Alexandria Engineering Journal (2022) 61, 81–90

HOSTED BY

Alexandria University

Alexandria Engineering Journal

www.elsevier.com/locate/aej
www.sciencedirect.com

Application of DASH client optimization and artificial intelligence in the management and operation of big data tourism hotels

Nan Wang

School of Economic and Trade, Henan University of Engineering, Zhengzhou 451191, China

Received 22 February 2021; revised 15 April 2021; accepted 26 April 2021
Available online 05 June 2021

KEYWORDS

DASH client optimization;
Artificial intelligence;
Big data;
Hotel operations

Abstract The hotel uses modern information technology to establish a customer data group, which contains information about the customer's information on space configuration, color design, etc., and uses scientific operation methods to accelerate the rapid, transformation and upgrading of the hotel. The rapid development of information technology represented by the big intelligent mobile cloud has a lot of functions, can meet the needs of different customers and diversified characteristics at the same time, and provides a complete, stable and accurate information integration platform for hotel system management. The main research directions of DASH include client adaptive algorithm design, multi-client fairness and resource utilization issues, client improvement under multiple servers, and server load balancing. The development and application of scientific and technological information has broken through the development path of the hotel management system, providing new development space and opportunities for the improvement of the hotel management system, but at the same time it will also face more new challenges. Therefore, this article focuses on the characteristics of the tourism accommodation management system under the big data environment, and analyzes the development of the hotel management system under the network environment. The purpose is to provide some reference and reference significance.

1. Introduction

With the development of society and the great progress of scientific and technological information, the management methods of various industries have undergone great changes. Subsequently, hotel operations should also keep pace with the times, gradually adapt to the various needs of the public and make similar changes. The rapid progress and widespread use of information technology has accelerated the further improvement of hotel operations to a certain extent. The hotel uses modern information technology to establish a customer data group, which contains information about the customer's information on space configuration, color design, etc., and uses scientific operation methods to accelerate the rapid, transformation and upgrading of the hotel. The rapid change of the Internet has had a huge impact on traditional industries. In the

E-mail address: wangyushuo2016@tom.com

Peer review under responsibility of Faculty of Engineering, Alexandria University.

https://doi.org/10.1016/j.aej.2021.04.080

hotel operation, if the original hotel operation system is still used, it is easy to achieve the goal. So far, the information technology represented by the big intelligent mobile cloud has developed by leaps and bounds. It has a lot of functions and can simultaneously meet the needs of different customers and diversified features, providing a complete, stable and accurate information integration platform for hotel system management. On the one hand, the hotel operation system under the Internet context captures the needs and preferences of customers through analysis and calculation of big data, completes accurate sales and targeted recommendations; on the other hand, it further simplifies the payment process and provides people with more comfort Travel services. In addition, information technology can help hotel managers formulate corresponding solutions to improve the efficiency of hotel operations. Secondly, the mobile Internet is very popular. As mobile Internet technology becomes more and more advanced, the hotel operation system must not only meet the diverse requirements of many customers at the same time, but also create a new path for the development of the hotel industry and complete the coordinated development of online and offline. Finally, the development of artificial intelligence technology has promoted the creation of hotel operation systems. Intelligent management has developed into the development direction of a famous hotel operation, and it is also a new function that the original hotel operation system does not currently have.

2. Related work

With the continuous deepening of artificial intelligence technology, although the application of artificial intelligence in the hotel industry is still in its initial stage, the hotel industry is using artificial intelligence technology to improve service quality and accelerate operational efficiency. The literature [1] believes that in the process of implementing management and control, while actively guiding the development of the enterprise, it is necessary to pay attention to guiding the implementation process, the progress of the strategy implementation and solving the implementation obstacles; the view [2]] is scientific and fair Competitive strategy is the prerequisite for the hotel to survive and continue to develop; the literature [3] analyzes the choice and implementation of the three basic strategies of the hotel; the literature [4] believes that the staff training system is imperfect, and the communication between senior and lower managers Insufficiency makes it difficult to implement the strategy of competition among enterprises. Document [5] records that the improvement of the hotel's strategic environment requires on the one hand to strengthen the cultural skills of hotel managers and improve their job opportunities; on the other hand, the managers should also strengthen the actual management of the hotel and fully understand consumer consumption. In order to maximize the use of the hotel's equipment, improve the hotel's service capabilities, and gain market recognition; the document [6] records that consumer needs should be given priority in the development of the hotel's operations. When guests arrive, they must be equipped with highly qualified label staff. Such employees need the hotel to give special training, so that customers can experience the hotel's cultural traditions in the service, and confirm the hotel's popularity and strength. In addition, literature [7] suggests that other consumers also develop similar services based on their own systems, so that customers can achieve high satisfaction, such as eating and living, so as to develop personalized operating plans according to their needs; literature [8]. The record points out that based on its own situation, formulate long-term hotel development plans, formulate development strategies, study hotel management in detail, compare the development status of different hotels horizontally, conduct self-analysis and inspections fairly and scientifically, recognize development opportunities, and analyze internal and external conditions, Take certain measures to supplement the strategy; Document [8] records that business hotels should consider the co-construction of services and fire protection. It is not only necessary to improve the hotel's hardware equipment, such as the collocation of advanced leisure facilities in the guest rooms, but also to provide customers with the same star-rated services, such as providing catering according to the hotel's star ratings, so that customers are satisfied; the document [9] records that domestic Business hotels basically follow the operating models of international hotels. Although these models are relatively complete and mature, it is difficult to show the unique culture of the hotel and lower the competitiveness of enterprises. In order to coordinate streaming media transmission standards, DASH was born under this background, which has attracted great attention from the industry and academia. Literature [10] believes that the main research directions of current DASH include client adaptive algorithm design, multi-client fairness and resource utilization issues, client improvement under multiple servers, and server load balancing. Literature [11] designed a client bit rate adaptive algorithm based on unstable network buffer length and limited client buffer length. Literature [12] believes that the algorithm mainly divides the buffer into different levels, and then scales the bandwidth. This ratio changes at any time. For the bandwidth winding problem, the algorithm uses sliding window technology to solve. In fact, the algorithm designed in this paper is to select a code rate level between high and low bandwidth by limiting the rise and fall time of the buffer to ensure the smoothness of the code rate level. The document [13] recorded the problems of video changes and playback interruption during the playback of the sprint video of the information center network, and proposed an algorithm for adaptively selecting the bit rate of the information center network, because the information center network has the characteristics of caching, which is also Cause the above problems. Literature [14] believes that algorithms that improve user viewing experience can ensure the smoothness of client video playback and at the same time increase the video bit rate. Finally, the experiment proves that the performance of the algorithm in video flight is significantly better than the traditional algorithm. This algorithm can only be used in ICN networks, which is also the disadvantage of this algorithm and lacks compatibility. Literature [15] proposed a new video speed control algorithm, which has an adaptive delay response to network load and a sensitivity width algorithm to short-term bandwidth. The video time buffer of the client is used as a feedback signal to control the bit rate select. This experiment proves that the algorithm is effective and robust in the actual network environment. Literature [16] provides its own bit rate adaptive algorithm based on client buffer and current network bandwidth on the client.

