Research on Key Technologies of Environmental Monitoring System for Jujube Forest in Northern Shaanxi Based on Cloud Computing

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Abstract: The climate and geographical distribution in northern Shaanxi restrict the increase of jujube yield. In China, there are few studies on the environmental monitoring system of jujube forest land, and its application scope needs to be further expanded. Judging from the current actual situation, there are some drawbacks in the environmental monitoring system. His cost is relatively high. In order to ensure the real-time data monitoring, this paper studies the environment monitoring system based on cloud computing. This will help to increase the production of jujube, increase people's income, and also provide necessary reference for environmental monitoring.

1. Introduction

For our country, jujube is a special product. Its main planting areas are distributed in the following areas: the middle and lower reaches of the Yellow River, such as Shaanxi, Shandong, etc.[1-2]. Most of these areas are famous for wild jujube. Its main characteristics are strong adaptability, especially drought and cold tolerance. In addition, it has low requirements for soil and climate. The cultivation of jujube is simple and the fruiting period is short. Its fruit has high nutritional value and is welcomed by people. The soil and climate conditions on the Loess Plateau are suitable for the growth of jujube. Therefore, jujube can be said to be the best cash crop to get rid of poverty and become rich. North Shaanxi jujube is famous for its unique geographical and quality advantages. The jujube in northern Shaanxi is of high quality and low price. It can be the most important export economic food in China.

The fate of people in northern Shaanxi is closely related to jujube, forming the jujube culture in northern Shaanxi. Northern Shaanxi belongs to temperate zone, and its illumination intensity is abundant. The climate in this area is relatively cool, with less precipitation and poor soil fertility in the surrounding areas. The cultivation of jujube in northern Shaanxi has a history of 3000 years, and it has a good level in the production of dried jujube. The brand of jujube in Northern Shaanxi is well-known overseas. There are many studies on jujube in China. According to different varieties of jujube, different growth results and different climates, we divided the areas of jujube cultivation and compared the producing areas of dried jujube, so as to determine the jujube eugenic areas. We found that the northern Shaanxi jujube region is the late-maturing dry jujube region in China. This provides a new direction for the development of jujube in northern Shaanxi.

At present, regarding the environmental monitoring system of jujube forest land in northern Shaanxi, this research takes the jujube forest land in northern Shaanxi as the research object, focuses on the analysis of the system platform based on cloud computing, determines the regionalization index, carries on the data detection in the principle of environmental monitoring system, sends information in real time, and rationally distributes the industrial base, so as to promote industrial development and provide scientific basis[3].

For environmental monitoring, wired will have a visual impact on aesthetics, and it is extremely unfavorable for management and maintenance[4]. For wireless sensor networks, although it is more extensive, it is mainly used in outdoor areas with complex conditions and harsh environment. Therefore, this paper mainly uses cloud computing-based platform technology to monitor environmental systems, which overcomes the limitations of traditional methods, and its characteristics are simpler and more mobile[5].

2. Cloud computing

Cloud computing platform is a platform for computing and storing data. It mainly uses virtualization technology and distributed technology to unify different protocols in the network. At the software level, it relies on MPI technology to parallelize multiple algorithms, and also relies on logical subroutines to schedule other logical computing units. Finally, it realizes the process of parallelization. This paper designs an environment monitoring system based on cloud computing, the main purpose is to improve the efficiency of the system. At the same time, the monitoring system of cloud computing platform has two main parts, the system client and mobile terminal, as shown in Figure 1.
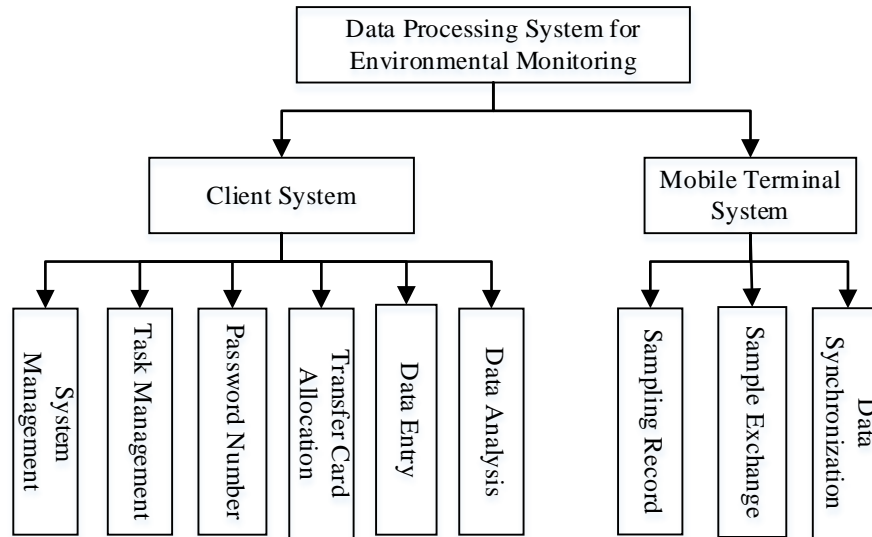

