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Research Article

An English Teaching Ability Evaluation Model Based on Edge Computing

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One of the main basic components of the future generation of intelligent combat equipment is the edge computing platform. Evaluate the strategy and describe the test methods and key performance indicators. The method attempts will help to combine big data, intelligent computing models with typical military application scenarios, and conduct targeted research on the capability evaluation methods of embedded edge computing platforms. Aiming at the traditional evaluation method that uses manual evaluation, there is a great subjective consciousness in the evaluation process, which causes the problem of low accuracy of evaluation. A feedback model-based English teaching ability evaluation method is proposed. The use of a feedback mechanism in the English classroom can significantly increase the comparison of ability parameters. The open-minded calculation of the feedback evaluation is used to evaluate the various abilities in the English teaching process. The indications are presented as numbers, and an evaluation feedback model is built to verify the evaluation's completeness and accuracy. In order to ensure the accuracy of the designed evaluation method of English teaching ability based on the feedback model, the simulated classroom teaching environment is simulated for comparison experiments, and the effectiveness of the designed evaluation method can be verified through the effective analysis of experimental data.

1. Introduction

Due to the deepening of the trend of globalization, the competition between countries is no longer limited to politics, economy, military, and other aspects. The competition of national soft power has become a new international competition point. With the rapid development of the Internet, information has been disseminated instantaneously, and the input of Western cultural ideas into China has shown the characteristics of rapid, multipoint, and wide-ranging, which has caused a great impact on China's local culture. As a generation that grows up with the Internet, contemporary college students have not only broadened their horizons and increased their knowledge, but also their ideology has been influenced by foreign cultures to a certain extent. From the perspective of cultural power, it is the historical mission of contemporary college English teaching to enhance the national cultural self-confidence of contemporary college students, fully mobilize their subjective initiative, improve their awareness of consciously spreading Chinese traditional culture, and promote Chinese culture to the world. In order to realize the inheritance and dissemination of Chinese culture, it is necessary to cultivate compound talents with strong patriotic feelings and be able to use the English language proficiently for cross-cultural communication. The study found that the current English teaching in colleges and universities pays too much attention to the input of cultural phenomena from English-speaking countries while neglecting to guide students to use English to export Chinese culture in reverse, resulting in a serious lack of local culture in English teaching. Therefore, from the perspective of cultural power, deepening the reform of English teaching in colleges and universities, deeply integrating Chinese local culture in teaching, and realizing the mission of educating people in the discipline has become a basic project for the construction of cultural power.

For industrial wireless sensor networks, Liu et al. [1] proposed the concept of boundary tracking of continuous

objects based on binary tree-structured svm. Zhang et al. [2] used the Kalman filtering technique to infer the application of wireless sensor networks in dynamic linkage video surveillance systems. Wang et al. [3] used deep learning to examine the concept of self-adaptive collection for energy-efficient data streams in heterogeneous wireless sensor networks. Tdoa-based joint synchronization and localization technique for asynchronous wireless sensor networks was defined by Wang et al. [4]. The concept was proposed by Chowdhury et al. [5]. The paper on the Controller of Aviation Switched Reluctance Starter/Generator Integrated System is written by Fan et al. [6]. The design of an off-line led control system based on 4g-LTE was developed by Tang et al. [7]. The design of a manned centrifuge control system based on a motion controller was proposed by Xiao et al. [8]. To improve the reliability of wireless sensor networks, Khoshraftar et al. [9] investigated the concept of a hybrid technique based on clustering.