3. Design of a tourism hotel management system based on DASH client optimization technology

3.1. DASH working principle

The service status of the DASH system is very similar to the system application, both of which implement the service process of the interaction between the server and the client. Fig. 1 shows how the dashboard works. On the left is the HTTP server, and on the right is the DASH client. Both are connected via the Internet.

The entire service process is: First, the client sends a request to the server, and the client is connected to the server through the TCP three-way handshake. Second, the client sends an httpget request to the server to save the MPD media file on the server, and the server sends the MPD file to the client after receiving the request [17]. According to the current network conditions, the client uses its own set of adaptive logic to determine the encoding of the video clip to be requested at the next moment, and stores the URL information according to the given file in the MPD file video clip, and sends it to the server at the specified bit rate Make a request. After receiving the video segmentation request, the server should provide the client with the video segmentation at the required bit rate. When the client receives a video clip, it starts decoding and playing. At this time, a video clip service is completed.

3.2. DASH system framework based on SDN

3.2.1. System framework

This article points out an improved structure of an SDN-based DASH system, as shown in Fig. 2.

Fig. 3 shows the framework of the DASH video delivery model, which mainly includes five aspects: client, switch, controller, proxy server and video server. The client initiates a video request. The difference is that, before connecting to the video server, the client first plans to request segmentation with the web server [18]. The web server makes a decision

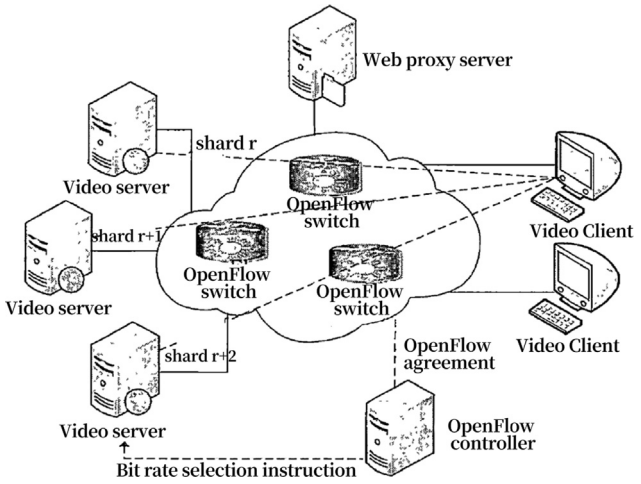

Fig. 2 SDN-based DASH system framework.

based on the current bandwidth situation. Decide how many fragmentation requests the client should initiate this time and which servers to request. The client makes adaptive bit rate decisions based on the obtained decision data; the switch mainly provides the data transmission function on the data plan; the proxy server is responsible for status monitoring, fragmentation planning, data transmission, etc. When the client initiates a video request, the request is particularly Including the requested target server and the requested server number on the web server, the status monitoring module and the shardplanning module perform cutting operations and request allocation; OpenFlow is responsible for the management and control system, and also completes the monitoring of the DASH service flow, and assigns DASH users Access events are reported to the resource and decision server.

