Application of Big Data Technology in Water Conservancy Project Informatization Construction

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Abstract: In order to better develop the cause of water conservancy project, improve the quality of water conservancy project construction, and bring more benefits to the public, this paper expounds the current situation of water conservancy project informatization construction in China through theoretical analysis, discusses the feasibility of big data in water conservancy project informatization construction, and points out the specific application of big data technology, so as to achieve the purpose of water conservancy project informatization construction.

1. Introduction
Water conservancy project has been an important public utility in China since ancient times, which can bring welfare to the people. Because of its special nature, the construction period of water conservancy project is generally long, the construction content is also more, the construction cost is very high, the construction technology involved is complex and diversified, and the problems that need to be dealt with in the construction process are trivial. In order to improve the construction quality of water conservancy project, it is necessary to introduce new science and technology. Liu Hongxia[1] and others pointed out that information technology is one of the means to promote the development of water conservancy project, which can effectively improve the efficiency and quality of water conservancy project management. Xiao Lindong[2] proposed that integrating information technology into the construction management of water conservancy projects can effectively improve the construction quality of water conservancy projects and better develop the cause of water conservancy projects. Zhang Wenhao[3] further introduced big data technology on the basis of water conservancy project informatization, which can better promote the construction and development of water conservancy project informatization.

2. The current situation of water conservancy project information construction in China
On the premise of maintaining the status quo, most water conservancy management units in China have established the relevant water conservancy project information management system according to the actual situation, and use the water conservancy project information management system to effectively formulate the project construction plan, optimize and effectively manage the construction conditions, construction quality, construction progress, construction cost and construction safety. However, due to the rapid development of information technology, the update speed of many water conservancy project information work seems to be very slow, domestic in this aspect has started late, and problems gradually appear. The main manifestations are as follows.
2.1. Industry development lags behind current demand
With the rapid development of domestic market economy, water conservancy management departments pay more and more attention to economic development, environmental impact assessment, soil and water quality protection and landscape design\[^{3}\]. However, considering the current situation of water conservancy project information construction, the existing data collection methods are still widely used, which can not meet the objective requirements of industry development at this stage. For example, some water conservancy organizations in water quality and soil and water conservation still rely heavily on the existing data collection methods, resulting in lack of professional assessment information. At the same time, the available information is limited. It reduces the efficiency of obtaining relevant information, and further affects the actual business development and industrial development.

2.2. Insufficient top design
In the process of water conservancy project information construction, we should pay attention to the related problems of high-rise design, mainly the top-down management and design problems. The upper design must match with the reality, and must adopt different methods and actions according to the actual situation, so as to maximize the effectiveness of the upper design, and avoid the "direct" and "one-sided" phenomenon." The best leader" and "one hand holding" are extremely harmful. Therefore, if the leadership of each water conservancy management department is insufficient, it will not be able to establish an effective master plan, nor provide a reasonable high-level design plan, and the information construction will fall into a passive state, or even come to an end. But at present, a large number of water conservancy management units in China have not fully realized the significant impact of the upper design. It is obvious that the defects have a great impact on the development of water conservancy project information construction.

2.3. Lack of effective coordination platform
In the information construction of water conservancy projects, some platform coordination problems are often involved, which usually have a great negative impact. In the process of sharing information between different departments, the lack of coordination of the platform will inevitably have a great impact on the actual project management and production and operation effect, and reduce the value of informatization. As far as the current situation is concerned, there is still a lack of effective coordination platform in China, which leads to many problems. Due to the lack of an effective coordination platform, it is impossible to form an integrated data management organization mechanism, which often leads to data heterogeneity and other problems. At the same time, due to the lack of effective information exchange and sharing among departments, it is impossible to make scientific decisions.

3. The feasibility of big data technology in water conservancy project informatization construction
China's water conservancy industry is paying more and more attention to the application of big data technology, but it has not yet been implemented. The application of big data technology in water conservancy project information construction has become the inevitable trend of water conservancy project information construction development. In order to gradually use the application value of big data, it is necessary to transform the weak data management mode into fine data management, improve the comprehensive management consciousness, realize the comprehensive management of water conservancy project, and promote the development of big data technology in water conservancy project construction. Through comprehensive and rapid processing of various data collected every day, make full use of the value of information, gradually solve various problems in data, realize continuous improvement of data collection, and carry out subsequent storage and data aggregation, so as to ensure data integrity and integrity, ensure real-time sharing of data and information, and gradually repair information processing vulnerabilities\[^{4}\]. At the same time, it also needs to realize the open processing
of data information, realize the sharing management of various application data, reflect the meaning of data sharing in the network environment, increase the flexibility of data application, and make reasonable development decisions.

