Digital Management of Sports Industry Based on Big Data Era

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Abstract. In the era of big data, the sports industry is facing transformation and upgrading. Big data has become the key technology to lead the cross-border sports industry and strengthen the sports industry. In the era of big data, the development direction of sports industry is based on the development concept of big data sharing of sports industry, relying on the refinement and personalized service of big data to the market, aiming to build a sports industry chain of industrial integration and build a big data platform of sports industry, so as to realize online sports consumption and offline sports experience. Based on the above background, this paper aims to study the digital management of sports industry in the era of big data. With the maturity of big data technology, the combination of big data and sports industry has become inevitable. Based on the simple analysis of the characteristics and background of the era of big data, this paper discusses the opportunities and challenges faced by the big data sports industry, and proposes to promote the research of digital management of sports industry from the aspects of improving data storage and processing capacity. In the era of big data, sports industry management should be able to use big data technology to analyze valuable information from massive data. In the era of big data, the storage of massive information requires data analysis and processing, and timely feedback of information, which all bring great challenges to the sports industry.

Keywords: Big Data, Sports Industry, Digital Management, Data Storage

1. Introduction
With the emergence and development of QQ, microblog and app, as well as the emergence of portable mobile devices and the vigorous development of Internet and cloud computing, we have entered the era of "big data", with explosive growth of data, which has a huge impact on our production and life. Relying on the innovation of sports industry in the era of big data can optimize the overall sports industry system, integrate sports resources, enhance the utilization efficiency of sports resources, and promote the cross-border integration of sports industry [1-2]. Sports big data refers to the mining of...
sports related data in big data, and providing effective graphics and data reports for decision-makers to provide valuable information [3]. According to the domestic market survey, China's current sports big data companies are mainly divided into four categories: the all event data company represented by Chuang Bing, the sports health data analysis company represented by Gudong millet, the competitive color data company represented by competitive color cat and the football data company represented by Kongdi [4]. The essence of these four kinds of big data sports companies is to create a new business model of sports industry based on integrating resources and providing sports value-added products and personalized services according to the needs of users [5-6].

Compared with traditional data collection methods, big data can get useful information from these data, and analyze and get feedback results, so as to provide data support for decision-making [7]. In addition, by analyzing timely information, enterprises can accurately grasp market development, understand customer consumption information, and then carry out more targeted services [8]. For example, in the sports and fitness industry, the use of sensing equipment can get the physical quality information of customers, and the use of social software can understand the real needs and situations of customers. Through the integration of these information, it can provide customers with sports opinions, thus attracting more customers to participate in sports and creating greater value [9-10]. But with the development of sports industry, the management of sports industry has become more and more complex. In a word, human resource practitioners and managers should actively think about how to use digital management to operate, count and analyze human capital as a value-added asset, and how to use digital management to break through the bottleneck of traditional human resource management, reverse the situation in the enterprise, and become an important partner of enterprise strategic management [11-12].

In this paper, the application of information technology to sports information resources can be carried out from three aspects: the application of digital technology; the selection of sports information resources; the classification of massive information resources. Through continuous improvement, it can bring a new look to the development of sports information resources in China. In the optimization and integration of sports information resources, strengthening the training of Sports Digital talents can bring strong talent strength, improving the sports system in higher education can improve the level of sports education, strengthening the innovation and practice ability of sports information resources can bring more development vitality, and improving the construction of sports network system can bring better use of sports information resources, so as to Bring new opportunities for the development of China's sports industry in the new era.

2. Method

2.1. Introduction to Hadoop

Hadoop is an open source framework of Apache open source organization. It is currently a very widely used open-source cloud computing programming platform. Now, Hadoop platform has been used from the traditional industry to the Internet industry, such as eBay, visa, Wal Mart, the world's largest auction website, and so on. The most important design in Hadoop framework is HDFS and MapReduce. Among them, HDFS provides the lowest level support for Hadoop distributed computing and storage, and it is also the basis for mass data storage. MapReduce's idea is mainly because a
Google paper has been widely distributed. MapReduce is actually to decompose the work through map and reduce functions, and then summarize the results of all the decomposed work. Hadoop has the following advantages:

1) Extensibility: the basic purpose of Hadoop design is storage and extensibility. Hadoop expansion is particularly easy and does not need to change any structure.