The development of English learners' cultural identity is closely related to economic development and cultural dissemination. In teaching practice, students' cultural self-confidence and cultural identity can be enhanced by comparing Chinese and foreign cultures, thereby improving students' ability of cultural exchange and cultural appreciation. However, by observing the long-term English teaching in colleges and universities, it is not difficult to find that most of its teaching focuses on the introduction of cultural concepts, customs, and ways of thinking in Western countries. From a specific example, most of the festivals that contemporary college students are interested in come from Western countries, such as Christmas, Thanksgiving, Halloween, and so on. In contrast, they are not very interested in our country's traditional festivals, and some students even do not know much about the origin and customs of traditional festivals. Sometimes, college students can talk with others about Western festivals and customs, but they cannot fluently introduce Chinese traditional culture to foreign friends and lack the ability to tell Chinese stories, spread Chinese culture, and convey Chinese voices to the world. Therefore, from the perspective of cultural power, the real dilemma of English teaching in colleges and universities is the lack of Chinese local culture teaching and the weakening of the education function of English subjects.

Coverage reliability study of wireless sensor networks including common cause failures was proposed by Liu [10] using the *d-s* evidence theory. Cui et al. [11] investigated the design of a machine learning and wireless sensor network-based intelligent home pension service platform. For wireless sensor-actor networks, Ying et al. [12] examined the concept of an autonomous connectivity restoration technique based on finite state machines. Yu et al. [13] proposed a contextual anomaly detection adaptive approach in the Internet of things via wireless sensor networks. Reliability evaluation of wireless multimedia sensor networks based on instantaneous availability was investigated by Yang et al. [14]. For a high-density seismic array survey, Tian et al. [15] developed the notion of a wireless energy-efficient system based on the directed diffusion routing approach. Based on path graph flow modeling using Marchenko-Pasture distribution, Siva Kumar et al. [16] explored efficient fault-tolerant routing in IoT wireless sensor networks (eft-pmd). For boosting resilience in wireless sensor networks, Qi et al. [17] developed the concept of a key predistribution system based on -pbibd. Sensor deployment technique based on social spider optimization algorithm for wireless sensor networks was proposed by Zhou et al. [18]. Sharma et al. [19] proposed Woatca, a safe and energy-aware approach for clustered wireless sensor networks based on whale optimization.

With the continuous deepening of English teaching, the assessment of English teaching ability has become extremely important. Among them, the most basic indicators of English teaching ability are the storage of English vocabulary and the ability to use vocabulary. This data is also an important indicator for evaluating the quality of English teaching. In other words, language learning ability is the ability to use vocabulary. In traditional English teaching ability assessment methods, manual evaluation methods are used. The advantage of the manual evaluation method is that the evaluation process is very flexible, but the human evaluation has a certain subjective awareness; at the same time, with certain mixed factors, it is easy to cause great evaluation errors. At the same time, there is no specific evaluation standard in the evaluation process, resulting in the same person. There are certain differences in the evaluation criteria. This greatly affects the accuracy of the assessment. In the process of evaluating English teaching ability, it is not possible to use a single angle for evaluation. It is necessary to make comprehensive judgments in multiple dimensions and multiple levels, and establish certain evaluation standards, so as to facilitate the unified measurement of different variables. In response to the abovementioned problems, this paper designs an English teaching ability assessment method based on the feedback model. And, in order to ensure the rationality and effectiveness of the design of this article, simulate the English teaching environment, use the evaluation method of this article and the traditional evaluation method to conduct a comparative test, and the experimental data is effectively proved to verify the effectiveness of the proposed method of English teaching ability evaluation based on the feedback model. Effectiveness and accuracy of the assessment: Wang et al. [20] investigated Node location privacy security in industrial wireless sensor networks using differentially private grids. A Compact Speech Recognition Network with Spatio-Temporal Features for Edge Computing is described by Yang et al. [21]. "Empowering Things with Intelligence: A Survey of the Progress, Challenges, and Opportunities in Artificial Intelligence of Things," according to Zhang et al. [22]. An Audio-Visual Emotion Recognition System Using Deep Learning Fusion for a Cognitive Wireless Framework was investigated by Hossain et al. [23]. For the hardware-in-the-loop modeling of the pantograph catenary interaction, Facchinetti et al. [24] proposed the notion of Real-time catenary models.