At present, the informatization work of most domestic water conservancy projects is progressing steadily, and there are corresponding problems, but the overall effect and development momentum are relatively good. Only by making full use of big data technology, can we comprehensively promote the process of water conservancy project informatization and give full play to the important role of big data technology in the construction of water conservancy project informatization.

4. Application of three big data in water conservancy project

4.1. Cloud computing application

From the perspective of theory and technology, big data technology and cloud computing complement each other. They effectively deploy cloud computing, extract important information elements from large-scale data, perform target data mining and analysis, and implement virtualization technology. It is based on cloud computing and big data technology. At this stage, cloud computing can not only be widely used in the high-precision level of watershed, but also be simulated in the dimension of multi-scale real-time simulation. In the case of two-dimensional or three-dimensional hydrodynamic model and large-area calculation or large-area River calculation, it has been converted to variance model step by step on a regular basis. In the simulation of river water cycle, cloud computing technology can be used in network distributed computer, and can be used to segment complex two-dimensional or three-dimensional fluid dynamics and related process models.

4.2. 3D Intelligent Collaborative Design

As we all know, the design of water conservancy project has a strong cohesion, which not only infiltrates into many fields, but also needs the cooperation of many professional designers. Even in some stages of water conservancy project design and implementation, it is necessary to combine the design plan with the results of designers in various disciplines, and timely share and integrate the test to meet the needs of engineering design. Therefore, in order to improve the work efficiency as much as possible, ensure the safety of water conservancy projects, shorten the design and construction time of water conservancy projects, and ensure that the work and progress of designers can be balanced in each design stage of water conservancy projects, it is necessary to use 3D intelligent collaborative design.

In the so-called three-dimensional intelligent collaborative design, the basis of three-dimensional collaboration is three-dimensional digitization, and the carrier of three-dimensional collaboration is the three-dimensional design platform, sharing and integration process of data and resources combined with big data technology. At the present stage, the use of 3D intelligent design platform enables designers and construction personnel not only to detect the design process and project design progress, including but not limited to terrain, electrical facilities, layout, etc., but also to visualize the water conservancy project, which can continue the whole process from design to completion.

By referring to the existing research results of the current 3D intelligent collaboration system and the actual use status of the 3D intelligent collaboration system, hydraulic engineering designers can perform process based work on the same 3D intelligent collaboration platform. It can also realize the synchronous update of water conservancy project design data, realize the real-time sharing of water conservancy project data and resources, and can be used in water conservancy project design. After the design of the water conservancy project is completed, the design plan is uploaded to the cloud server. Project team members can model according to the uploaded electronic design plan. When the project team members complete the modeling of different parts of the project, the 3D intelligent collaboration platform can integrate the model through its own link function.
4.3. **Information system construction**

Applying big data technology to water conservancy project informatization is not only a challenge, but also an opportunity. The integration of big data technology and 5G technology will be an important trend of China's development. Although this is an existing technical process, it uses big data to realize the intelligence, automation and convenience of water conservancy project information. At present, big data technology and 5G technology have not been integrated into the design and construction of most water conservancy projects in China, and big data technology is the requirement of the development of domestic water conservancy project construction and the information age. 5G technology has been applied to water conservancy projects, which is an inevitable trend in engineering\(^\text{[6]}\). In order to achieve the level of intelligent water conservancy project construction, it is necessary to further promote the improvement of enterprise information system. As an important part of water conservancy construction enterprise informatization, enterprise information system should be combined with other advanced research results such as big data. Therefore, it can realize the intellectualization of water conservancy project in the life cycle of design, construction and project operation. Therefore, the construction of water conservancy project information needs to combine big data technology, 5G technology, the underlying Oracle database and machine learning tools to realize the construction of water conservancy project information system based on big data technology. The information system is shown in Figure 1.

![Figure 1. Construction diagram of water conservancy project information system](image)

5. **Conclusion**

In conclusion, for the development of water conservancy project, information construction is the general trend. In order to better promote the information development of water conservancy project, timely introduce new science and technology, and carry out information construction of water conservancy project, we must give full play to the important role of big data technology and improve the application level of big data technology.
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