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Research Article

Animation Art Design Online System Based on Mobile Edge Computing and User Perception

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Based on mobile edge computing and user perception technology, this paper analyzes and discusses the respective advantages and disadvantages of the important optimization models and mobile models in the animation art design, as well as the wireless block data transmission mechanism and protocol. In order to solve the problem that user mobility cannot be sensed, a content-centric mobile edge animation art design mechanism based on user mobility perception is proposed. This mechanism comprehensively calculates the centrality of users' perception of nodes, the idle rate of animation design, and the staying time of users in a small area. The mobile edge network controller integrates the information of each edge user's perception node, calculates the importance of each edge user's perception node and prioritizes it, and selects the appropriate content animation to design the user perception node according to the ranking result. Finally, various simulation or platform test experiments were carried out for all the design schemes in this paper, and the experimental results were analyzed. The simulation experiment results show that compared with the traditional animation design mechanism, the animation art design system effectively reduces the average number of hops for users to obtain content by up to 15.9%, improves the hit rate of edge user perception node animation design by at least 13.7%, and reduces the traffic entering the core network by up to 32.1%. According to the comparison results, the various designs in this work can successfully use sensor data to preclassify migration tasks in the mobile edge network environment. Compared with the latest block data transmission protocol, it has a significant performance improvement, reducing the data distribution delay by 34.8%, thereby helping to improve the overall efficiency of mobile edge computing.

1. Introduction

Mobile edge computing has become a computing model that is expected to provide pervasive computing and storage services for mobile and big data applications. At the network edge, due to the deployment of small base stations, the mobile edge computing service network can be established [1]. These small base stations are usually able to directly connect to mobile users and provide them with fast feedback low-latency services. Therefore, mobile users can upload and migrate some computationally intensive or delay-sensitive tasks to the currently connected small base stations. Mobile edge computing networks use the hardware resources on small base stations to assist users in handling such tasks [2]. The decision to perform task migration in this new computing model faces many new challenges such as complex task requirements, high user mobility, diverse applications and services, and limited computing and storage resources of small base stations [3]. Therefore, how to collect and use the new features of the mobile edge network and improve the task allocation decision and data transmission efficiency involved in the task migration process are all topics and directions that are worthy of in-depth study [4–6].

With the rapid development of the entire mobile Internet and the development of a new generation of wireless networks, in order to solve the above problems, small base stations with certain computing and storage capabilities have been laid on the edge of the mobile network on a large scale [7]. Therefore, how to use these small base stations scattered on the edge of the network to provide users with lower latency and higher bandwidth services and to undertake

the task of reducing the burden on the core network has become particularly important [8]. Therefore, task migration under mobile edge computing can be used not only as a way to expand terminal resources but also as an effective method to increase network throughput and reduce task delay. In this context, the research on task migration decision-making, task migration allocation, and high-performance block data transmission mechanism has great practical significance [9]. Specifically, in terms of task migration decision-making and allocation, the unique data or device characteristics (such as sensor data) that can be provided by mobile smart terminals or mobile Internet of things terminals are used to combine the task's demand for computing resources and reduce task processing time. The goal of extending and reducing the energy consumption of equipment is designed to design a more optimized migration strategy, so as to achieve more detailed division and decision-making on whether the task is migrated or to which user-aware node is for processing [10].

On this basis, this paper mainly designs and verifies the following three aspects of work in mobile edge computing: a service model architecture that perceives the characteristics of mobile users and a migration task preclassification mechanism, a user-based mobile migration optimization algorithm, and a high-performance block data reliable transmission protocol. In order to solve the situation that the content animation design location and the marginal user perception node animation design space are insufficient, this paper proposes an animation design mechanism based on the age and popularity of the content information. This mechanism uses the three attributes of communication, computing, and animation design of the edge user perception node and uses the communication ability, computing ability, and animation design ability of the user perception node as an evaluation index to measure the importance of the user perception node. The node animation design content is required by users, and when the animation design space is insufficient, the information age and popularity of the animation design content in the animation design user perception node are used as reference indicators for content replacement. Simulation experiments show that compared with the animation design mechanism and probabilistic animation design mechanism, the algorithm in this paper improves the fault tolerance rate of edge user perception node animation design by 12.3% and 10.8%, respectively.

2. Related Work

The development of the mobile Internet has led to the vigorous rise of video applications, and video traffic occupies a dominant position in the explosive growth of data traffic on a global scale. With the growth of mobile data traffic, the traditional cloud computing-based mobile Internet architecture cannot meet the low-latency requirements of video applications, and the consumption of network bandwidth has increased sharply. Therefore, the center of the mobile communication network architecture has evolved from base stations to information and content. The mobile edge network (MEN) includes mobile fronthaul networks (between radio frequency units and distribution units), mobile midhaul networks (distribution units to centralized units), and mobile backhaul network (above the centralized unit) [11–13].