In summary, this paper starts from the current situation of the use of multimedia teaching platforms in colleges and universities, expounds on the problems existing in the current multimedia teaching platforms, and proposes an

edge multimedia teaching platform based on smart cloud classrooms. By adding edge servers, the network efficiency of the original system can be improved, the utilization of teaching resources can be improved, and new development ideas for modern education informatization can be provided.

2. Edge Computing

Edge computing is an open platform that integrates network, computing, storage, and application core capabilities at the edge of the network near the source of things or data, and provides edge intelligent services nearby, meeting the needs of industry digitization in agile connection, real-time business, data optimization, application intelligence, Critical needs in terms of security and privacy protection. There are two ways to obtain data from the cloud, one is to obtain data through a database, and the other is to obtain data from some terminal devices. It is an improvement on the second method of obtaining data. In the traditional cloud computing model, edge devices do not have any ability to process data, while in the edge computing model, network edge devices can not only request content and services from the cloud center but also Data storage, caching and cleaning can be performed. In the edge computing model, edge devices play a role that cannot be ignored, and the requirements for edge devices are also increasing. It is necessary to continuously improve the hardware platform of edge devices and the software technology in edge devices to improve the reliability of data processing based on edge computing. Sex and safety: it is very common for students to use the same learning resource multiple times by different students or even the same student in the classroom and after-school learning. If these resources exist on the edge server, the redundancy and congestion problems of transmission can be solved. In addition, information such as students' learning behaviors will be temporarily stored on the edge server, and then transmitted to the cloud server after the bandwidth usage rate is low, which can reduce the number of direct interactions between the terminal and the cloud, so as to reduce the pressure on network bandwidth.

2.1. Capability Evaluation Model of an Edge Computing Platform Based on Microbatch Processing. The embedded edge computing platform is a scalable and open computing system composed of multiple types of heterogeneous processing nodes. The hardware resource layer interconnects computing nodes through a high-speed switching network to ensure high-speed throughput between nodes. The virtualization layer divides the system's computing resources, storage resources, and network communication resources into virtualization granularity, and provides service interfaces for managing and operating virtualized resources. The computing framework layer provides a registration method that allows system resources to be registered in the system, allowing for flexible scalability of system resources; user requests request services from the system's resource manager through the task manager, and the resource manager performs system resources according to task requirements Allocate and decompose the computing tasks and data in parallel through the computing framework, and then map them to specific working nodes; the working nodes map the computing tasks and data assigned to the working nodes to the executor (i.e, worker) through its own node manager.) To perform specific calculations; after the calculation is completed, the final processing result of the data is obtained after merging through the calculation framework. The computing framework also provides functions such as node error recovery, computing process, and system working status monitoring.

The performance of the edge computing platform is affected by comprehensive factors such as network performance, computing node performance, resource scheduling strategies, and basic computing architecture, and is very complex. Its performance evaluation is very important for platform bottleneck detection, resource scheduling strategy, configuration parameter tuning, etc. in the process of platform design and deployment. Although there are already some cloud platform performance testing tools on the market, such as Yahoo's YCSB (Yahoo! Cloud Serving Benchmark), which is mainly used to test the performance of cloud storage nonrelational databases; TPC's TPC Benchmark TMW simulates online bookstores for e-commerce Benchmark performance test; Cloud Stone open source project of University of California (UC) Berkeley, used for performance evaluation of Web2.0 system in a cloud environment. In addition, compared with traditional computing platforms, embedded computing platforms are unique in terms of resources, functions, and performance. Therefore, performance evaluation methods need to be combined with the characteristics of embedded platforms.

2.2. Minibatch Model. The microbatch processing model is a computing model in the current big data computing framework, such as Spark. Its basic principle is to use time windows of different lengths to control the flow time interval, processing time interval, and result in output interval of data in the computing framework. Through the time slice window, the input data of the system is divided into minibatch data blocks; batch data processing is performed at each processing sliding window time; a data processing result output required by the user is generated in each output sliding window, as shown in Figure 1.

