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Application Analysis of Artificial Intelligence Technology in Museum Concept Design

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Abstract

The current rapid development of artificial intelligence technology has involved all aspects of the production field. The development of various algorithms and programs has pushed artificial intelligence to a new peak. Due to its complexity and diversity in the field of architectural design, the positive impact of artificial intelligence technology on architectural design is discussed from the perspective of conceptual design. For museums, which are one of the increasingly popular public facilities, the introduction of artificial intelligence technology has provided certain help in assisting the conceptual design of the museum. This article analyzes the theoretical and practical support of artificial intelligence technology in improving conceptual design, analyzing the architectural appearance, structural layout, materials, etc., to increase the feasibility and practicality of assisting conceptual design. It has certain reference significance for building a modern, advanced, international and interactive modern museum.

Keywords: *AI, architectural design, conceptual design, data analysis, stable diffusion, stylized rendering , Midjourney,chatGPT*

1. Introduction

Nowadays, going to museums to watch exhibitions has increasingly become a new way of life for everyone. Especially during the current summer and holidays, the public's demand for visiting museums has surged, and the summer "museum fever" continues to heat up. The latest data from the State Administration of Cultural Heritage shows that there are currently 6,565 museums in China and the free admission rate exceeds 90%. Not

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only is it highly open, museums across the country are also actively launching unique and exciting cultural and museum activities.

1.1 Structure and Methodology

From the overall design of the museum, intelligent supporting Settings, combined with the overall style of the museum, through big data and statistical analysis, intelligent guide visitors to effectively alleviate the personnel density, congestion, experience decline and other problems for analysis and discussion.

Table1. Overview of Current Museum Style Designs

	
Shanghai World Expo Museum Shanghai(2017)	**China Grand Canal Museum Jiangsu(2019)**
	
The Palace Museum Beijing（1925）	**Sanxingdui Museum Sichuan（2023）**

2. Overview of the Application of Smart Technologies in Museum Conceptual Design

2.1 Basic principles and Iimportance of Museum Conceptual Design

The conceptual design of a museum refers to the design process carried out during the creation or renovation of a museum. It involves the planning and design of the museum, including, positioning, theme, exhibition strategy, spatial layout, and interactive experience. The conceptual design aims to provide a unique and attractive experience for museums through creative thinking and strategic planning.

In the conceptual design process of the museum, the following aspects can be considered:

2.1.1 Define Goals and Positioning

It is very important to define the goals and positioning of the museum. Identifying the museum's mission, target audience, and core values helps to determine the direction of subsequent design.Based on the actual needs of the construction project, the venue construction will be considered, and the corresponding data will be analyzed through the intelligent system and feasibility experiments will be conducted to improve the efficiency of project implementation.

2.1.2 Theme and Exhibition Strategy

Choose an attractive and unique theme to show the category of the museum collection or the specific period, culture, etc. The exhibition strategy should be developed around the theme, including the selection and organization of exhibits, presentation methods and interactive forms, etc.

Table2. AI Drawing Software Generates Appearance Effects

Prompt	Museum, Retro-Futurism, Bjarke lngels, Compostie Materials Facdes Glass and Metal, Perspective, Water frount, Mir render, Natural Light
midjourney	
Stable diffusion	

aiDraw	

2.1.3 Space layout and Display Design

Museums should be committed to providing educational and participatory experiences. Through educational programs, activities and interactive exhibits, visitors can participate in museum exhibitions and educational activities in various ways.

3. Advantages and Challenges of Intelligent Technology in Conceptual Design of Museums

Intelligent technology has many advantages in the conceptual design of museums, which can provide a more interactive, personalized and rich visiting experience. However, it also faces several challenges, including technology implementation, privacy protection, and preservation of traditional culture. Here is a detailed description of the advantages and challenges of smart technology in museum conceptual design:

3.1 Superiority

3.1.1 Interactive Experience

Intelligent technology can create a rich, diverse and interactive visiting experience. By using virtual reality (VR) and augmented reality (AR) technology, visitors can interact with the exhibits and learn more about the historical and cultural background. In addition, smart technology can also provide an immersive experience, allowing the audience to experience the stories and emotions of the exhibits personally.For example，The National Marine Museum (National Maritime Museum): The museum uses virtual reality technology to provide an exhibition experience called "Virtual Time Lens". Visitors can use the VR headset to watch past Marine historical scenes, such as naval battles, navigation and exploration, to experience the vicissitudes of history and the charm of the age of navigation from them.