3.2.2. Video fragmentation scheduling strategy

The multi-server request status is: a client sends multiple video clip requests to multiple servers at a point in time, and the

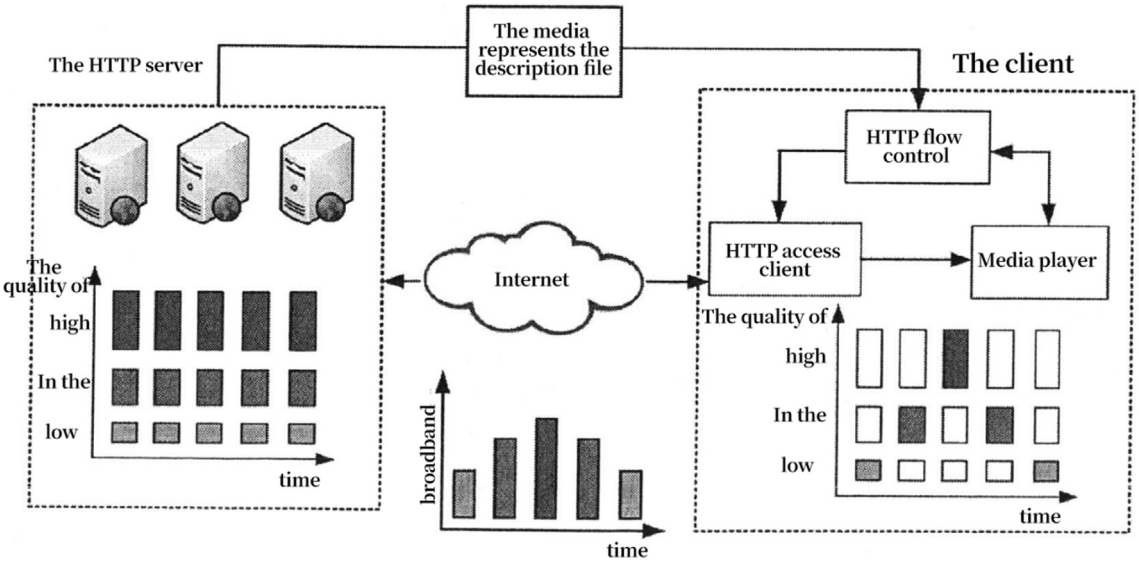

Fig. 1 DASH system working principle diagram.

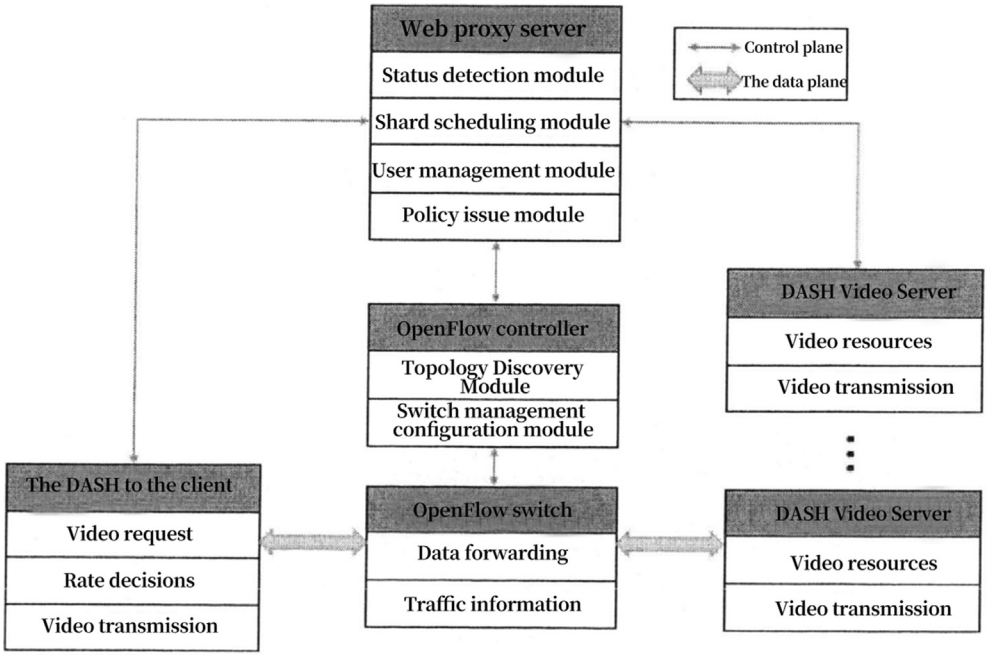

Fig. 3 DASH video transmission model.

request allocated by the server is positively correlated with the bandwidth, which can ensure the simultaneous execution of multiple servers. However, as time changes, bandwidth also changes, and during the scheduled synchronization time, every segment of the same video block may not be downloaded. The symbols and descriptions defined by the number of servers and the length of the video block are shown in Table 1.

Suppose there are S servers storing the video requested by the client, the available bandwidth of the i-th server is cl, in descending order:

$$c_1 \geq c_2 \geq \cdots \geq c_s \tag{1}$$

Sk represents the number of servers used to request the k-th video, of course:

$$S_k \leq S \tag{2}$$

The number of disks included in the k-th video is designated as Nk. If the number of fragments required by the i-th server is nl, the number of fragments requested by the Sk-th server is allowed:

$$n_{S_k} = 1 \tag{3}$$

Number of fragments requested by other servers:

$$n_I = \lfloor c_I / c_{S_k} \rfloor \tag{4}$$

Table 1 The number of servers and video block length issues special definitions.