Figure. 1 Functional Diagram of Monitoring System Based on Cloud Platform

The whole monitoring system has the following functions:

The first is the management class of the system. This part mainly includes system management and task management. The main purpose is to achieve the overall functions of the system, including adding and deleting functions.

Secondly, data recruitment and processing. The core components are data acquisition and recruitment, and the most important is classification and processing.

Again, data encoding and encryption. Because sometimes the environmental monitoring system may involve secret level information, at the same time, it needs to encrypt and encode the data.

Finally, the function of data synchronization cannot be ignored. On the one hand, we need to ensure the data information of the monitoring system. In addition, in order to avoid information loss, we need to ensure data synchronization.

3. Environmental Monitoring System

Generally speaking, for environmental monitoring, its objects, means and treatment methods are complex, and there are many factors to be considered, including the following aspects: First, for monitoring objects, there are many factors involved, such as atmosphere, soil, water, biological, solid waste, etc. These basic factors need to be comprehensively analyzed; secondly, it needs to be considered. Monitoring means, especially environmental factors, such as chemistry and physics, are usually used to characterize their environmental factors. Finally, environmental data monitoring[6]. When analyzing statistical data, we usually consider the situation involving natural and social development, so that we can correctly clarify the connotation after comprehensive consideration.

At present, the role of modern information technology in environmental monitoring is becoming more and more obvious. It is necessary to manage environmental monitoring system more scientifically. Combining cloud computing technology, install cameras and other devices in the location to be monitored to communicate with communication equipment. Then real-time data is

sent to the data center. Aiming at the powerful processing ability of cloud computing, massive data is placed in the processing center clothing. On the server, departments and enterprises that need to acquire data can acquire available resources through "cloud". Figure 2 shows the structure of cloud-based environmental monitoring system, which is composed of three parts: perception layer, network layer and application layer.
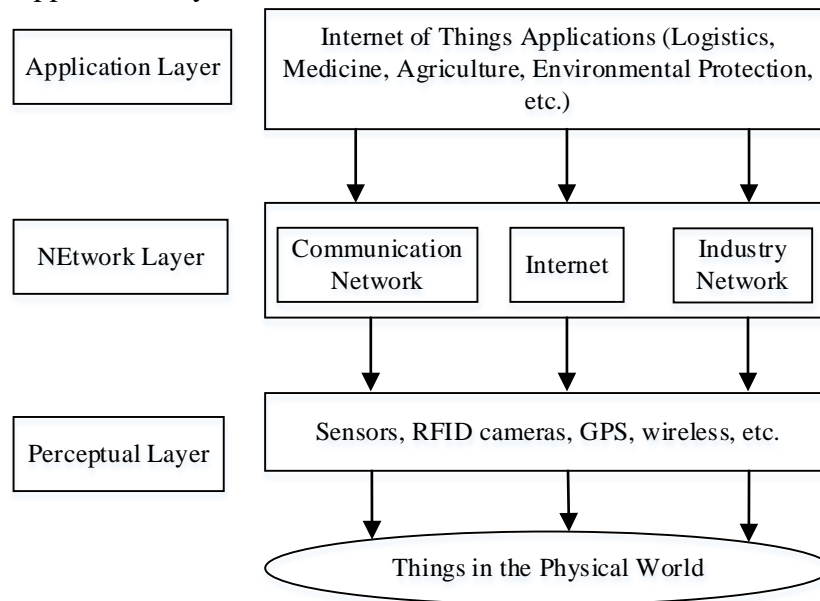

Figure 2 System architecture of cloud computing

4. Key technologies

Environmental monitoring system relies on Internet of Things technology to collect real-time data. Usually, the data to be collected are stored in cloud computing centers. These centers include water quality monitoring, air monitoring, pollution source monitoring, noise monitoring and other databases, which often provide data resources for their application systems. Figure 3 shows the framework of the environmental monitoring platform. The internal business portal provides convenient services for relevant personnel by processing certain information, thus improving the task of effective utilization of environmental monitoring data. At this time, the whole platform of environmental monitoring is based on cloud computing platform, so users can choose the services they need on demand, so that users can access the network using computers and other terminals.