2.3. Embedded Edge Platform Test Architecture Based on Microbatch Processing Model. Edge computing needs to deal with two main types of data, one is information flow and the other is signal flow. However, both information flow and signal flow can be technically attributed to a unified computing framework, and both information and signal processing can be regarded as it is a kind of mapping, namely Map, and all the fusion analysis of information and signals can be regarded as a kind of synthesis, namely, Reduce. Therefore, the test architecture of the edge computing platform in this paper is studied with the Map-reduce computing model. Whether in signal reconnaissance or

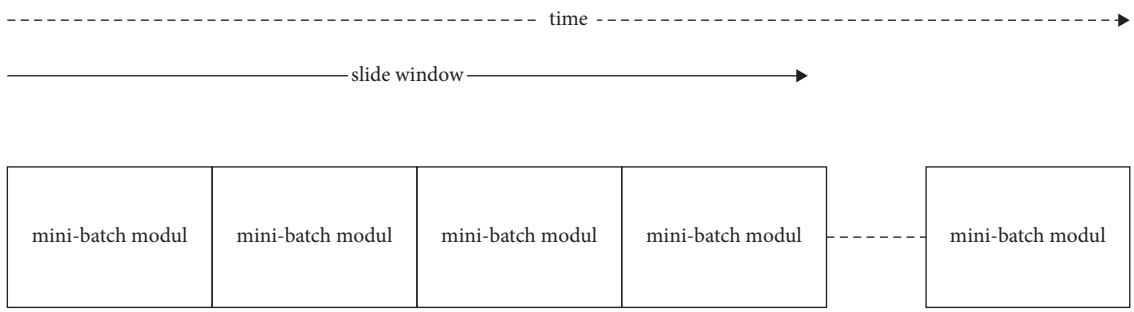

Figure 1: Slide window.

cognitive radio applications, distributed collaboration always has incomparable advantages over single nodes, such as incomplete information reception and susceptibility to interference.

As an example, this paper proposes a computing capability evaluation model of an embedded edge platform based on microbatch processing. At the same time, the edge computing network is also a self-scheduled and self-managed computing framework. Multiple edge nodes can join the edge computing rack by registering resources with the computing framework to form a more powerful edge computing cluster. From the perspective of system performance evaluation, single The difference between edge computing nodes or multiple edge computing nodes is mainly reflected in the difference in performance, and the tested computing model can adopt a unified architecture, that is, the Map-Reduce computing architecture mentioned above.

The data processing process of collaborative electromagnetic situation awareness in the embedded edge platform can be divided into three stages: Map, Shuffle and Reduce stages, as shown in Figure 2. Map stage: cooperative nodes distributed in different spaces and with different detection capabilities receive different electromagnetic signals and perform Map operations first. Each node creates a key-value pair for every single signal to match the input of the Map-reduce unified computing framework form. Among them, key identifies the signal type, Value loads the signal content and generates multiple key-value pairs for multiple signals of the same type. In theory, the Map stage should be accompanied by some data processing work, such as Fourier transform, filtering, etc. Shuffle stage: classify and converge the signals output by Map according to application requirements. This convergence strategy is completely defined by the user according to the application requirements, which can be a signal type or physical area, etc.; Reduce stage: the final comprehensive processing of the signal, such as joint spectrum sensing, detection target positioning, etc.

3. Computational Ability Evaluation Process and Indicators

3.1. Main Measurement Indicators and Methods. The microbatch processing model is used for computing power evaluation. The time-slicing, processing sliding window time, and output sliding window time of microbatch data should be comprehensively set according to task requirements and the computing power of the platform. As an evaluation of the computing power of the platform, in addition to testing the following indicators, such as the amount of input data per second, the deployment time of microbatch data tasks in the system, and the time required for each microbatch data to be processed in the system. This paper proposes the following test performance indicators based on the evaluation requirements of the embedded cloud platform's computing capabilities.