Symbol	Description
S	Total number of servers
ci	Available bandwidth of I servers
Sk	Number of servers used for the k-th video
Nk	The number of slices of the k-th video
nl	The number of shards from the i-th server
Nmax	Video block length upper threshold

The total number of fragments requested is:

$$N_k = \sum_{i=1}^{S_k} n_i \tag{5}$$

Get the available bandwidth settings for each server at the beginning:

$$\{c_1, c_2, \cdots, c_s\} \tag{6}$$

And initialize the number of servers used in this request to S. If A is the service allocation matrix, then the size is:

$$N_k \times S_k \tag{7}$$

The above problem is reduced to a limited optimization problem. The goal of optimization is to minimize the download time of the disk. The decision variable is the allocation matrix A. The constraints include:

(1) Each disk is only downloaded from one server, which is:

$$\sum_{j=1}^{S_k} a_{ij} = 1 \tag{8}$$

(2) Server allocation matrix A is 0–1 matrix, which is:

$$a_{ij} \in \{0, 1\} \tag{9}$$

(3) The end of the download of the previous paragraph is earlier than the end of the download of the next paragraph, which is:

$$\mathrm{t}(n) < \mathrm{t}(n+1) \tag{10}$$

In short, the allocation matrix A is a decision variable, and a video clip request planning model is established:

$$\text{obj}: \min\left\{ \begin{array}{c} max \\ 1 \le j \le S_k \end{array} \sum_{i=1}^{N_k} a_{ij} \frac{b_k \cdot \tau}{c_j} \right\} \tag{11}$$

The purpose output is:

$$\begin{array}{l} \sum_{j=1}^{S_k} a_{ij} = 1, i = 1, 2, \cdots N_k \\ a_{ij} \in \{0, 1\}, i = 1, 2, \cdots N_k, j = 1, 2, \cdots S_k \end{array} \tag{12}$$

$$\mathrm{t}(n) < \mathrm{t}(n+1), n = 1, 2, \cdots, N_k - 1 \tag{13}$$

$$\mathrm{t}(n) = \frac{\sum_{i=1}^{S_k} \left(a_{nj} \cdot \sum_{i=1}^{n} a_{ij}\right)_{b_k \cdot \tau}}{\sum_{i=1}^{S_k} a_{nj} c_j} \tag{14}$$

The optimization problem is an NP-hard problem and cannot be solved directly by convex optimization theory. This article provides a heuristic algorithm. When solving, use a greedy algorithm to solve matrix A row by row, and then redistribute the solved fragments to each server. The specific solution is:

Step 1) At the beginning of the algorithm, it is necessary to obtain the output of algorithm 1, that is, the length of the video block N and the number of servers S, and use them as the input of the algorithm, and the available bandwidth c of the server as the input of the algorithm:

$$\mathrm{c} = \left\{c_1, c_2, \cdots., c_{s_\lambda}\right\} \tag{15}$$

Step 2) Initialize the disk allocation matrix A = 0, and start to allocate N video disks.

Step 3) For each video segment:

$$\mathrm{i} = [1, N_k] \tag{16}$$

Recalculate the download time of each server segment:

$$\mathrm{t} = \left\{t_1, t_2, \cdots., t_{s_\lambda}\right\} \tag{17}$$

Calculate the download time of the first i-1 allocated video clip on each server:

$$\mathrm{t}' = \left\{t'_1, t'_2, \cdots., t'_{s_k}\right\} \tag{18}$$

Add these two times together, and assign the section to the server with the smallest total download end time t + t.

Step 4) When N video segments are allocated, return to matrix A.

3.3. Client algorithm based on Q learning

The client uses the Q learning algorithm in reinforcement learning as an adaptive algorithm. The goal of reinforcement learning agents is to learn how to map from environmental states to optimal behaviors. Reinforcement learning provides environmental reinforcement signals, which are an evaluation of the quality of behavior produced by the agent. Fig. 4 is a model of reinforcement learning.

When the agent interacts with the environment, it will happen multiple times: 1) the agent reaches the current state s; 2) the agent selects the current state according to the current state s and the improved signal value: the optimal behavior under a; 3) informs the agent to perform action a Later, when the environment changes, the agent moves from state s to a new state s′, and corresponds to the improved signal value r; 4) returns the improved signal r to the agent.

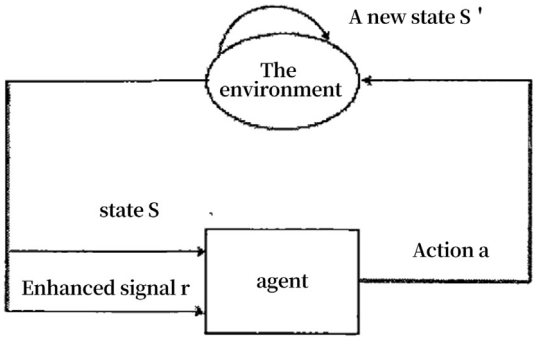

Fig. 4 Reinforcement learning model.

Since the agent needs to consider the long life cycle of the target and the unclearness of the model when choosing behavior, a value function is constructed between the strategy and the reward function to help the agent choose the strategy.

(1) Strategy. Strategy describes the actions of the agent at a given time. The focus of reinforcement learning is the strategy that directly determines agent behavior. The concept of strategy is: the way the agent determines the action when interacting with the environment:

$$\pi : S \times A \rightarrow [0, 1] \tag{19}$$

Si is the mode range, A is the action range, and P(S, A) represents the probability of determining action A in the mode.

(2) Reward function. The reward function describes the goal of authorized learning, maps the perceived environmental conditions into reinforcement signals, and provides an assessment of the quality of behavior [19]. In general, the reinforcement signal is the ratio of a positive number representing a reward to a negative number representing a penalty. The purpose of reinforcement learning is to maximize the total return value.

(3) Value function. The payment function is a "short-sighted" signal, which represents the current good situation. The value function is a kind of "foresight" signal. Reward is an immediate evaluation given by the environment after the subject implements a specific behavior, and the value function is the accumulation of rewards corresponding to several subsequent states [20]. Therefore, when choosing an action, the decision is usually based on a value function.