In terms of improving the recognition accuracy of user behavior characteristics, Cong et al. [14] started with sensor data such as different directions and positions of smart phones and provided experiments and analysis methods. In this work, two experiments of placing smart phones in different user carrying positions were carried out. The experiments included 10 users participating in the test and 6 daily user behavior characteristics. They built a feature vector based on the three-dimensional acceleration signal to calculate the average and standard deviation and built an instance-based classifier. By organizing the acceleration signals into the same coordinate system, the accuracy of its recognition has been significantly improved. Sha et al. [15] use acceleration sensors to distinguish seven behavioral features generated in the user's daily activities. It considered and clarified the placement of 6 kinds of mobile phones. Compared with the previous work, this work was able to construct more features because it collected more time-domain and frequency-domain features from the 7 users participating in the experiment. Finally, a support vector machine classifier is used to test the classification results. When the placement position is known, the overall F-score can reach 94.8%. Zhang et al. [16] tried to minimize the task execution delay with a one-dimensional search algorithm in a single-user scenario. The algorithm outputs whether a task determines the migration strategy according to the computing and processing capabilities of the user's mobile devices and small base stations, as well as the animation design queue status of the application tasks. In addition, the model proposed in this work also takes into account the characteristics of the wireless channel between the user equipment and the small base station. In the task migration calculation model proposed by the author, the task migration decision is completed by the task migration strategy module at the user equipment.

Wang et al. [17] proposed that the content of the animation design in the device is shared through D2D communication; that is, in each time period, each user should animate the design data at a constant rate, and then, each user transmits the D2D link at a constant rate as a convex optimization problem. In SBS animation design, the content animation is designed in the small base station (SBS). If the user's desired content animation is designed in SBS, the local SBS will directly distribute the content to the device. Generally, the information between SBSs in the same area is shared; that is, the data content or resource usage of the animation design in each SBS is known to neighboring SBSs. Miao et al. [18] proposed to perform animation design on SBS; that is, in each time period, it is ideal to design data at a constant rate and redefine the problem as a convex program. Then, the dual decomposition method is used to solve this convex problem, and a subgradient algorithm for finding the optimal dual variable is proposed. Finally, the optimal transmission power structure at MBS and the optimal animation design strategy at SBS are derived. Some scholars

use the relevance of user files and user social relationships to predict the popularity of content through collaborative filtering and predict the needs of certain users to provide active services by designing popular content in advance animation on base stations and devices. This approach can greatly reduce the peak demand for data traffic. Researchers make time-varying estimates of popularity based on user requests and the freshness of content and use the Poisson noise model to estimate the popularity distribution a priori [19–21].

3. Construction of an Online Design Model of Animation Art Based on Mobile Edge Computing

3.1. User Perception Level Distribution. The functions of the user-perceived data center mainly include mobile network control, management, and scheduling. The functions of the mobile core network mainly include control plane network functions such as mobility management (AMF), session management (SMF), and user data management (UDM). Gateway functions such as User Plane Function (UPF) are interconnected with the centralized unit of the mobile edge network or other macrobase stations to form a regional convergence network [22, 23]. The mobile edge network is composed of a mobile fronthaul network, a mobile midhaul network, and a mobile backhaul network. Figure 1 is the user-perceived hierarchical topology.

Each user perception node will operate according to the three states of the time slot—transmission time slot, reception time slot, and sleep time slot. Then, the work of data distribution and transmission will be completed in the form of page-by-page transmission; that is, a user perception node will only transmit the data of the next page after the current page data has been received by the subuser perception nodes in its structure.

$$\left(\frac{x-y}{a_1}\right)^2 - \left(\frac{x+y}{a_2}\right)^2 = 1. \tag{1}$$

The RAN network has evolved from a two-level structure consisting of a baseband processing unit and a remote radio frequency unit in a 4G network to a centralized unit (CU), a distributed unit (DU), and a radio unit (RU). The centralized unit and the distributed unit can be deployed separately or jointly. According to their different deployment methods, the RAN network is divided into different networks: the radio frequency unit and the distributed unit are between the fronthaul network and the distributed unit.

$$S = \frac{E(m=1)}{L} - \frac{N}{L} \times \left(1 - \frac{2}{L+d}\right)^{N-m}, \tag{2}$$

$$t' = [r \times \cos\theta, r \times \sin\theta, r \times \tan\theta_1 - t]. \tag{3}$$

Between the centralized units is the intermediate transmission network, and above the centralized unit is the backhaul network. The core network is split into two parts: a new core network unit and a mobile edge computing (MEC) unit. The mobile edge network is further divided into a mobile fronthaul network, a mobile midhaul network, and a mobile backhaul network.

$$f_{11} = \left(\frac{1}{n} \times \sum_{i=1}^{n} x_t^2, \frac{1}{n} \times \sum_{i=1}^{n} y_t^2\right). \tag{4}$$

Specifically, in terms of network resource management, with network virtualization technology as the technical support, the cloud control layer performs a unified and abstract description of physical and network resources to achieve resource pooling and unified scheduling. For different IoT applications, the cloud-based control layer builds dynamic edge networks on demand and implements collaborative management of edge network resources by deploying virtual gateways. First, it can support the data distribution transmission form of the multihop pipeline, and different page data can be transmitted at the same time in different hops, thus reducing the overall data distribution; the second is to establish a retransmission mechanism and ensure the reliability of the final data transmission.

$$g(m,t) = \frac{n * (h(m,t)/k(i,t))}{\sum_{i=1}^{n} h(i,t)/k(i,t)}. \tag{5}$$

A bitmap can be used in a request message to indicate the missing data packet, and for the entire file object, using a bitmap to represent it may occupy a large space in the limited message payload or even fail to represent it. However, it will be much smaller if a bitmap is used to represent a page of data, so it can also be appropriately placed in a request message. When all page data has been received, the reliability of block data transmission will be reduced. It is guaranteed.