2) Low cost: Hadoop framework can run on all ordinary computers without special requirements for hardware.

3) Security: Hadoop uses the backup and recovery mechanism of distributed file system to ensure the security of the system. Hadoop can provide at least one backup in the initial situation.

4) High performance: achieve high-performance data exchange mode of distributed file system.

2.2. Basic principles of HDFS

Hadoop distributed file system HDFS can run properly on low-cost hardware [25], which is the foundation of data storage and distributed computing. HDFS is a highly fault-tolerant system, which can be placed on a cheap computer. At the same time, HDFS can provide high throughput during data access, which is extremely suitable for large-scale data sets. Hadoop distributed file system stores resource files to data nodes in the cluster in a way of partition and backup. By default, the resource files imported nearby are divided equally. You can also adjust the default size of data blocks and the number of backups.

HDFS has the following basic characteristics:

1) Hadoop clusters have only a unique namespace.

2) Hadoop can automatically read the installation configuration files of the system, and divide the input resource files into multiple data blocks at the same time. Each data block is distributed to different data nodes in the cluster, and block replication between nodes will be performed according to the number of backups, so as to ensure the integrity and security of data.

3) The resource files in HDFS are written once but read many times.

4) HDFS is suitable for building on multiple low-cost computers, with strong scalability and fault tolerance.

5) Hadoop provides the default configuration of HDFS for small cluster installation. Users only need to modify the default configuration according to their own situation.

HDFS adopts the primary / secondary relationship architecture, which includes a primary node and multiple slave nodes. An HDFS cluster element contains a namenode and multiple datanodes. Namnode (name node) runs on the master node, which is equivalent to a central coordinator, which is responsible for managing the namespace of resource file system, and also supervising the access of clients to files. In a cluster, a data node is usually installed at a node. It mainly manages the storage of data on its own node.

Of course, in the actual operation process, any resource file will be divided into a lot of data blocks, and any small data block that is divided corresponds to a group of data nodes. When the name node implements the basic operations such as opening and closing the resource file in the file system, it also maps the information of any small data block to each detailed data node. The data node is responsible for receiving the read and write requirements of the system resource file client.

HDFS mostly uses Java development language. For this reason, all machines supporting Java
language can arrange name nodes and data nodes. The biggest feature of Java language is that it has a strong cross platform, which enables HDFS to be deployed to a variety of types of machines.

3. Experiment
Step 1: Firstly, it introduces the connotation of big data and analyzes the important application of big data in the digital management of sports industry. Then, it briefly introduces the big data technology Hadoop, including the basic principles of HDFS, MapReduce and HBase, and finally introduces the architecture of Hadoop. Then based on the big data of sports industry digital management needs analysis and design. This chapter analyzes the demand analysis and feasibility analysis of the sports industry digital management system based on big data, introduces the digital process, analyzes and designs the system architecture adopted by the system, and designs the functional modules of the system.

Step 2: Then it analyzes the important value of using metadata in the digital management of non-sports industry, explains the connotation of metadata and introduces the description information of three aspects of metadata. This paper describes the content of digital management of sports industry through metadata. Then, the digital management database and metadata management system of sports industry are designed. Based on Hadoop platform, the distributed image retrieval function is realized. This paper analyzes the architecture and shortcomings of the traditional image retrieval system, and puts forward a sports industry digital management information image retrieval system based on Hadoop platform. It mainly introduces the specific implementation of the parallel full-text image retrieval function based on Hadoop, including the implementation of MapReduce module and HDFS module.

Step 3: Finally, the data entry and texting functions of synta are introduced. Then, the hardware equipment needed for the experiment test and the construction of Hadoop platform are introduced. This paper analyzes the architecture and shortcomings of the digital management system of sports industry. Aiming at massive digital pictures, it can not only improve the retrieval efficiency of pictures, but also ensure the integrity and security of data, and reduce the cost of hardware equipment. Based on the Hadoop platform, the architecture of the whole text storage and retrieval system and the retrieval algorithm of massive pictures are proposed.