(4) Environmental model. The environment model is not a necessary content for intensive learning, it is optional. The ability to simulate environmental behavior.

Commonly used reinforcement learning algorithms include montecarlo algorithm, differential algorithm, Q learning algorithm and SARS algorithm. The client category in this article uses the Q learning algorithm. The Q learning algorithm is a dynamic programming method based on numerical iteration. Therefore, the algorithm has the function of calculating the state-action pair quality:

$$Q : S \times A \rightarrow R \tag{20}$$

In Q learning, through interaction with the environment, knowledge about rewards and environmental status is obtained. The Q function is used to measure the quality of the agent's conditions and behavior. The specific formula is:

$$Q(s,a) = (1-\alpha)Q(s,a) + \alpha[r + \gamma maxQ(s',a')] \tag{21}$$

The specific flow of Q learning algorithm is shown in Fig. 5.

In the above figure, the event is the number of learning, and the step is the learning process. First, randomize the Q value table to 0, initialize the event to 1, and then evaluate whether the event is greater than the maximum learning time. If it is, then the procedure ends [21]. The second is to select actions based on the Q value, and then determine whether s is the final state, and if s is the final state, increase the value of the set by 1. In environmental learning, the Q value gradually shrinks and finally reaches the best value.

3.4. Rate adaptive algorithm based on Q learning

The reward function describes the purpose of the authorized learning problem. It reflects various conditions (state behavior) it feels to the reward value r, and evaluates the quality of the behavior. Negative numbers indicate penalties, and positive numbers indicate rewards. The purpose of this article is to maximize QoE. Therefore, the reward function is a QoE target, which includes three aspects: ① video level; ② video quality swing; ③ buffered stream. For the corresponding return function, there is a similar linear correlation between the objective PSNR value and the subjective average sentence nucleus (MOS). Therefore, a reward function corresponding to the video quality is created:

$$R_{quality} = -(QL_L - QL_i) \tag{22}$$

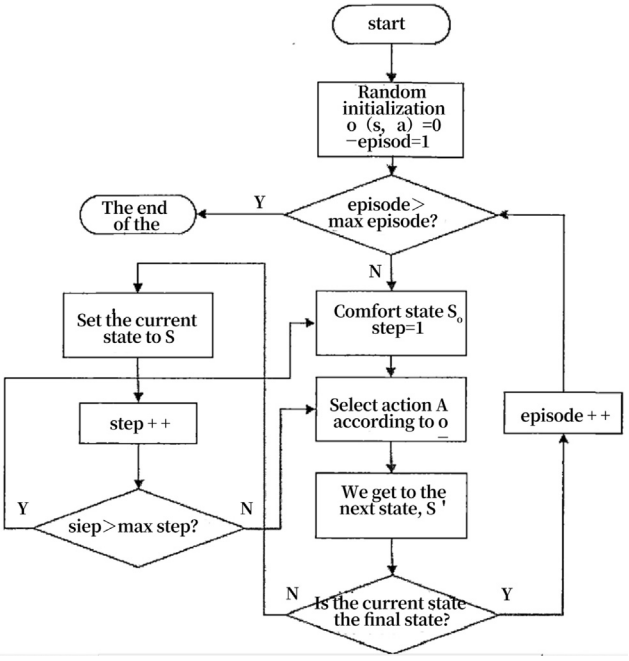

Fig. 5 Q learning algorithm flowchart.

Due to changes in the bandwidth of the DASH system, the desired video quality level changes accordingly, causing changes in video quality and affecting user experience. Create a regression function corresponding to quality fluctuations:

$$R_{oscillation} = -|QL_{i+1} - QL_i| \tag{23}$$

The interruption of video playback caused by the buffered stream is a third party that affects QoE, so the buffered stream has also become an important aspect of the reward function. When the client buffer is exhausted, the video playback is interrupted and a rejection event occurs [22]. Reward function, this article considers the division of the reward function corresponding to the buffer stream according to the buffer size:

$$R_{buffer} = \begin{cases} -100; B_i \le 0.1B_{max} \\ -(B_{max} - B_i); B_i > 0.1B_{max} \end{cases} \tag{24}$$

The final reward function is a linear superposition of the three:

$$R = C_1 R_{quality} + C_2 R_{oscillation} + C_3 R_{buffer} \tag{25}$$

This article is about buffer decryption. Table 2 shows the relative relationship between quality level and video bit speed.

The following formula provides the Q learning media function, that is, the Q function. The value function is a "long-term" signal. From a long-term perspective, the pros and cons of various conditions are considered to ensure that the client can achieve a satisfactory experience in the process of bit rate changes [23]. The value function maintains the speed decision matrix Q, which is an SxA matrix composed of patterns and action sets. The bit rate decision matrix Q will also be transformed according to the Q function. The finally learned bit rate decision matrix Q can maximize the customer experience:

$$Q(s,a) = (1-\alpha)Q(s,a) + \alpha[R + \gamma maxQ(s',a')] \tag{26}$$

3.5. Experimental simulation and analysis

The test conditions in this article are shown in Table 3.

This article uses real server bandwidth simulation. Aiming at the problem that the actual collected server bandwidth does not match the video bit rate specified in this article, the actual data is compressed.

3.5.1. Average video quality

We encode the code rate level from low to high, starting from 1, there are seven levels. Statistics of expected video quality levels under different bandwidths, the average quality comparison results are shown in Table 4. The first row in the table

Table 2 Correspondence table of quality level and video bit rate.