3.2. Mobile Edge Computing Algorithm. The tasks of the mobile edge computing model can be processed in three ways, namely, letting the task be executed locally, through the edge small base station, or through the upper-level macrobase station to request the mobile edge computing service for task processing. By calculating the energy consumption and delay costs generated by different access methods, to achieve the lowest energy consumption cost as the optimization goal, it is combined with the minimum delay limit of user tasks.

In the algorithm at this stage, the criteria for judging the three categories are as follows: if the task is executed locally that can meet its minimum delay requirements and the energy consumption of the local execution does not exceed the energy consumption of the migration task, it will be retained for execution locally; if tasks that cannot meet the minimum latency requirements for local execution must be migrated to the mobile edge computing system for execution, tasks in other cases represent the third type and tasks in this type will eventually be in the first stage that determines whether to migrate tasks to the mobile edge computing user perception node according to the wireless

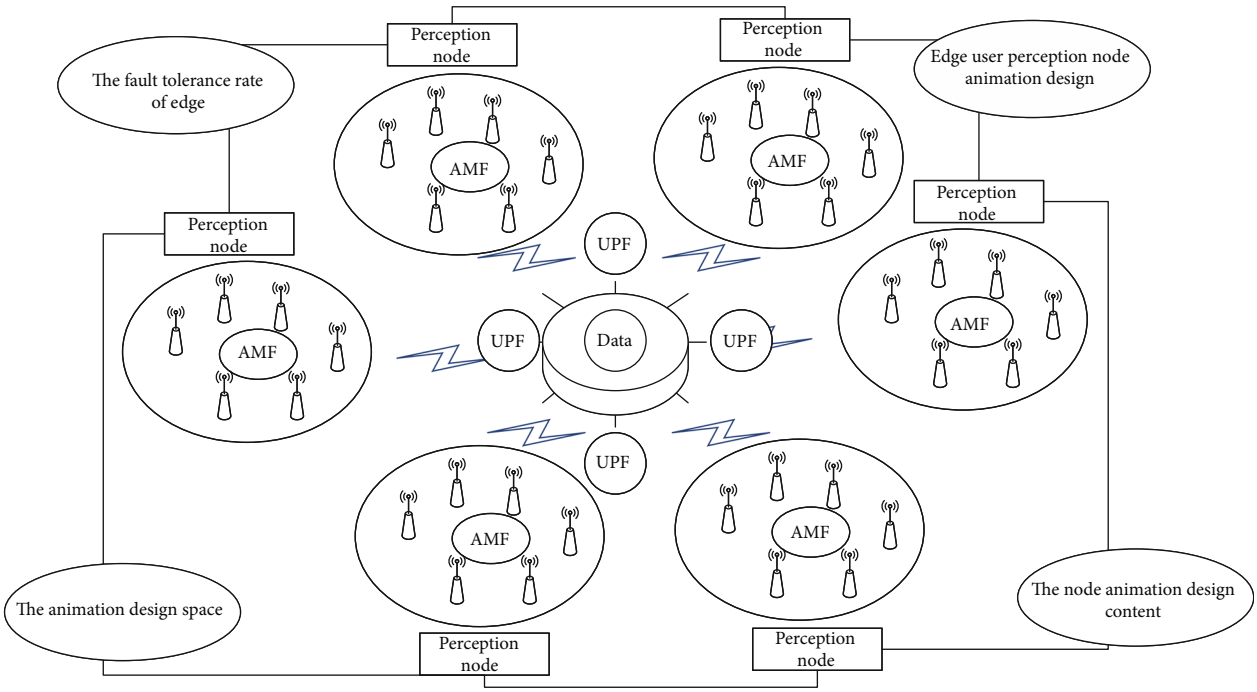

Figure 1: User-perceived hierarchical topology.

communication status. Figure 2 is a histogram of user perception nodes of mobile edge computing.

The core idea of the animation design mechanism based on the age and popularity of content information is as follows: first, according to the three inherent communication, computing, and animation design attributes of the edge user perception node, select the appropriate content required for the edge user perception node animation design. The process of determining the edge user perception node is by calculating the distance from the edge user perception node to the user perception node to characterize the communication capability of the user perception node; the number of collaborative edge user perception nodes sharing animation design content characterizes the computing ability of the user perception node. The free rate of the animation design space of the perception node represents the animation design ability of the edge user perception node. Finally, the total score of each edge user perception node is obtained and the animation design priority of the edge user perception node is sorted, and several are selected in order.

In the current network, video data traffic has replaced voice data traffic as the main traffic type. In many cases, D2D communication enables devices that are close to each other to share content or interact with each other, such as games and social networks. At the same time, D2D communication can improve network efficiency in many aspects: firstly, it saves a lot of signaling resources and reduces transmission delay; secondly, it saves a lot of elements compared to transmission through base stations; in addition, because the path loss is much smaller than that of base station-to-device communication loss, it can improve the spectral efficiency.