Computing acceleration performance is an important indicator of an embedded edge computing platform. It determines whether the computation time decreases as the number of computing nodes rises, i.e., whether the platform can improve real-time computing performance by adding more computing nodes.

$$\text{performance} = \frac{\text{pot\_time}}{\text{total\_}m\text{\_pot\_time}}. \tag{1}$$

Keep the total amount of data or the amount of data flowing into the platform per unit time unchanged, only increase the number of nodes participating in the calculation, and record the time of data processing. The computation acceleration performance index should expand in a linear fashion as the number of computing nodes m increases, implying that adding computing nodes can effectively reduce calculation time. However, in an actual system, as computing nodes increase, communication, resource management, and other losses will increase, so it is very difficult to maintain this linear growth.

The adaptability of the data set is to examine the adaptability of the platform under the condition that the number of processing data set and the number of computing nodes is expanded in the same proportion. The calculation method is as follows:

$$\text{ada} = \frac{\text{pot\_time}}{\text{total\_}m\text{\_pot\_time} * M\text{\_data}}. \tag{2}$$

If the data set adaptability index varies about 1.0 as m increases, the platform is capable of adapting to changes in the data set's scale.

Resource scheduling problem has always been one of the core problems of cloud computing platform, which is directly related to the operating performance of the system. Edge computing platform resources are precious and limited, so how to efficiently use limited resources to complete computing tasks is an important evaluation index for the

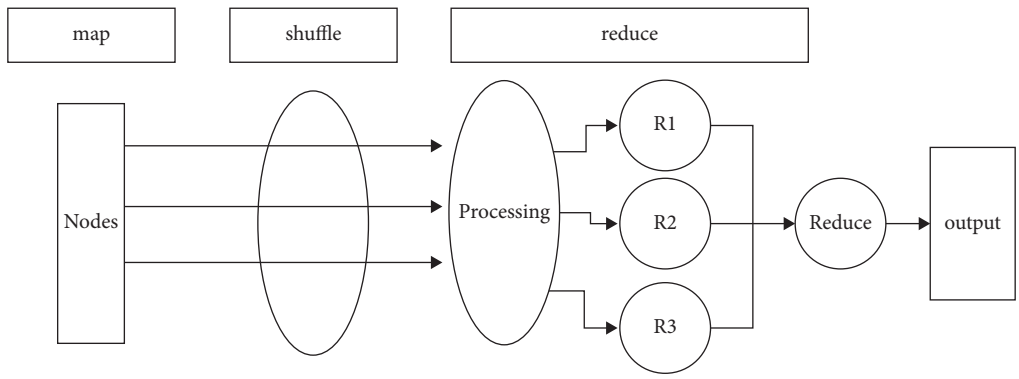

Figure 2: Three stages of model signal processing.

resource scheduling strategy of edge computing platforms. From the current design of the embedded edge computing platform with the central processing unit (CPU) core as the smallest granular computing unit, the computing resource utilization evaluation index can be evaluated based on the CPU core utilization ratio of the average scheduling of the same task.

3.2. Open-Minded Calculation with Feedback Evaluation. The English teaching ability assessment method based on the feedback model proposed in this paper is to complete the effective assessment of English teaching ability by establishing an assessment feedback model. In order to ensure that the evaluation feedback model can perform efficient and accurate evaluation, the open-minded calculation of feedback evaluation is introduced. The open-minded calculation of feedback evaluation can limit the evaluation criteria to a certain extent, unify different variables, and ensure the evaluation criteria. At the same time, there is only one variable in the evaluation process. Open-minded calculations using feedback evaluation first need to establish a limit matrix, so that multiple elements are replaced to ensure variable balance. The establishment of the limit matrix is:

$$\begin{bmatrix} 0 & F & P & E \\ F & A_{11} & A_{12} & A_{13} \\ P & 0 & A_{22} & A_{23} \\ E & 0 & A_{32} & A_{33} \end{bmatrix}. \tag{3}$$

