Design of 3D Model of Cross-Regional Water Transport Device for Water Conservancy Project Based on High in the Clouds

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Keywords: Digital Twin Theory, High in the Clouds, Water Transport Device, 3D Model, Design, Water Conservancy Projects Across Districts.

Abstract: The design of the three-dimensional model of the water transport device plays an important role in the cross-regional of water conservancy projects, but there is a problem of inaccurate design positioning. Traditional deep learning cannot solve the problem of designing 3D models in cross-regional hydraulic projects, and the effect is not satisfactory. Therefore, the design of the three-dimensional model of the cross-regional water transport device of water conservancy project based on high in the clouds is proposed, and the design of the three-dimensional model of the cross-regional water transport device of water conservancy project is analyzed. Firstly, the digital twin theory is used to locate the influencing factors, and the indicators is divided according to the design requirements of the three-dimensional model of the water transport device, so as to reduce the interference factors in the design of the three-dimensional model of the water transport device. Then, the digital twin theory is used to form the design scheme of the three-dimensional model of the high in the clouds water transport device, and the design results of the three-dimensional model of the water transport device is comprehensively analyzed. The MATLAB simulation results show that under certain evaluation standards, the high in the clouds is better than the traditional deep learning in terms of the design accuracy of the 3D model of the water transport device and the time of the design influencing factors of the 3D model of the water transport device.

1 INTRODUCTION

The design of the three-dimensional model for water transport devices plays a crucial role in cross-regional water conservancy projects, as it enables faster and more accurate establishment of the said models (Song and Zhang, et al. 2023). However, during the design process of these three-dimensional models, there exists an issue of poor accuracy in their design schemes, which negatively impacts the overall quality of the water transport device's three-dimensional model (Pan and Guo, 2023). The application and analysis of high water device transmission data set are also explored in this study. Some scholars suggest that incorporating cloud-based technology into the analysis of three-dimensional models for water transport devices can effectively evaluate the design schemes and provide necessary support for their optimization (Jiao and Lin, et al. 2023). Building upon this idea, this paper proposes utilizing cloud-based technology to enhance the design scheme of the three-dimensional model for water transport devices and validates its effectiveness (Duan and Yanchun, et al. 2023).

2 RELATED CONCEPTS

2.1 Mathematical Description of the High in the Clouds

The cloud-based system utilizes computer technology to enhance the design scheme of the three-dimensional model for the water transport device (Qian and Zhang, et al. 2023). It takes into account the index parameters involved in the design process of the three-dimensional model for the water transport device. it is y_i found that the unqualified value parameters in the three-dimensional model of the water transport device is z_i, and the design scheme of the three-dimensional model of the water transport

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device is $tol(y_i \cdot t_{ij})$ integrated with the function to finally judge the feasibility of the three-dimensional model of the water transport device, calculated as in formula (1).shown.

$$\lim_{x\to\infty}(y_i \cdot t_{ij}) = \lim_{x\to\infty} y_{ij} \geq \sqrt{a^2+b^2}\max(t_{ij} \div 2) \tag{1}$$

Among them, the judgment of outliers is shown in Equation (2).

$$\max(t_{ij}) = \mathrm{A}(t_{ij}{}^2 + 2\cdot t_{ij}) \succ mean(\sum t_{ij}+4) \tag{2}$$

The high in the clouds combines the advantages of computer technology and uses the three-dimensional model of the water transport device for quantification, which can improve the design accuracy of the three-dimensional model of the water transport device (Fan and Liu, et al. 2023).