Quality level	Video bitrate
1	400kbps
2	500kbps
3	700kbps
4	900kbps
5	1300kbps
6	1600kbps
7	1900kbps

Table 3 Software and hardware list.

Project	Parameter
Experimental host	Intlcorei3.8G RAM
operating system	Winedows8 Professional Edition
Sharding scheduling environment	MatlbR2015b under Winedows8
Q-leamg algorithm environment	Virtual machine Ubunt14.06LTS
Q-learing algorithm language	Python2.8

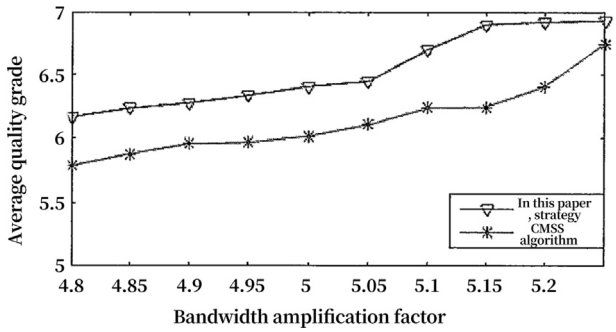

Fig. 6 Statistics of average video quality levels of each strategy under different bandwidth magnifications.

shows the size of the server bandwidth, and the remaining rows correspond to the experimental results under different strategies. In addition, Fig. 6 is a graph showing the average video quality of each strategy under different bandwidth sizes.

The strategy in this article can obtain excellent video quality under the server bandwidth multiplier. When the network scale is 5.16, the network status can meet the needs, and the video quality level obtained under this strategy is close to 7.

3.5.2. Number of quality fluctuations

Video requests are made in different bandwidths, and the number of video quality changes realized by the client is counted. The average quality comparison results are shown in Table 5. The first row in the table shows the size of the server bandwidth, and the remaining rows correspond to the number of video quality changes under different strategies. In addition, Fig. 7 is a graph corresponding to the number of video quality changes of each strategy under different bandwidth sizes.

As the bandwidth continues to increase, the network status continues to improve, and the number of quality fluctuations in these algorithms is also decreasing. Therefore, the bit rate achieved by the client is smoother. However, in the strategy proposed in this article, the amount of video quality changes is smaller. The strategy in this article is based on the video block as the planning unit, without fluctuations. The CMSS algorithm uses video segments as the planning unit, causing different video segments to select only the highest possible bit rate, reducing the bit rate variation between segments [24]. As the bandwidth enhancement factor increases, the distance between the two curves decreases. This is because when the bandwidth factor increases, the network status gradually improves. According to CMSS, each server has better service functions. Therefore, when choosing a video bit rate, you can select the video with the highest bit rate among the set bit rates, so that the number of quality results will be quickly reduced.

3.5.3. Instability

When requesting videos of different bandwidths, evaluate the video quality of the client and calculate the instability according to the formula. The details are shown in Table 6. The first row in the table shows the size of the server bandwidth, and the remaining rows correspond to the instability values under different strategies. In addition, Fig. 8 is a graph of the instability of each strategy under different bandwidth sizes.

When the service bandwidth expands, the instability of these algorithms also gradually shows a downward trend. When the bandwidth is equal to 5.26, the instabilities of these algorithms are roughly the same. This is because when the bandwidth is doubled, network conditions are gradually improving, and the client can achieve a relatively high video bit rate, and because the bandwidth is high enough, the bit rate change rate is reduced, thereby expanding the stable performance of the client. At this time, the strategy contained in this article has significant characteristics in the following aspects: stable performance [25]. This is because the strategy of this article is to use the video block as the planning unit to ensure that the quality of the video block is exactly the same and will not fluctuate.

4. Tourism and hotel management and operation development strategies based on artificial intelligence technology in big data environment

4.1. Competitive strategic choices of tourist hotels under the background of artificial intelligence

4.1.1. Upgrade hardware and strengthen technical support

Now, the hotel finance department is a department with a high demand for labor, and human resources are used to control daytime income and operations. The advantage of artificial intelligence is that it can learn from itself and complete a large amount of repetitive and standardized data work. The addition of artificial intelligence technology can greatly reduce the audit tasks of the financial department, thereby eliminating economic loopholes caused by human factors and repeated mechanical audit work.

Table 4 Average quality level statistics table under different bandwidth multiples.

Bandwidth magnification	4.81	4.86	4.91	4.96	5.01	5.06	5.11	5.16	5.21	5.26
This article strategy	6.18	6.25	6.29	6.35	6.42	6.46	6.71	6.91	6.92	6.92
CMSS algorithm	5.78	5.89	5.97	5.98	6.03	6.12	6.25	6.27	6.42	6.76

Table 5 Statistical table of the number of quality level fluctuations under different bandwidth magnifications.

Bandwidth magnification	4.81	4.86	4.91	4.96	5.01	5.06	5.11	5.16	5.21	5.26
This article strategy	38	36	32	27	23	18	19	18	17	16
CMSS algorithm	49	45	39	36	28	28	25	23	21	18

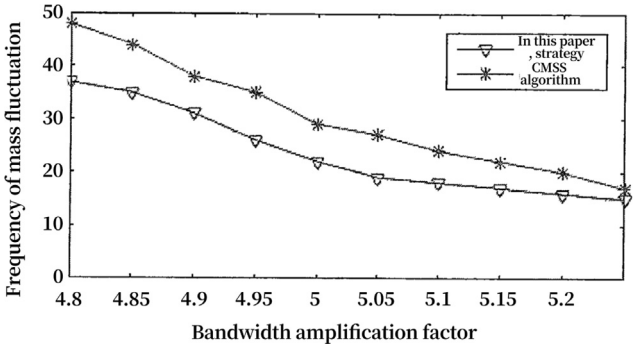

Fig. 7 Statistical graph of the number of fluctuations in the quality level of each strategy under different bandwidth magnifications.