3.3. Composition of Animation Art Elements. In the animation art scene, mobile users migrate the computationally intensive and time-sensitive tasks on their devices to a mobile edge computing network composed of multiple small base stations with computing and storage capabilities. In this mobile edge computing system, we consider a small base station set N, where $N = \{1,2,3, \cdots, n\}$, and distribute the data in the network according to the similarly mentioned mesh topology distribution transmission. All of the small base stations can receive, execute, and transmit tasks that need to be relocated. In addition, we also assume that the software-defined network architecture is used in the mobile edge network; that is, all small base stations are controlled and monitored by the central controller. Among them, conditions C1 to C3 are guarantees of the delay conditions for using three different methods; conditions C4 to C6 are that the task can only choose one way to execute, and the purpose is to avoid task duplication and waste of computing and energy resources. It is to ensure that the channel allocation does not conflict; condition C8 restricts the total number of channels occupied not to exceed the number of channels that can be allocated.

The basic structure of MEC is given in the specification document. The MEC system is divided into three levels at a macrolevel, namely, the system layer, the host layer, and the network layer. Figure 3 is the distribution of the basic structure of animation art elements. The top layer is the system layer, which is the level management entity of the MEC system. It manages the MEC system globally and abstracts the system as an interface for users and third-party developers to use; the middle layer is the core host layer, which is hosted by the MEC. It consists of two parts and MEC host management, including the underlying hardware resource

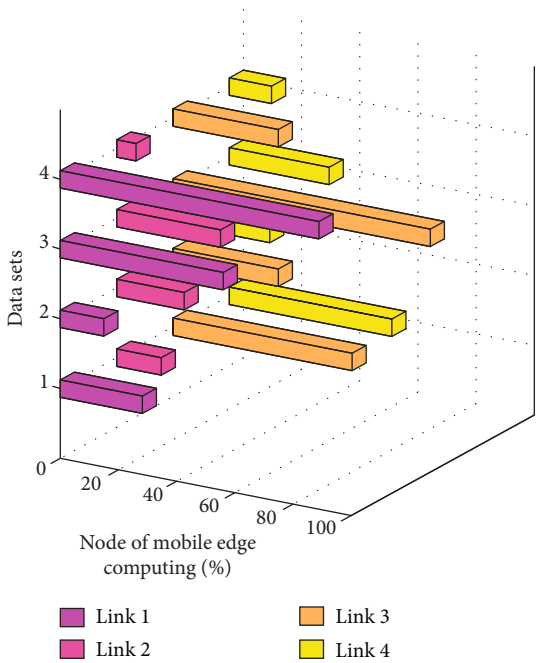

Figure 2: Histogram of user perception nodes of mobile edge computing.

layer and the virtualization layer, which provide guarantee for functions related to virtualized switching, storage, and computing.

Among them, unloadable tasks must be performed locally on the vehicle, such as user interaction, input and output, and peripheral interfaces. The unloadable part of the task can be executed by the animation processor, or it can be transmitted to the MEC server on the RSU side by establishing a connection with the roadside unit. The unloadable task generally does not need to interact with the local device. It is assumed that the tasks of each vehicle user cannot be divided into multiple subtasks in fine-grained granularity again; either all are handed over to the local execution or all are offloaded. The roadside unit detects the task status of the animation, minimizes the overall service delay according to the status of the animation and the task, plans the unloading strategy and arranges the order of task scheduling, and arranges the priority of the unloaded task.

3.4. Design Model Weight Iteration. In order to evaluate the control optimization decisions taken by the animation design system in each state, this section uses the resource usage cost under the time delay constraint to represent the cost function of the system. The main user's resource usage cost is mainly determined by the energy consumption and resource price generated by the system. In order to maximize the use of renewable elements, the cost of using renewable elements can be set to zero.

One advantage brought about by migrating the user's computationally intensive tasks to the mobile edge computing small base station is that it can reduce the execution delay. When the user's local device performs all computing tasks by itself (that is, no task migration is performed), the execution delay (Dl) represents the time it takes to perform tasks locally on the user device. In the case of migrating computationally intensive tasks to mobile edge computing small base stations for processing, the execution delay (Do) includes the following three parts: (1) transmission of migration data to mobile edge computing user perception node duration (Dot); (2) the calculation and processing time (Dop) of the migration task of the small base station in the mobile edge computing system; and (3) after the migration task is processed, the user equipment receives the processing transmitted back from the small base station to receive the result data (Dor).

Figure 4 is the level of the animation art design model. As the number of user-perceived tasks increases, the proportion of tasks processed on the local device also increases, because although offloading tasks can greatly reduce the delay, due to the single-channel characteristics, tasks need to be queued and the waiting time will also increase as the number of tasks increases, and local processing can be performed in parallel, so local computing has a significant advantage. We iterate 100 times to reach convergence, find the optimal unloading strategy, and achieve the minimum overall system time cost. And we compare the improved binary particle swarm algorithm and the original binary particle swarm algorithm, both can achieve convergence, and the convergence speed is faster, but the BPSO algorithm makes all the particles follow the position of the optimal particle and gradually tend to be the same. The phenomenon of prematurity has appeared, so that it has fallen into the local optimal situation and cannot jump out of finding the global optimal solution. The GA-BPSO algorithm strengthens the global search ability through crossover and mutation operations, so that the final result is obtained. Strategy performance is better than that of BPSO. Therefore, from the point of view of the convergence and convergence rate of the algorithm, although the convergence rate of the algorithm is not as fast as the BPSO algorithm, the discrete particle swarm optimization algorithm introduced with the genetic algorithm has a significant improvement in the optimization ability, and the system delay performance is improved about 9.2%.