Suppose I the design scheme judgment function of the three-dimensional model of the water transport device is $F(t_i \approx 0)$ as shown in Equation (3).

$$F(d_i) = \lim_{x\to\infty}\sum t_i \bigcap \xi \cdot \sqrt{2} \to \oint y_i \cdot 7 \tag{3}$$

2.2 Selection of Design Scheme of Three-Dimensional Model of Water Transport Device

Hypothesis II The three-dimensional model function of the water transport device is and the weight coefficient is $g(t_i)$, then, the design requirements of the three-dimensional model of the water transport device is unqualified and the three-dimensional model of the water transport device is shown in Equation w_i (4).

$$g(t_i) = \ddot{x}\cdot z_i \prod F(d_i)\frac{dy}{dx} - w_i\hbar \tag{4}$$

According to hypotheses I and II, a comprehensive function of the design of the three-dimensional model of the water transport device can be acquired, and the outcome is depicted in Equation (5).

$$\lim_{x\to\infty} g(t_i) + F(d_i) \leq \bigcap \max(t_{ij}) \tag{5}$$

To improve the design reliability of the 3D model of the water transport device, all data needs to be standardized and the result is shown in Equation (6).

$$\boxed{\lim_{x\to\infty} g}(t_i) + F(d_i) \leftrightarrow mean(\sum t_{ij}+4) \tag{6}$$

2.3 Analysis of the Design Scheme of the Three-Dimensional Model of the Water Transport Device

The crucial to conduct a comprehensive analysis of the design scheme for the three-dimensional model of the water transport device. This entails mapping the design requirements of the three-dimensional model to the corresponding library and subsequently eliminating any design schemes that fail to meet the necessary criteria (Yang and Zhu, et al. 2023). According to Equation (6), the anomaly evaluation scheme can be proposed, and the results is shown in Equation (7).

$$No(t_i) = \frac{\boxed{g(t_i)} + F(d_i)}{mean(\sum t_{ij}+4)} \tag{7}$$

The scheme is not proposed, then scheme integration is necessary, and the outcome is illustrated in Equation (8).

$$Zh(t_i) = \sqrt{b^2-4ac}[\sum \boxed{g(t_i)} + F(d_i)] \tag{8}$$

The comprehensive analysis of the 3D model for the water transport device includes setting thresholds and assigning weights to design schemes, ensuring precise accuracy in high-altitude environments (Zhao, 2023). The systematic testing of the 3D model design scheme for the water transport device requires accurate analysis (Ouyang and Xiang, 2023). Reducing the design accuracy of the overall 3D model of the water transport device, and the calculation result is shown in Equation (9).

$$accur(t_i) = \frac{\min[\sum \boxed{g(t_i)} + F(d_i)]}{\sum \boxed{g(t_i)} + F(d_i)} \times 100\% \tag{9}$$

The investigation of the design scheme of the three-dimensional model of the water transport device shows that the design scheme of the three-dimensional model of the water transport device presents a multi-dimensional distribution, which is in line with the objective facts (Peng, 2023). The three-dimensional model of the water transport device has no conditionality, which indicates that the design scheme of the three-dimensional model of the water transport device has strong randomness, so it is regarded as a high analysis study (Liu and Huang, et al. 2023). If the random function of the three-dimensional model of the water transport device is $randon(t_i)$, then the calculation of Equation (9) can be expressed as Equation (10).

$$accur(t_i) = \frac{\min[\sum g(t_i) + F(d_i)]}{\lim\limits_{x\to\infty} \sum g(t_i) + F(d_i)} + randon(t_i) \quad (10)$$

Among them, the three-dimensional model of the water transport device meets the normal requirements, mainly because the computer technology adjusts the three-dimensional model of the water transport device, removes the duplicate and irrelevant schemes, and supplements the default scheme, so that the design scheme of the entire three-dimensional model of the water transport device has a strong dynamic correlation (Chai and Zhou, 2023).

3 OPTIMIZATION STRATEGY OF 3D MODEL OF WATER TRANSPORT DEVICE

The high in the clouds adopts a random optimization strategy for the 3D model of the water transport device and adjusts the Internet information parameters to realize the scheme optimization of the 3D model of the water transport device (Wang and Fan, et al. 2023). The high in the clouds divides the 3D model of the water transport device into different design levels of the 3D model of the water transport device, and randomly selects different schemes. In the iterative process, the design scheme of the 3D model of the water transport device with different design levels of the 3D model of the water transport device is optimized and analyzed. After the optimization analysis is completed, the design level of the 3D model of the water transport device of different schemes is composed, and the best 3D model of the water transport device is recorded.