Environmental monitoring platform can be composed of Internet of Things and cloud computing as its supporting environment. It can be the main position for data acquisition system and data storage system, and application system and application interaction are also indispensable. At this time, the application system mainly has several aspects of management system: synthesis, water environment, atmosphere, noise, pollution sources and so on. Firstly, for the integrated management system, the most important thing is to be responsible for the maintenance and management of the system, which can provide timely information services, even intelligent decision-making, comprehensive evaluation system. Secondly, for the water monitoring system, real-time monitoring of water resources, evaluation of water quality, regulation of water volume, timely emergency treatment. Thirdly, for the atmospheric monitoring system, it monitors the atmospheric quality, evaluates the atmospheric quality, changes or strengthens the illumination according to the change of weather in time. Finally, it involves the pollution source management system, the implementation of monitoring nearby pollution sources, do a good job of early warning function, to ensure the quality of jujube.
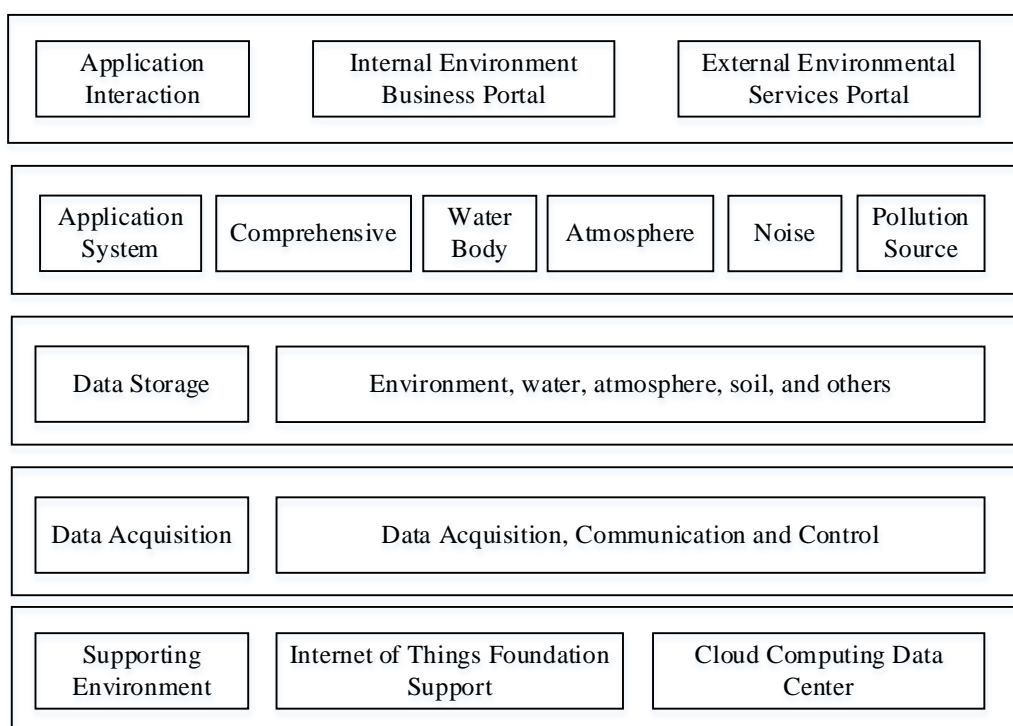
Figure. 3 Framework of Environmental Monitoring Platform

Table 1 shows the real-time data obtained through cloud computing, according to a large number of cloud computing can faster and better improve the production of jujube, to facilitate human production and life.

Table 1. Average Temperature, Precipitation and Sunshine of Jujube Growing Period in Northern Shaanxi

Investigation period	Average Temperature/C	Precipitation /mm	Sunshine hours/h
Budding stage	0.27	3.05	-0.75
Brittle ripening harvest time	0.15	8.38	-11.88
Dormancy period	0.33	5.32	-3.62
Flowering stage	0.14	-2.24	-3.28
Young fruit stage	0.21	-10.61	-8.98

5. Conclusion

This paper designs the overall framework of cloud computing environmental monitoring, which saves manpower and improves efficiency. In this architecture, we use cloud computing technology to process data by processing the information acquired by the perception layer. In the application layer, we use cloud computing platform for comprehensive management to improve utilization. At the same time, we have built a modern environmental monitoring system. This system can intelligently perceive and process the environment, monitor in all directions, and realize the common development of human and environment. In this paper, the jujube forest land in northern Shaanxi is taken as the research object, the regionalization index is determined, the data is detected by the principle of environmental monitoring system, and real-time information is sent to promote the development of jujube economy in northern Shaanxi.

Acknowledgement

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