4. Application and Analysis of the Animation Art Online Design Model Based on Mobile Edge Computing and User Perception

4.1. Mobile Edge Computing Data Preprocessing. The hardware environment of this experiment is Intel(R) Core(TM) i7-640m CPU @2.8 GHz and 8 G RAM, and the software environment is Ubuntu 16.04 LTS 64-bit MATLAB 2016a. Finally, it is compared with the animation design mechanism LCE and the probability cache mechanism Prob and compares and analyzes the three evaluation indicators of the content source user's perception node average number of requests, animation design hit rate, and average request delay.

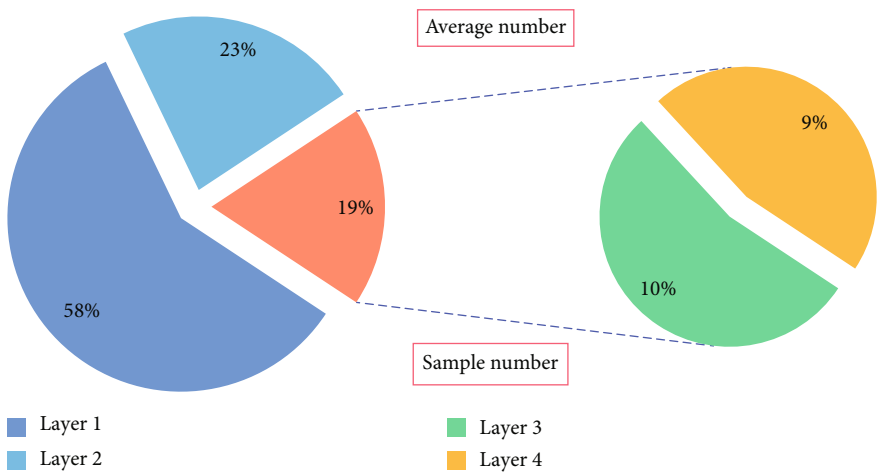

Figure 3: The distribution of the basic structure of animation art elements.

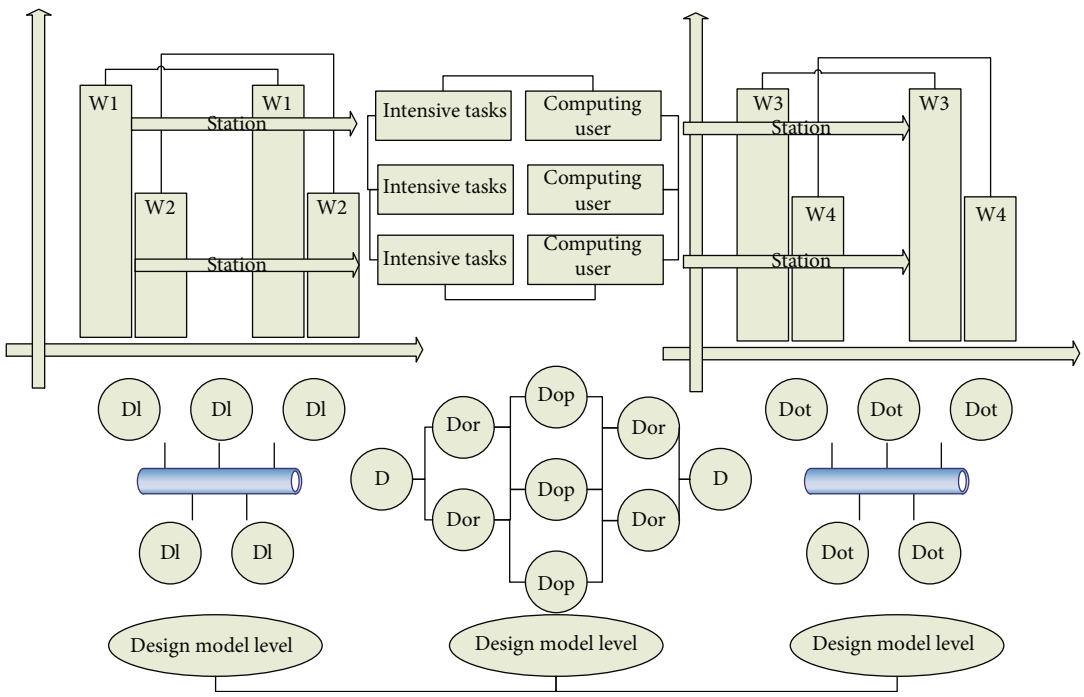

Figure 4: Animation art design model level.