4 PRACTICAL EXAMPLE OF A 3D MODEL OF A WATER TRANSPORT DEVICE

4.1 Introduction to the Design of the Three-Dimensional Model of the Water Transport Device

I collected data on the basis of June 2020, and comprehensively judged by the information and data of the high water level device, and realized the perfection of the data.

Table 1: Design requirements for 3D models of water transport devices

Scope of application	Grade	Accuracy	Design of 3D model of water transport device
Engineering construction	I	85.00	78.86
	II	81.97	78.45
Equipment selection	I	83.81	81.31
	II	83.34	78.19
Equipment optimization	I	79.56	81.99
	II	79.10	80.11

The design process for the 3D model of the water transport device in Table 1. is shown in Figure 1.

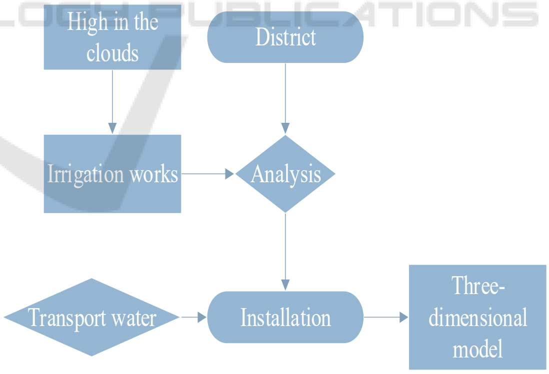

Figure 1: Analysis process of 3D model of water transport device

In terms of rationality and accuracy, high in the clouds outperforms deep learning in designing the 3D model of the water transport device. Figure 2 illustrates that the design changes in the 3D model of the water transport device demonstrate improved accuracy and reliability when using high in the clouds. Consequently, the design speed, accuracy of the design scheme, and overall stability of the 3D model of the water transport device are enhanced when utilizing high in the clouds.

4.2 Three-Dimensional Model of Water Transport Device

The design of the three-dimensional model for the water transport device encompasses non-structural information, semi-structural information, and structural information. Following the ore-selection process in the high-altitude region, a preliminary three-dimensional model of the water transport device is obtained, and the feasibility of its design scheme is analyzed. In order to accurately verify the effectiveness of the 3D model for the water transport device, different design levels of the 3D model are selected, and the corresponding design schemes are presented

Table 2: The overall situation of the design scheme of the 3D model of the water transport device

Category	Random data	Reliability	Analysis rate
Engineering construction	85.32	85.90	83.95
Equipment selection	86.36	82.51	84.29
Equipment optimization	84.16	84.92	83.68
Mean	86.84	84.85	84.40
X6	83.04	86.03	84.32
		P=1.249	

4.3 Design and Stability of the Three-Dimensional Model of the Water Transport Device

The "high in the clouds" approach, the design scheme for the 3D model of the water transport device is compared with the design scheme incorporating deep learning techniques. The design scheme for the 3D model of the water transport device

The design of the 3D model for the water transport device in the high in the clouds surpasses deep learning in terms of quality, while maintaining a lower error rate. This suggests that the design of the 3D model for the water transport device in the high in the clouds is relatively stable, whereas the design of the 3D model for the water transport device using deep learning exhibits inconsistency. The design scheme for the average 3D model of the water transport device for each of the three algorithms

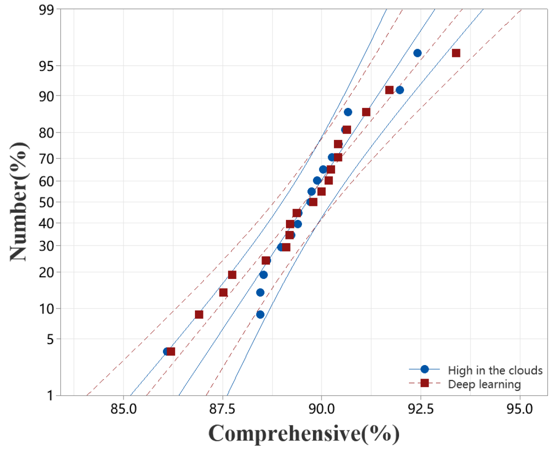

Figure 2: Design of three-dimensional models of water transport devices with different algorithms

