Design of Basketball Sports Data Analysis System Based on Cloud Computing

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Abstract. The traditional basketball training is basically guided by the coach's experience and theoretical basis, combined with the general performance of the athlete. Although this method has a certain effect, it depends too much on the coach's experience level and often does not get the expected results. Aiming at the rigorous and unstable problems of the traditional method, this paper proposes the design of a basketball sports data analysis system based on cloud computing. Through cloud computing deployment, athlete data is uploaded to the cloud, and then the data is stored and managed, and task scheduling is processed and analyzed. In the experiment, the sports data of 2 athletes were compared with the average level of 300 athletes. The results show that athletes X and athletes Y are below average in skill and endurance level, and need to strengthen targeted training in subsequent training to make up for their own shortcomings.

Keyword: Basketball sports data analysis, cloud computing, cloud computing deployment, data storage and task scheduling

1. Introduction
Basketball is a crazy sport in most countries in the world. Whether it is a campus basketball game, a professional basketball game or a basketball game among amateur basketball enthusiasts, people will pay attention [1]. Basketball has gone through a long development process. Basketball training has changed from basic training to advanced training, and basketball skills have also changed from simple training to complex training [2]. The level of youth basketball training is related to the development effectiveness of future basketball careers [3]. Therefore, a scientific basketball data analysis system is particularly important.

In the field of basketball analysis, many experts and scholars have conducted research and are committed to helping athletes improve their training results. In [4], the author proposed Session-RPE to quantify the load of different youth basketball training courses so as to tailor the training to suit the characteristics of athletes. In [5], the authors checked the condition of basketball players by communicating with experienced sports medicine physicians, and then conducting a questionnaire survey when an acceptable level of accuracy was determined. In [6], the author established questionnaire surveys and literature analysis methods to establish an index system for the quality of distance education teaching, and based on the analytic hierarchy process to evaluate the basketball
players’ skills. In [7], the author selected 17 basketball players to contact, then recorded the lunge and squat training data of these athletes under various weights, and finally conducted a summary analysis. Although the above research has played a certain role in training basketball players, there are still some shortcomings. For example, the amount of data is too small, the operation process is tedious, does not have extensive science, and the cost is too high. Especially when managing a large number of athletes, these methods are difficult to meet the needs of a large number of athletes, and the data analysis results are not intuitive enough.

Cloud computing can connect huge system resource pools together, share infrastructure, and provide various information technology services to the outside world. Basketball players have their own different characteristics, and cloud computing can integrate many sports data. Cloud computing has been applied in many fields. In [8], the author applied cloud computing to protect private data so that evaluators can safely train classification models for data encrypted with different public keys. In [9], the author uses cloud computing for the patient health monitoring system, enabling healthcare providers to remotely monitor and evaluate the patient's health in a comfortable residence, which greatly facilitates the development of healthcare work and reduces human and material costs. In [10], the author applied cloud computing to resource and time-intensive tasks, alleviating the problems that originally required large amounts of capacity and intelligent resource management. Not only save costs, but also reduce carbon emissions and achieve sustainable information technology. In summary, cloud computing has many advantages, so consider using cloud computing technology to build a basketball sports data analysis system.

Aiming at the problems that traditional sports data analysis methods are not scientific, time-consuming, labor-intensive, and costly, this paper proposes the design of a basketball-based sports data analysis system based on cloud computing in order to provide a reference for related field work.

2. Method

2.1 Cloud computing overview
Cloud computing is a new way of combining computing, networking, and storage. Cloud service providers allow users to store applications and files on remote servers and access data over the Internet. The information you want to access can be found in the "cloud" and does not require users to access it in specific areas. The characteristics of cloud computing are as follows: (1) Cloud computing resources are not centralized storage, but integrated through virtualization technology to provide services to users. Users can provide cloud computing resources without labor. (2) Extensive network access. Provides functionality through the network and access through standard mechanisms. (3) Cloud users can access the cloud platform and use the services in the cloud platform with the help of different terminal devices. (4) It can quickly expand outward and inward according to demand.