The average number of requests accepted by the content source user perception node reflects the number of times the source user perception node has been visited. The lower the request load is, the higher the animation design hit rate of the edge user perception node will be; the traffic flowing to the core network will decrease, and the performance of the corresponding animation art design mechanism will be better. This paper uses the edge confidence based on the mean shift to describe the average probability that the detected edge information points are true edge points. The greater the degree of difference is, the higher the probability that the detected edge point is the true edge point. At the same time, we use the edge detection results to reconstruct the animation and calculate the reconstruction similarity index with the original image, to evaluate the integrity of the edge detection results and to make up for the defect of the edge confidence index; the reconstruction method adopts the linear interpolation reconstruction method.

Figure 5 is the similarity index curve of moving edge reconstruction. The experimental results show that as the number of auxiliary users increases, the total system cost based on Lyapunov's computing migration strategy shows a significant downward trend. This is because more auxiliary user SDs participate in D2D-ECN, and the joint optimization strategy of task offloading, power control, and computing resource allocation can be used to realize distributed task transmission and data processing and reduce the energy for each auxiliary user, thereby reducing system overhead. It can

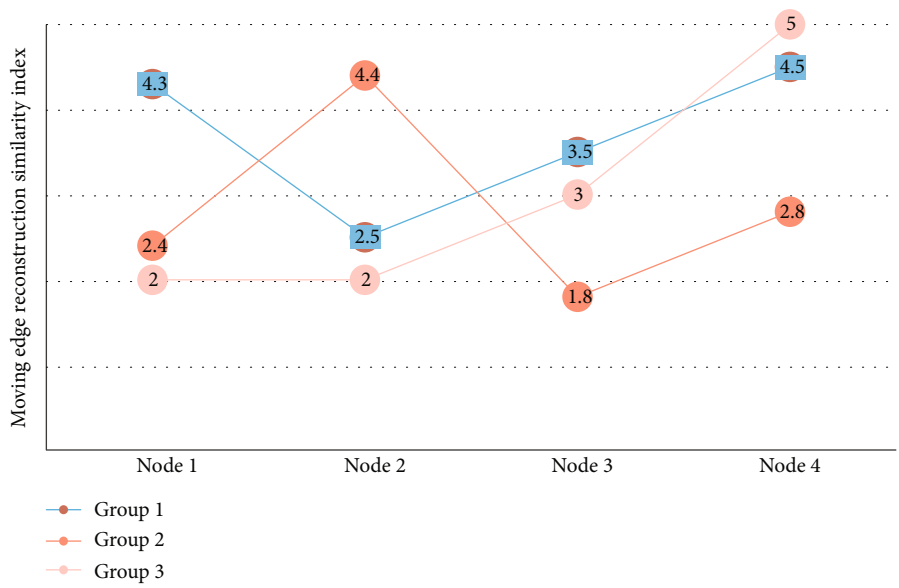

Figure 5: Moving edge reconstruction similarity index curve.

be seen that the average number of requests accepted by content source user perception nodes of the three animation design mechanisms gradually decreases with the increase in R. Among them, the AoIPC mechanism content source user perception node accepts the least number of requests and flows to the core network the least. This is because with the increase in R, most of the content requested by the user is directly animated at the edge user perception node, where the user can directly obtain the requested content, so the average number of requests received by the content source user perception node is large. Compared with the AoIPC mechanism, Prob is still insufficient in the diversity of animation design content at the user perception node, so it still causes a certain amount of content redundancy. In the end, the average number of requests received by the user perception node of the content source is relatively large. Compared with AoIPC and Prob, the LCE mechanism has the same animation design for all content resources at all user perception nodes. Even if the animation design capacity increases, there is still a lot of content redundancy. The content source user perception node obtains it, and the content source user perception node accepts the most requests on average.

4.2. Animation Art Online Design Simulation. In this section, MATLAB R2014b software is used to simulate and verify the task migration algorithm in a single cycle. In order to verify the performance of the two-way matching correlation algorithm, we used the random request correlation strategy as a benchmark to compare and analyze the animation utility and the edge server utility.

In addition, in the two-way matching process, the influence of animation and edge server as the association applicant or association decision-maker on the utility of their respective preferences was analyzed through simulation. On the other hand, in addition to adopting two-way matching to satisfy the respective preference utility of animation and edge servers, in the actual economic model, the resource supply and demand parties will also maximize the total income from the perspective of cooperation (social welfare) to design animation and edge servers. This problem can be described as a 0-1 linear programming problem that maximizes the weighted utility of animation and edge servers. With the help of the correlation analysis and screening unit, we can select all the sensor parameters that are positively related to the user's preferred applications and services and pass them to the learning unit for training. We use learning tools to classify, select which sensors are more critical to specific applications and services, and provide service references for small base stations in mobile edge computing networks accordingly.

Taking into account the richness and diversity of the edge details of the animation, the edge detection experiment is compared with the sample library composed of 20 images, and the average value and the mean square error are used to calculate the edge confidence and the results of the reconstruction similarity and combined with the t-test. When the P value of the significance test is greater than 0.05, it means that there is no significant difference between the effects of the two detection methods and vice versa and it indicates that the effects of the two detection methods are significantly different. Figure 6 shows the sensor parameters of mobile edge computing.