Table 3: Comparison of design accuracy of 3D models of water transport devices by different methods

Algorithm	Survey data	Design of 3D model of water transport device	Magnitude of change	Error
High in the clouds	85.33	85.15	82.88	84.95
Deep learning	85.20	83.41	86.01	85.75
P	87.17	87.62	84.48	86.97

Learning exhibits limitations in accurately designing the three-dimensional model of the water transport device. The three-dimensional model of the water transport device experiences significant changes and high error rates when utilizing deep learning. On the other hand, the design of the 3D model of the water transport device using general cloud-based methods outperforms deep learning. Moreover, the accuracy of the 3D model design in the general cloud-based approach remains consistently above 90% without significant fluctuations. To further establish the superiority of the general cloud-based method, a comprehensive analysis is conducted using various techniques.

The design of the three-dimensional model for the water transport device in the high in the clouds is notably superior to deep learning. This can be attributed to the fact that the high in the clouds enhances the adjustment coefficient of the three-dimensional model for the water transport device and establishes a threshold for Internet information, thereby eliminating any design schemes

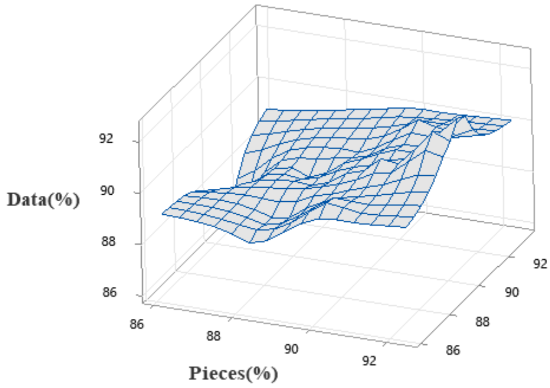

Figure 3: Design of a 3D model of a water transport device in the high in the clouds

4.4 Rationality of the Design of the Three-Dimensional Model of the Water Transport Device

The accuracy of the cloud-based high-in-the-clouds method, the design scheme of the water transport device incorporates deep learning to create a 3D model, and the design scheme of the 3D model of the water transport device is shown in Figure 4.

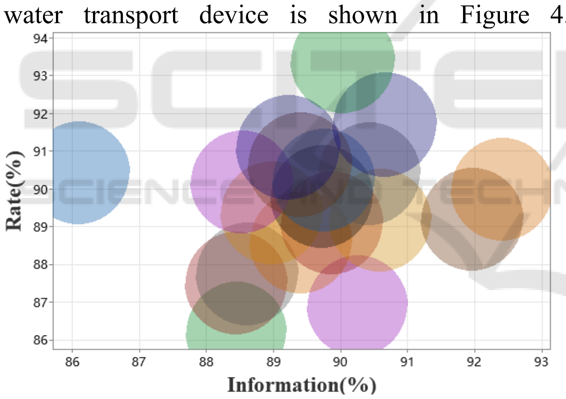

Figure 4: Design of three-dimensional models of water transport devices with different algorithms

It can be seen from Figure 4. that the design rationality of the three-dimensional model of the water transport device in the high in the clouds is better than that of deep learning, and the rationality of the three-dimensional model of the water transport device can be increased by improving the three-dimensional model of the water transport device by using the high in the clouds. The introduction of the high in the clouds can provide a decentralized data storage and management platform, ensuring that results is securely recorded and saved. With the high in the clouds, a unique identifier can be created for each, and the relevant data and scheme can be recorded on the high in the clouds.