2.2 Cloud computing deployment
The management network realizes the integration and connection between server devices and device management in cloud computing. This business network enables customers to use cloud resources to connect virtual machine deployment applications. The storage network is connected to external storage to read and share data on the network. The switches use 2950-24 switch0 and 2950-24 switch1 to separate the different service network segments of the device in cloud computing. The server Server-PT uses CAS and requires the installation of CVM, CIC, and SSV. The virtualization management system is mainly used to manage the virtualization of hardware resources such as computing, network, and storage in the data center, and to provide automation services for upper-layer applications. The cloud computing management center consists of the most basic modules of the cloud, and combines infrastructure resources and related strategies into a virtual data center cloud resource pool.
2.3 Data storage management and task scheduling

Cloud computing also involves the storage and management of basketball big data. In data storage, the storage process is completed by using a distributed file system. The use of virtualization technology makes the platform better than the cluster parallel file system when dealing with massive basketball sports data. By managing the namespace of the file system, other modules in the platform can efficiently and conveniently access related data.

In task scheduling, comprehensive consideration is given to the actual working machines, including hardware configuration (such as CPU, memory, free disk space, etc.) and software information (such as CPU utilization, network bandwidth, load, etc.). The redundant SP-DPP platform needs to be able to automatically detect and eliminate failed nodes in time to ensure the normal operation of the platform's main control tasks. Combining multiple virtual machine computing nodes (with less load) on the same physical node enables the actual resource utilization of each physical node to be significantly improved.

3. Experiment

The cloud computing-based basketball sports data analysis system designed in this article is based on the B / S architecture. Users do not need to install any clients and can access it directly using a web browser. The management personnel upload the age, height, and body focus data of each basketball player in the background, as well as the training data and performance data of the players. The data analysis system can comprehensively judge each person's various data and give corresponding suggestions or opinions. At the same time, the disadvantages and advantages of similar athletes can be compared and analyzed, and the visual analysis results are given. Users can view related data information through personal passwords.

4. Results

Result 1: Structural design of basketball data analysis system

The functional module diagram of a basketball-based basketball analysis system designed in this paper is shown in Figure 1. The data analysis system includes 4 modules, which are a system configuration module, a data acquisition module, a data management module, and a data analysis module. The system configuration module has system parameter settings and database settings; the function of the data acquisition module is to send acquisition commands and perform data processing and storage; the functions of the data management module include real-time data display and historical data display; the function of the data analysis module is to display the analysis results and give relevant sports suggestions to help athletes exercise scientifically.

![Figure 1. Structure of a basketball data analysis system](image)

Result 2: Analysis of basketball sports data

In order to verify the effectiveness of the cloud computing-based basketball motion analysis system...
designed in this paper, the average training data of 300 basketball players was calculated and analyzed. Then upload the sports data of 2 basketball players for analysis, compare the obtained results with the average level of 300 players, and give corresponding suggestions. The data analysis results of basketball players are shown in Figure 2. The vertical axis in the figure represents the scoring situation.

![Scores](image)

**Figure 2.** Scoring of athletes X and Y

Through the processing of the basketball sports data analysis system, it can be seen from Figure 2 that the ability of athlete X in basketball skills is significantly lower than that of athlete Y and lower than the average. In terms of endurance, athlete X showed a clear advantage, and athlete Y’s endurance score was below average. In terms of speed, athletes X and Y are both above average, and their speed capabilities are not much different. From the above analysis results, it can be seen that athlete X needs to strengthen his skills in subsequent training, while athlete Y needs to focus on strengthening endurance training. Through systematic scientific operations, it provides constructive guidance for corresponding training.

5. Conclusions

Basketball training does not come by feeling. It requires systematic training. Each athlete has its own strengths and weaknesses. How to avoid deficiencies and give full play to their own advantages is the concern of all coaches and athletes. The cloud computing-based basketball analysis system proposed in this article can help coaches and athletes to formulate scientific and reasonable sports plans, help to quickly improve athletes' physical fitness, and enhance their sports level. I hope the research in this article can provide a reference for related people.

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