In order to achieve the optimal compromise between the long-term average task service delay and the long-term average energy consumption of the system, a joint optimization problem of task offloading, computing resource allocation, and energy scheduling is designed. From a time-domain perspective, network traffic shows periodic changes during weekdays and weekends. From a spatial point of view, network traffic presents single-peak and multipeak characteristics in different areas. Moreover, business traffic has strong randomness on the peaks and troughs. For a single IoT device, according to different business requirements, the generation of business data has stronger random

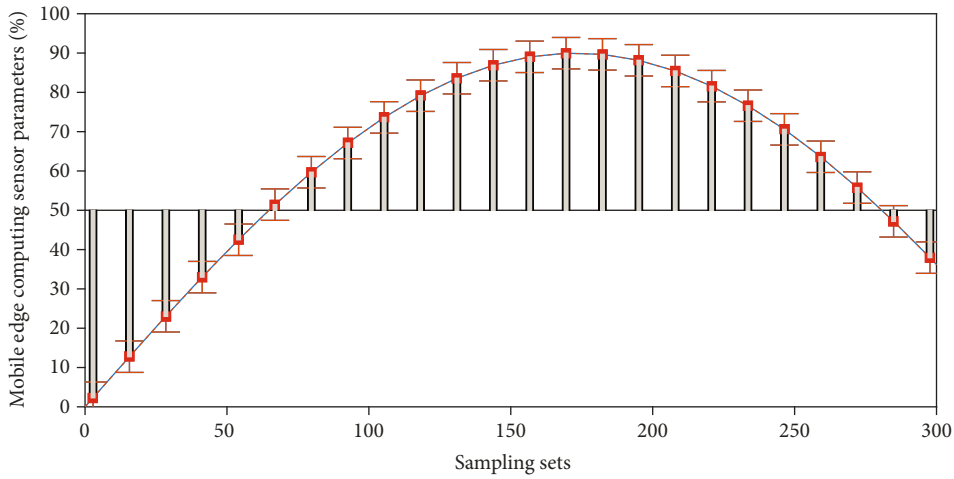

Figure 6: Mobile edge computing sensor parameters.

characteristics. It can be seen that the distribution of renewable elements presents the characteristics of periodic certainty, periodic uncertainty, and complete randomness. It can be seen from the temporal and spatial distribution characteristics of business data and renewable elements that in real network scenarios, it is difficult to use a deterministic distribution or closed expression to accurately reflect the characteristics of data and energy distribution under different temporal and spatial conditions. The simulation results prove that the algorithm proposed in this paper can effectively reduce the average response delay of system processing tasks by comparing it with other algorithms and ensure that the cost of application service providers for leasing base station resources is maintained at a relatively low level.

4.3. Example Application and Analysis. In this model framework, we choose to use the naive Bayes method as a concise learning tool. The edge confidence and reconstruction similarity are used to quantitatively evaluate the detected edge information points, the statistical samples are used to quantitatively evaluate the mean and standard deviation of the results, and the t detection method is used to count the edge confidence and reconstruction similarity of 20 images. Due to the differences in the detection effects of strong and weak edges in the method in this paper, the samples are divided into two categories: animations containing a large amount of strong edge information and animations containing a large amount of weak edge information.

For battery-powered equipment that may have computing interruptions, energy harvesting technology is used to ensure the continuity of data transmission and business processing. One aspect of this consideration is that Naive Bayes only needs a small amount of training data to estimate sensor parameters for classification. On the other hand, this section mainly proposes this innovative model framework rather than a specific learning algorithm. This learning tool was chosen because of the efficiency of its deployment in the framework. Therefore, the computing migration system needs to design a matching computing migration algorithm based on this randomness and uncertainty, so as to ensure the continuity of the computing migration process. Figure 7 shows the calculation uncertainty distribution based on the mobile edge.

The curve trends of the OCA-CLJP algorithm and the OCA-SSCR algorithm are very close, but the former will, under the condition of violating the long-term average cost constraint, seek a solution with better cost through continuous iteration. Therefore, in 0-20 time slots, the OCA-CLJP algorithm is constantly switching between finding a solution with better cost and a solution with better delay, which leads to greater volatility of the delay curve, but this also makes the cost converge faster. Among them, the HF algorithm does not have a mechanism for cooperation between base stations, so that a large number of tasks are routed to the remote cloud for processing, resulting in a higher average response delay of the system. However, the SFCC algorithm has a fixed overhead limit (set to 160) in the time slot. Compared with the OCA-OSCR and OCACLJP algorithms, the service chain can be animated and the processing tasks will be reduced, so its performance is better than that in this article.

It can be seen that the three performance indicators of the content animation design hit rate, the average number of requests accepted by the content source user perception node, and the average user access delay are the best when considering both the content information age and the content popularity, and only the content information is considered. The performance of the animation design system is second when the age does not consider the popularity of the content, but the performance of the animation design system is the worst when only considering the popularity of the content without considering the age of the content information.

Figure 8 shows the confidence of animation art design based on moving edges. It can be seen that the overall edge confidence of the method in this paper is slightly lower than that of the PCNN method. Combined with subjective qualitative observation, it can be found that the false detection of noise information by PCNN is the main reason for its high confidence, and the filter method has too many falsehoods.