4. Discuss
4.1. Analysis of experimental results
In the era of big data, big data institutions collect and sort out sports data through terminal equipment and Internet technology, and mine and analyze sports related data in big data, which can realize the sharing of sports information and resources within sports industry, promote the transformation and upgrading of sports industry, optimize the internal structure of sports industry, promote sports industry and big data institutions as well as colleges and universities, scientific research institutions, communication with government departments, so as to lead the cross-border integration of sports industry. Based on the big data survey, the total output and added value of China's sports industry in 2018 are shown in Table 1.
Big data through the analysis of data, using sensor technology, vital signs monitoring technology to construct big data information feedback. For example, the use of visualization technology has brought better viewing experience for the audience, increased the interaction between coaches and athletes, and the use of Hawkeye technology can make the game more just. Therefore, it is of great significance to enhance the key technologies of sports industry, which can provide personalized services for users and promote the healthy development of sports industry. In recent years, the value-added of global sports industry is shown in Figure 1.

**Table 1.** Total output and increase the value of the sports industry in 2018

| Sports Industry Category Name                                   | Total (100 million yuan) | Value Added  |
|-----------------------------------------------------------------|--------------------------|--------------|
| Total output                                                    | 276.9                    | 129.4        |
| Physical fitness and leisure activities                        | 856.2                    | 458.1        |
| Physical training and education                                 | 11238.2                  | 2755.5       |
| Manufacturing of sporting goods and related products            | 229.1                    | 115.0        |
| Sports competition performance                                  | 149.5                    | 52.6         |

*Figure 1. Annual income growth of the global sports industry from 2007 to 2019*

The global sports industry (including infrastructure, sports competitions, sports training and related commodities) is worth about US $600-700 billion annually, and its growth rate is far faster than the GDP growth rate of the world's largest countries.

4.2. **Analysis of problems in sports industry management of big data**

The combination of big data technology and sports field is an inevitable choice for the development of sports modernization. Sports itself is complex and data collection is difficult. In competitive sports, the training of athletes and the track of actual tactics have become the key data to be collected. Big data technology will inevitably promote the improvement of training level, and the training data of athletes need real-time transmission by sensors. The transmission results of these data will be able to provide data support for training decision-making. In the era of big data, traditional training materials, training methods, etc. are facing challenges. In addition, in the data collection and analysis, the audience of the event is larger, and the tactics adopted for the event and the running speed of athletes are higher. Therefore, data collection and storage will bring great challenges to relevant departments.
In the aspect of data mining, the storage of data in the era of big data is not the key, but the analysis and utilization of information. In the development of sports industry in the era of big data, we should be able to use big data technology to analyze valuable information from massive data. In the era of big data, the storage of massive information requires data analysis and processing, and timely feedback of information, which all bring great challenges to the sports industry.

In terms of sports information security, with the rapid increase of sports big data, the security of data storage began to be threatened. At present, a lot of data analysis is open, which creates conditions for crime. Once separated from the relevant legal constraints, consumer information will be leaked, and even a small number of enterprises deliberately disclose user information for economic benefits.

5. Conclusion
Through data collection, big data can excavate valuable information from many data, integrate sports resources, and improve the utilization efficiency of sports resources. At present, the sports industry structure is obviously short, which can not meet the people's diversified and ornamental sports consumption. Optimizing the structure of sports industry can balance the relationship between sports supply and consumption, adjust the relationship between supply side and demand side, meet the diversified sports demand of the people, eliminate inefficient supply and ineffective supply, and make up for the structural weakness. With the wide application of wearable intelligent equipment, the era of big data has entered people's life. The arrival of big data era is a new opportunity for the development of sports industry. Big data can realize the optimal combination of sports resources, promote the transformation and upgrading of industrial structure, and lead the cross-border integration of sports industry. However, the application of big data in sports industry is still in the initial stage of development, and there are still many deficiencies. We should do a good job in protecting the privacy of users, promote the continuous integration of sports industry and big data, provide personalized services for users, and promote the sustainable development of sports industry.

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