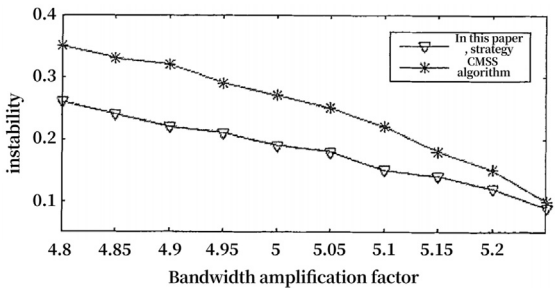

Fig. 8 The instability fluctuation diagram of each strategy under different bandwidth magnifications.

4.1.2. Establish a smart procurement system

In recent years, many hotels have formed scale through mergers and acquisitions, but with the expansion of the scope, they will also face three major problems: First, the number of supply-side resources continues to increase, and the types of tenders continue to increase; second, multiple purchases continue to decline; Third, in bidding and procurement, the horizontal coordination efficiency with different departments is low, leading to an increase in the demand for cost reduction, improving efficiency and risk control.

4.1.3. Hotel brand building incorporates technological elements

The intermediate process of building the image of fire protection is brand reputation, which is a link after the positioning of fire protection, which also has a great influence on fire protection publicity. Therefore, advanced service facilities can maintain the hotel's commercial and technical image, which is more conducive to fire protection and the development of the hotel. In addition to the severity of services, the soft power of the hotel must also be gradually improved.

4.1.4. Use cloud technology to improve hotel customer database

In the wave of artificial intelligence, business managers' attention to artificial intelligence technology strategies must shift from "whether to implement artificial intelligence" to "how to build or implement artificial intelligence." The shift of its focus will examine the three pillars of artificial intelligence-massive amounts of data, computer power and artificial intelligence algorithms. You need the ability to analyze the computer. Improving computer capabilities is a necessary condition for the current development of artificial intelligence technology. In the iterative process of future computer technology development, high computer capabilities have become very popular. The details are shown in Fig. 9.

4.2. The development trend of tourism hotel management and operation

4.2.1. Intelligent management system

By using more information technology, the management system will be more intelligent. From the most basic functions to more intelligent functions. Use artificial intelligence technology and massive information in big data to find customer

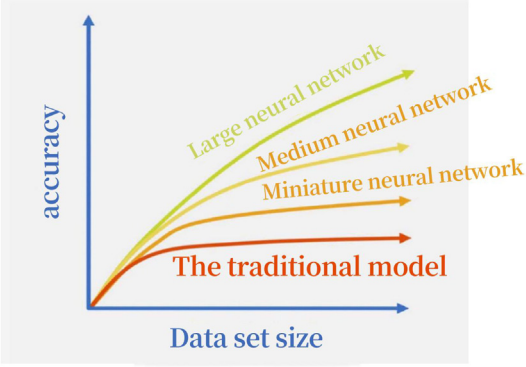

Fig. 9 The larger the data set used for training and the better the quality, the more A worker application will benefit.

Table 6 Instability statistics table under different bandwidth magnifications.

Bandwidth magnification	4.81	4.86	4.91	4.96	5.01	5.06	5.11	5.16	5.21	5.26
This article strategy	0.27	0.25	0.23	0.22	O.18	0.19	0.16	0.15	0.13	0.08
CMSS algorithm	0.36	0.34	0.33	0.28	0.28	0.26	0.23	0.19	0.16	0.11

requirements and consumer preferences, use cloud computing technology to accurately determine customer personalized requirements, and improve hotel management functions.

4.2.2. Transition from traditional functions to innovative functions

The rapid progress of the Internet has transformed the hotel operating system from original functions into innovative functions. It will not only gradually realize the functions of the traditional system, but also develop more and more innovative functions. Therefore, the hotel operating system must not only meet the requirements of offline management, but also fully integrate the requirements of online management to promote the conversion of functions of the hotel operating system according to customer preferences.

4.2.3. Pay more attention to customer privacy protection functions

In the Internet, various fields are undergoing technological changes to provide stronger technological support for privacy and customer confidentiality. The Internet era has promoted some improvements in hotel operations and modern hotel management. Therefore, the hotel operating system should make full use of Internet technology information, provide independent residence and check-out procedures, and store customer information through the Internet system to ensure the security of customer information.

4.2.4. Improve the comprehensive literacy of managers

In the network environment, improve the overall quality of hotel staff, provide guests with better services, and promote the computerization of the hotel operating system. Therefore, hotels should prepare scientific training plans in advance to improve managers' comprehensive reading ability and improve the technological design of hotel management systems. In addition, recruit professional management personnel to increase the level of use of the hotel management system and promote the development of the hotel management system in the direction of standardization, informatization and scientification.

5. Conclusion

The development and application of scientific and technological information has broken through the development path of the hotel management system, providing new development space and opportunities for the improvement of the hotel management system, but at the same time it will also face more new challenges. Therefore, this article focuses on the characteristics of the tourism accommodation management system under the big data environment, and analyzes the development of the hotel management system under the network environment. The purpose is to provide some reference and reference significance.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] C. Szegedy, W. Liu, Y. Jia, et al., Going deeper with convolutions, in: Proceedings of the IEEE conference on computer vision and pattern recognition, 2015, 1–9.