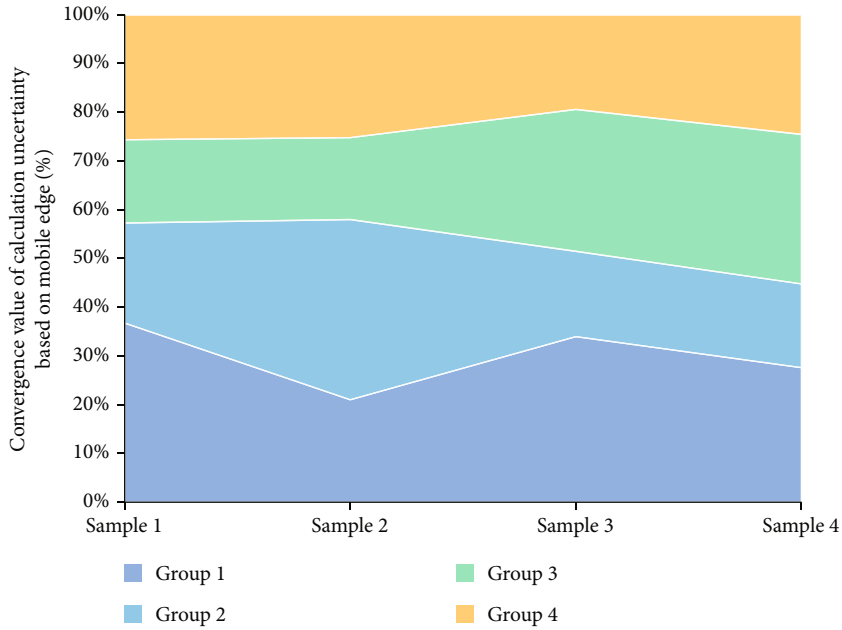

Figure 7: Distribution of calculation uncertainty based on mobile edge.

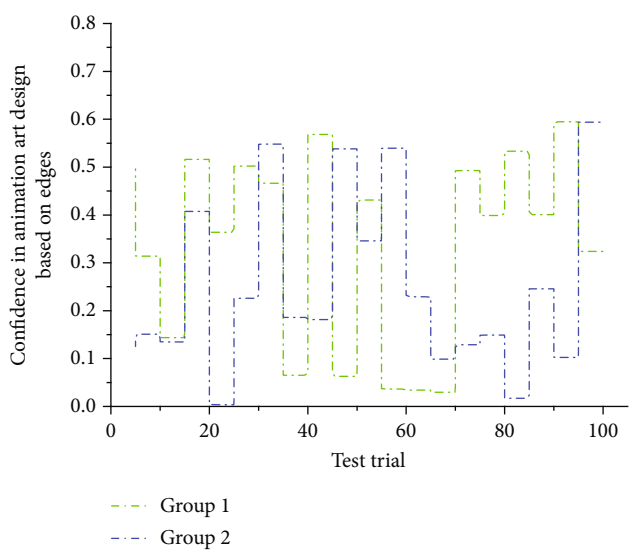

Figure 8: Confidence of animation art design based on moving edges.

Edges make their confidence low. Because of the effective suppression of noise information and false edges in this method, the confidence is more expressed as a judgment of true edges.

The reconstruction similarity of the method in this paper is basically greater than that of other methods, but it is worth noting that false edges will also lead to high reconstruction similarity. As mentioned above, the higher edge confidence in this paper indicates that the method in this paper has fewer false edges, and the reconstruction of animation is more based on true edges. It can be seen that the edges detected by the method in this paper are more complete and continuous. In summary, the method in this paper can effectively detect the edge information of animation, which has significant advantages in the accuracy and completeness of the edge compared with other methods. It can be concluded that the effect of using only a single indicator is worse than the effect of using two indicators at the same time, because each indicator of content measures different directions, and the information age of the content considers the popularity of the content at the current moment. The popularity of content considers the number of times the content has been requested in the past period of time, so this article considers the information age of the content and the popularity of the content as indicators to measure the content of the animation design to improve the performance of the animation design system.

5. Conclusion

In order to maximize the user's perception of the preferences of both parties, this paper designs an animation art design mechanism based on the mobile edge computing matching theory. Different from the 0–1 planning problem method of maximizing user perception preferences, the matching-based association algorithm is based on the participants' strict preference sequence, and after a limited number of mobile edge calculations, they achieve mutually satisfactory association results. First of all, according to the theory of open user-perceived hierarchical queuing network, this paper analyzes the average delay of processing tasks in the service chain and then quantifies the animation design and task routing decision-making of the service chain. Then, under the long-term average cost constraint set by the application service provider, this paper designs an online cost adaptive algorithm based on mobile edge computing technology, which converts the long-term minimization problem that requires future global task information into only single-

slot problem of current time-slot task information. On this basis, this article designs a joint optimization algorithm for animation access mode selection and task distribution for the high-speed animation environment, which is aimed at meeting the needs of diversified applications and taking into account the energy consumption of the system. Aimed at this complex mixed integer programming problem, this paper proposes a multiaccess coordinated computing migration strategy based on deep reinforcement learning. Both theory and simulation results prove that the computational migration algorithm proposed in this paper has good performance gain and convergence. The simulation results verify that the proposed collaborative computing migration algorithm can significantly reduce the average service delay of animation art design and reduce the energy consumption of the system.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that he has no conflicts of interest.

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