX. The server with public IP 148.70.221.38 is used as the master node, and the server with public IP 148.70.115.31 is used as the backup node. One active and one standby mode is set in kept. The virtual IP is 172.27.16.11, and the virtual IP is bound to the elastic public IP 148.70.136.51. Access the public IP, and the load balancer directs the video traffic of sports events to the master node. On the built server, the configuration file NGINX to configure video on demand service. First, set the port number and data block size of the configuration file. Add the video storage location in the application VOD field, and select the video storage location in the application VOD field_ HTTP add video on demand source address. After the VOD service is configured successfully, an IDO is placed in the directory of video storage location Mp4 playback file.

3.2 Results and Analysis

PSNR is an objective evaluation of the images in the video sequence. Through the frame by frame comparison between the reference frame of the original video sequence and the distorted video sequence, the video sequence is judged on the similarity of the distorted video. Generally, the larger the value of PSNR, the better the quality of the video sequence. Taking PSNR as the evaluation index, this paper tests the PSNR of the collected and encoded video sequence to test the effect of the real-time broadcasting method of sports events using wireless network communication technology. The real-time broadcasting methods of sports events based on data mining and random strategy are selected as the comparison methods. Test the PSNR mean value of each method in different broadcasting time, and the comparison results are shown in Tables 1, 2, 3 and 4.

In the test of continuous broadcast of sports events for 1 h, the mean PSNR of the real-time broadcast method based on wireless network communication technology was 34.61, which was 6.86 and 6.34 higher than the data mining and random strategy-based broadcast methods.

In the test of continuous broadcast of sports events for 2 h, the mean PSNR of the real-time broadcast method based on wireless network communication technology was 29.44, which was 4.20 and 5.37 higher than the data mining and random strategy-based broadcast methods.

In the test of continuous broadcast of sports events for 5 h, the mean PSNR of real-time broadcast methods based on wireless network communication technology was 26.29, which was 2.61 and 4.76 higher than data mining and random strategy-based broadcast methods.

In the test of continuous broadcasting of sports events for 5 h, the average PSNR of the real-time broadcasting method of sports events based on wireless network communication technology is 24.85, which is 4.51 and 4.43 higher than that based on data mining and random strategy. According to the above experimental test results, the video sequence output by the real-time broadcasting method of sports events using wireless network communication technology is less distorted, the output picture is stable, and the

Table 1. Comparison of PSNR for 1 h

Test times	The real-time broadcast method of sports events based on wireless network communication technology	The real-time broadcast method of sports events based on data mining	The real-time broadcasting method of sports events based on stochastic strategy
1	33.47	29.63	29.08
2	34.54	28.83	28.75
3	35.65	27.44	27.86
4	33.28	26.07	29.22
5	34.86	26.88	28.53
6	35.93	28.55	26.35
7	33.62	27.28	27.67
8	35.35	29.37	28.94
9	34.09	25.94	28.81
10	35.26	27.51	27.52

Table 2. Comparison of PSNR for 2 h

Test times	The real-time broadcast method of sports events based on wireless network communication technology	The real-time broadcast method of sports events based on data mining	The real-time broadcasting method of sports events based on stochastic strategy
1	29.47	24.66	23.74
2	30.87	25.88	24.88
3	28.56	26.77	25.66
4	29.34	25.14	23.33
5	28.55	24.01	24.40
6	29.22	24.29	23.32
7	28.71	25.79	24.34
8	29.84	25.49	23.78
9	29.63	25.85	23.45
10	30.25	24.52	23.84

broadcasting picture quality is improved to a certain extent, which can enable users to easily receive the high-definition real-time broadcasting picture of sports events. This is because this paper uses wireless network communication technology to divide audio and

Table 3. Comparison of PSNR for 3 h

Test times	The real-time broadcast method of sports events based on wireless network communication technology	The real-time broadcast method of sports events based on data mining	The real-time broadcasting method of sports events based on stochastic strategy
1	26.19	23.78	20.42
2	25.07	24.89	21.58
3	26.51	23.56	22.74
4	25.85	23.50	20.57
5	27.62	22.23	22.66
6	26.33	23.47	21.23
7	26.92	24.14	22.85
8	26.25	23.28	20.69
9	25.76	24.58	22.35
10	26.44	23.35	20.24

Table 4. Comparison of PSNR for 4 h

Test times	The real-time broadcast method of sports events based on wireless network communication technology	The real-time broadcast method of sports events based on data mining	The real-time broadcasting method of sports events based on stochastic strategy
1	25.73	18.46	20.40
2	24.87	19.88	20.72
3	24.92	20.65	19.89
4	25.65	19.22	19.65
5	25.20	20.59	18.37
6	24.01	20.38	21.44
7	23.50	21.06	22.43
8	24.57	20.46	21.16
9	25.74	21.73	21.85
10	24.28	20.97	18.29

video decoding and coding into two independent threads to work in parallel, so that the frame rate reaches the high-definition standard and improves the stability of the video image encoding and decoding process. Gann's model is used to improve the conversion

rate. The wireless network communication technology is used to allocate the number of channels in the space of mutual interference and balance the load of the relay network, so as to improve the PSNR, reduce the distortion of video sequences and enhance the overall transmission image quality.

4 Conclusion

The development of real-time broadcasting technology of sports events not only enriches people's cultural life, but also plays an important role in some special occasions. However, with the large-scale application of broadcasting system, some deficiencies in its implementation are gradually revealed. This paper presents a real-time broadcasting method of sports events by using wireless network communication technology. After the test, the picture quality of sports event broadcasting has been improved to a certain extent. Due to the large number of users watching sports events and the complex broadcasting business scenario, it is difficult to formulate a unified user Qoe model that meets various requirements. However, the current research on broadcasting methods mostly aims at maximizing user QoE. Therefore, when the rate adaptive algorithm is trained, whether it can adapt to new business scenarios or meet the needs of new user groups needs further research and verification. This paper only completes the real-time broadcasting under the windows platform. However, in the field of mobile devices, it is still necessary to transplant and improve the video broadcasting system, such as dynamically reducing the real-time streaming media frame rate and improving the image quality in the 5g network environment.

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