4.5 Validity of the Design of the Three-Dimensional Model of the Water Transport Device

In order to verify the effectiveness of the high in the clouds, the design scheme of the three-dimensional model of the water transport device is comprised with the design scheme of the 3D model of the water transport device with deep learning, and the design scheme of the 3D model of the water transport device is shown in Figure 5 shown.

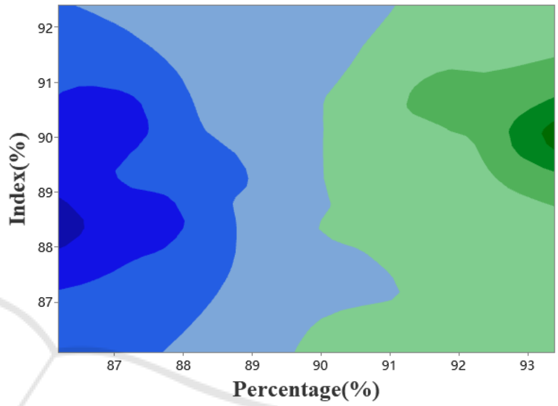

Figure 5: Design of 3D model of water transport device with different algorithms

The design of the 3D model for the water transport device in the high in the clouds surpasses deep learning in terms of quality, while maintaining a lower error rate. This indicates that the design of the 3D model for the water transport device in the high in the clouds is relatively stable, whereas the design of the 3D model for the water transport device using deep learning exhibits inconsistency. The design scheme for the average 3D model.

Table 4: Comparison of design effectiveness of 3D models of water transport devices with different methods

Algorithm	Survey data	Design of 3D model of water transport device	Magnitude of change	Error
High in the clouds	82.21	85.92	84.59	82.85
Deep learning	83.73	84.23	84.41	83.55
P	84.20	87.39	84.76	83.90

Deep learning exhibits limitations in accurately designing the three-dimensional model of the water transport device. The three-dimensional model of the water transport device undergoes significant changes and experiences a high error rate when utilizing deep learning. In contrast, the design of the three-dimensional model of the water transport device using general techniques yields higher accuracy compared to deep learning. Furthermore, the accuracy of the 3D model of the water transport device achieved through general methods remains above 90% without significant fluctuations. To further validate the superiority of the general approach, the effectiveness of the proposed method in this paper is assessed through a comprehensive analysis.

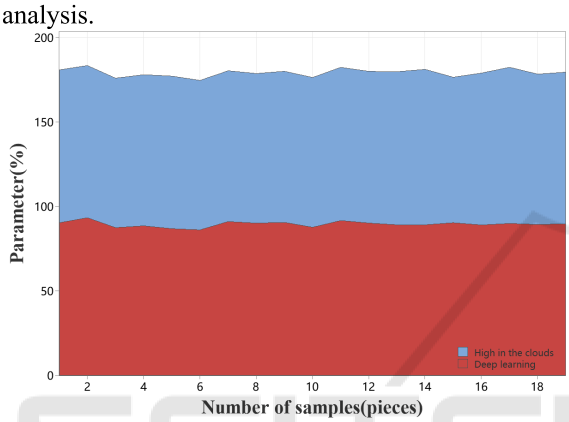

Figure 6: Design of 3D model of high in the CLOUDS WATER transport device

The design of the three-dimensional model for the water transport device in the high in the clouds outperforms deep learning. This can be attributed to the high in the clouds' ability to enhance the adjustment coefficient of the three-dimensional model and establish a threshold for Internet information, thereby eliminating any design schemes for the water transport device that fail to meet the requirements.

5 CONCLUSIONS

The three-dimensional model for water transport devices, this study proposes a cloud-based approach that leverages computer technology to optimize the model. Additionally, it thoroughly examines the design accuracy and reliability of the three-dimensional model while constructing an internet-based information collection system. The findings indicate that the cloud-based approach significantly enhances the accuracy of the three-dimensional model for water transport devices, enabling it to be applied to general models. However, excessive emphasis on the design and analysis of the three-dimensional model during the cloud-based process may lead to the selection of inappropriate design indicators for the model.

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