After the feedback data is selected, the open-minded calculation conditions are limited, and a large number of open-minded calculations are used in the process of constraint conditions. For this purpose, use expression conditions to connect to avoid calculation limitations. The conditional expression is:

$$\begin{aligned} P_N &= P_{N+1} + \Delta \circ (F_1)^n, \\ \widetilde{x} &= \sum_{r=1}^{s} u_r y_n - \sum_{i=1}^{m} v_i x_{ij}, \\ \widetilde{S} &= \max\left(\max \sum_{j=1}^{n} \widetilde{a_{ij,s}}, \max \sum_{j=1}^{n} a_{ij,s} \right). \end{aligned} \tag{4}$$

After the introduction of feedback evaluation open-minded calculation, the data characteristics in the English teaching process can be comprehensively expressed, and the comprehensive evaluation can be completed only by entering the feedback model. To create the feedback model, you must first determine the ratio, which is done as follows:

$$P_n' = P_S - \sum_{i=1}^{n-1} F_2' = \left(P_s - \frac{1}{1 - f_2} \right) + \frac{f_2' f_2}{1 - f_2}. \tag{5}$$

In order to ensure the validity of the experiment designed in this article, the traditional English teaching ability evaluation method is also used for evaluation.

4. The Experiment Results and Analyze

In order to ensure the effectiveness of the evaluation method in this article, the parameters are set and the network feedback is set to use reference data outside the value range [1000, 1250], and Dp, DD, S_j, and F_i are set to 40×10^4, 12.5, 900,1280 respectively. The design of the experiment in this paper needs to set up the experimental data to ensure that the experiment is compared under one variable. The set data is shown in Table 1.

In order to ensure the validity of the experiment, this paper performs Statistical Packages and Software Services (SPSS) calculation. The effective value of the SPSS calculation is above 0.95. Therefore, the SPSS value designed in this paper is effectively substituted into:

$$\begin{aligned} Y(k) &= \frac{y[u(k-1)]}{1 + y^2(k-1)} \\ &= \frac{1 \times [9.7 \times (5-1)]}{1 + 1 \times (5-1)} \geq 0.95. \end{aligned} \tag{6}$$

Confuse matrix is shown in Table 2.

$$\begin{aligned} \text{accuracy} &= \frac{\text{TP} + \text{TN}}{\text{TP} + \text{TN} + \text{FP} + \text{FN}}, \\ f_{1\text{-score}} &= \frac{2 * \text{precise} * \text{recall}}{\text{precise} + \text{recall}}. \end{aligned} \tag{7}$$

Since the comparison between the model and the method is used, there is great error. The error value

Table 1: Design data parameters.

Times	English teaching time	Content
1	15	Grammar
2	30	Words
3	35	Sentences
4	40	Oral
5	45	Writing
6	45	Dialogue

Table 2: Confuse matrix.

Real	Positive	Negative
Positive	TP	FN
Negative	FP	TN

guarantees the validity of the experimental data by substituting the coefficient between the measured value and the true value, and eliminates the method of metric matching used for random errors. Among them, the ratio coefficient changes according to the number of experiments, but during the selection process, its value range is between 2.45 and 6.55; the extremum measurement is used to eliminate the nonzero error, and the time interception method is used to set the zero value. Effectively avoid nonzero errors.

Analyzing the results of Figure 3 we know that the evaluation method in this paper is obviously closer to the theoretical value in the process of comparing with the theoretical value. It can be said that the design method in this paper is comprehensive in evaluation.

The English teaching ability evaluation technique based on the feedback model established in this study has an evaluation refutation value of more than 7500, which is sufficient to show that the evaluation model designed in this article has high accuracy, according to the results of Figure 4.

Aiming at the poor evaluation effect of traditional methods, a feedback model-based English teaching ability evaluation method is proposed. The experimental comparison results show that the improved evaluation method has certain advantages.