[2] L. Wang, Y. Xiong, Z. Wang, Y. Qiao, Towards good practices for very deep two-stream convnets. arXiv preprint, 2015, 1507-1559.

[3] X. Peng, L. Wang, X. Wang, Y. Qiao, Bag of visual words and fusion methods for action recognition: comprehensive study and good practice, CoRR (2014) 1405–1506.

[4] J. Donahue, J. Hendricks, M. Rohrbach, et al, Long-term recurrent convolutional networks for visual recognition and description, IEEE Trans. Pattern Anal. Mach. Intell 39 (2015) 677–691.

[5] J.Y.-H. Ng, M. Hausknecht, S. Vijayanarasimhan, et al., Beyond short snippets: Deep networks for video classification, in: Proceedings of the IEEE conference on computer vision and pattern recognition, 2015, 4694–4702.

[6] D. Tran, J. Ray, Z. Shou, et al., ConvNet architecture search for spatiotemporal feature learning. arXiv, 2017, 1708-1738.

[7] D. Tran, L. Bourdev, R. Fergus, et al., Learning spatiotemporal features with 3D convolutional networks, in: Proceedings of the IEEE international conference on computer vision, Venice, Italy, 22–29 October (2017), 4489–4497.

[8] Y. Li, W. Li, V. Mahadevan, et al., Encoding dynamics of deep features for action recognition, in: Proceedings of the IEEE conference on computer vision and pattern recognition, Las Vegas, NV, USA, 26 June–1 July (2016), 1951–1960.

[9] M. Martina, G. Masera, M.R. Roch, G. Piccinini, Result-based distributed-arithmetic-based filter architectures for approximately computing the DWT, IEEE Trans. Circ. Syst. I Regul. Pap 62 (8) (2015) 2103–2113.

[10] M.S. Prakash, R.A. Shaik, Low-area and high-throughput architecture for an adaptive filter using distributed arithmetic, IEEE Trans. Circ. Syst. II Express Briefs 60 (11) (2013) 781–785.

[11] M.A. Qureshi, M. Deriche, A new wavelet based efficient image compression algorithm using compressive sensing, Multimed. Tools Appl 75 (12) (2016) 6737–6754.

[12] Y. Lee, K. Hirakawa, T.Q. Nguyen, Camera-aware multi-resolution analysis for raw image sensor data compression, IEEE Trans. Image Process 27 (6) (2018) 2806–2817.

[13] Vinu Sundararaj, Optimal task assignment in mobile cloud computing by queue based ant-bee algorithm, Wirel. Pers. Commun 104 (1) (2019) 173–197.

[14] V. Sundararaj, Selvi. Muthukumar, R.S. Kumar, An optimal cluster formation based energy efficient dynamic scheduling hybrid MAC protocol for heavy traffic load in wireless sensor networks. Comput. Secur 77 (2018), 277–288.

[15] S. Vinu, An efficient threshold prediction scheme for wavelet based ECG signal noise reduction using variable step size firefly algorithm, Int. J. Intell. Eng. Syst 9 (3) (2016) 117–126.

[16] M.R. Rejeesh, Interest point based face recognition using adaptive neuro fuzzy inference system, Multimed. Tools Appl. 78 (16) (2019) 22691–22710.

[17] V. Sundararaj, Optimised denoising scheme via opposition-based self-adaptive learning PSO algorithm for wavelet-based ECG signal noise reduction, Int. J. Biomed. Eng. Technol 31 (4) (2019) 325.

[18] V. Geetha, V. Anbumani, S. Sasikala, L. Murali, Efficient hybrid multi-level matching with diverse set of features for image retrieval, Soft Comput. 24 (16) (2020) 12267–12288.

[19] V. Sundararaj, V. Anoop, P. Dixit, et al, Cauchy preferential crossover-based global pollination algorithm for MPPT in photovoltaic system, Progress Photovolt.: Res. Appl. (2020) 712–725.

[20] N. Kefalas, G. Theodoridis, Low-memory and high-performance architectures for the CCSDS 122.0-B-1 compression standard, Integration 69 (2019) 85–97.
[21] H.S. Shihab, S. Shafie, A.R. Ramli, F. Ahmad, Enhancement of satellite image compression using a hybrid (DWT–DCT) algorithm, Sens. Imaging 18 (1) (2017) 30.
[22] K.P. Yalamarthy, S. Dhall, M.T. Khan, R.A. Shaik, Low-complexity distributed-arithmetic-based pipelined architecture for an LSTM network, IEEE Trans. Very Large Scale Integr. (VLSI) Syst (2018) 349–371.
[23] A. Darji, R. Arun, S.N. Merchant, A. Chandorkar, Multiplier-less pipeline architecture for lifting-based two-dimensional discrete wavelet transform, IET Comput. Digit. Tech 9 (2) (2014) 113–123.
[24] G. Hegde, K.S. Reddy, T.K.S. Ramesh, A new approach for 1-D and 2-D DWT architectures using LUT based lifting and flipping cell, AEU-Int. J. Electron. Commun 97 (2018) 165–177.
[25] P. Naik, H. Guhilot, A. Tigadi, P. Ganesh, Reconfigured VLSI architecture for discrete wavelet transform, Soft Comput. Signal Process. (2019) 709–720.