Figure 5 shows the current smart cloud classroom adopts a student-led flipped classroom teaching mode. Teachers make microvideos of the content they need to teach, so that students can watch videos through the smart cloud classroom system for online learning after class and self-study time. Teachers can understand the students' learning situation before class, explain the difficulties and key points in the class, and solve the problems encountered by the students. A very important prerequisite for students to learn online is the need for abundant teaching resources, and cloud servers can provide huge storage space. In practice, it is found that when more than half of the students play the video at the same time, the buffering time of the video is relatively long. During class, when teachers let students watch microlecture videos on their own tablets, the phenomenon of long buffer time is more

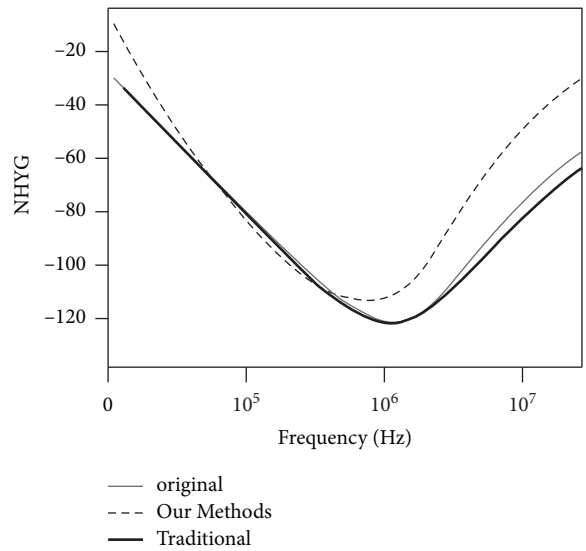

Figure 3: Comparation results.

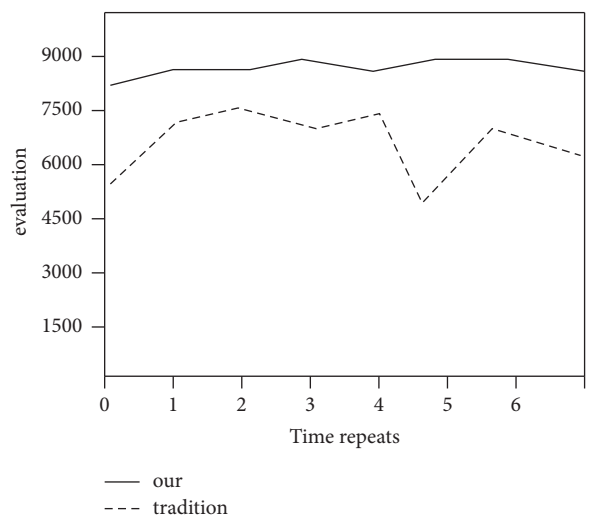

Figure 4: Comparation experiments.

severe Heavy. In addition, because students frequently request and submit data to the cloud server, when the number of classes reaches a certain level, the amount of data becomes very large, which not only takes up a lot of network bandwidth but also affects the data transmission speed, which makes the intelligent function of the system change. Become a burden.

Figure 6 shows the system performance on all aspects. The key benefits of 5G are faster transmission speeds, lower latency and thus more capacity for distant execution, a larger number of connected devices, and the ability to construct virtual networks (network slicing), which allows for more tailored connectivity to specific demands. Compared with video teaching on wired broadband networks or 4G networks, 5G-based smart physical education solutions have three major advantages: good time consuming, low memory, and low user overhead.

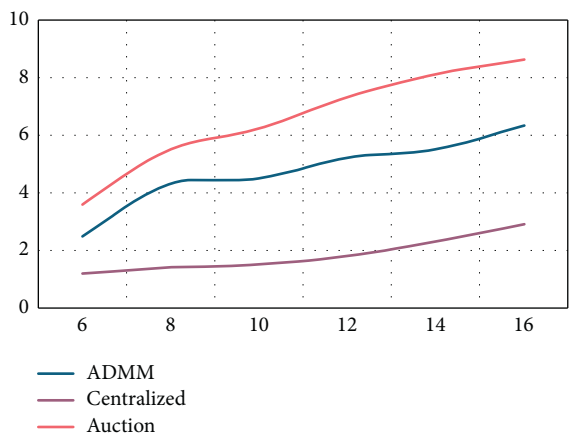

Figure 5: The results of all methods effectiveness.

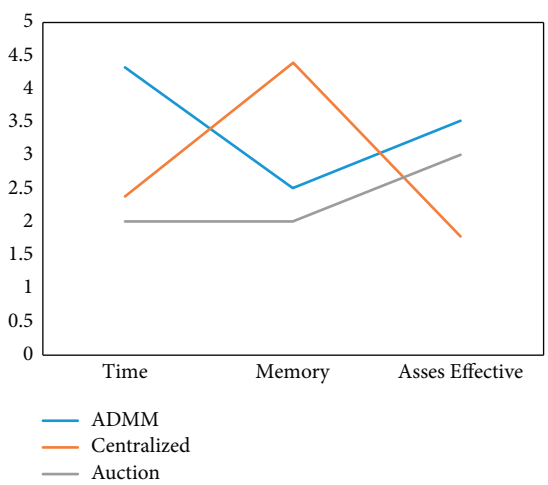

Figure 6: All aspects results.

4.1. Good Time Consuming. The acquisition equipment can be connected to the network through the 5G module, which avoids the displacement restrictions caused by the currently used wired connection methods such as optical fibers and video cables, and avoids the introduction of Wi-Fi network access methods. There are many dead spots and cumbersome access authentication switching, which makes the collection camera move flexibly, providing more collection angles and transformation space.

4.2. Low Memory. The "virtual private network" bearer service provided by the 5G bearer network provides its own independent "travel lane" for the bearer VR video stream, which is free from resource preemption by other services and ensures smooth video stream.

4.3. Low User Overhead. The introduction of MEC server saves downlink network bandwidth for users. The original 360° video is compressed to 1/3–1/2 of the original, which saves the traffic cost for users. At the same time, playing such videos requires lower configuration requirements for user hardware devices, which indirectly saves hardware acquisition costs.

5. Conclusion

Through the comparison of domestic and foreign data, this paper can find that there are still some problems in domestic related aspects. In the future, we can pay more attention from the following aspects.

5.1. Research on the Basic Theory of Edge Computing. According to the keyword timing map of international literature, foreign nations place a greater emphasis on research on edge computing-related ideas, whereas domestic research is generally lacking, and domestic research material is focused on its application but not on the relevant research results. Many, this is caused by the weak theoretical foundation of edge computing and related technologies. In order to develop a cohesive research program on edge computing in China, theoretical study on the topic should be expanded. Theoretical cognitive system to promote the development of edge computing and related industries.

5.2. Increase Research Cooperation. Compared with foreign countries, domestic edge computing-related research scholars, institutions, enterprises, and institutions lack cooperation. Purposeful cooperation can unearth more potentially valuable information. Various research parties collaborate widely and actively share knowledge in the field of edge computing, such as the implementation of a cloud-edge collaboration platform, how to effectively deal with different settings, technologies, and so on, as part of the national strategy. Edge computing will progress towards a more scientific and stable state as a result of the industry's impact, the consistency of the theoretical system associated with edge computing, and the solution of challenges.

5.3. Requirements for Edge Terminals in the Age of Intelligence. The formation of a data-intensive paradigm has accelerated the arrival of the age of intelligence. In the context of the intelligent era, the requirements for infrastructure are becoming higher and higher, especially the rapid development

of IOT and CPS, which makes more and more intelligent devices connect to the network, prompting the devices to have computing capabilities. It is vital to pay greater attention to the field of edge computing and mobile edge computing in order to increase the building of equipment.

Data Availability

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

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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