3.1.2 Personalized Tour

Intelligent technology can provide personalized tour services for audiences according to their interests and needs. Through apps on smart devices, visitors can take customized exhibition routes according to their preferences and choose the exhibition items and themes they are interested in. In this way, audiences can freely explore the museum and explore their areas at their own pace and needs.

3.1.3 Digital Preservation of Data

Intelligent technology makes the digital preservation of cultural relics and exhibits more convenient and

accurate. By using high-resolution image capture technology and three-dimensional scanning techniques, museums can digitize precious artifacts to prevent damage and destruction. This not only helps to protect the cultural heritage, but also allows the audience to appreciate and learn from these precious exhibits through the virtual display.Just on January 25 this year, China's Sanxingdui Museum was pushed by two tourists, causing a precious bronze cultural relic in the display case to fall from the display stand. The museum immediately arranged for experts to arrive at the scene. hinder. However, similar incidents have occurred before, causing damage to unearthed jade cultural relics, causing the cultural relic to become a national treasure that is permanently prohibited from being displayed abroad, but it caused more than just economic losses.

3.1.4 Educational Resources

Intelligent technology provides rich educational resources for museums. Through online platforms and applications, museums can provide online courses, lectures, games, and interactive learning resources to meet the learning needs of different audiences. Visitors can participate in the museum's educational activities at any time and place through smart devices, expanding their knowledge and cultural literacy.

3.2 Challenge

At the same time, because artificial intelligence technology is still developing and improving, there are many shortcomings, and the implementation of the plan still faces challenges.

3.2.1 Complexity of Technology Implementation

The introduction of intelligent technology in museums may face the complexity of technology implementation. For example, virtual reality and augmented reality systems may require high-performance.

hardware devices and complex software support. Museums may need to devote a lot of time and resources to the installation, management and maintenance of the system to ensure its proper operation.

3.2.2 Privacy Protection

Intelligent technology involves the collection and processing of personal data, so Privacy protection is an important challenge. Museums need to ensure that the personal data collected is fully protected, while following relevant privacy regulations to protect the privacy rights of tourists. At the same time, when using smart devices, the museum needs to clearly inform the audience of the purpose of the data collection, and provide selection or anonymous options.

3.2.3 Traditional Culture Preservation

While introducing intelligent technology, museums also need to balance the needs of traditional culture maintenance. Some museums display precious traditional cultural art and handicrafts, which need to be maintained in their original way. Therefore, museums need to carefully choose the application scope of intelligent technology, so as not to cause unnecessary interference or influence on traditional culture.

3.2.4 Social Engagement

While smart technology can provide personalized and interactive experiences, the introduction of smart technology in museums may also lead to spectators having more interaction with devices and less interaction with other spectators and exhibits. Therefore, museums need to find a balance to ensure that the introduction of intelligent technology does not affect the social interaction and communication between audiences.

4. Summary and Outlook

The advantages and challenges of artificial intelligence technology in the conceptual design of museums are a broad and complex topic. Museums need to consider their specific needs and objectives when designing and introducing smart technologies, and take appropriate measures to solve the technical challenges and protect the interests of the audience. This will help enhance the experience of visitors and make the museum a more engaging and interactive cultural venue.

5. Conclusion

In short, using artificial intelligence for museum conceptual design can provide valuable tools and insights, from enhancing the initial conceptual design to stimulate innovative thinking, providing design ideas and inspiration, improving project implementation progress, to specific interactive access experience, data collection and analysis, intelligent It provides important assistance in aspects such as cultural navigation, education and interaction. However, care should be taken to ensure that the human element, creativity, and interactivity are retained to meet the museum’s unique needs and vision. Best practices often involve combining artificial intelligence with the creativity and expertise of human designers to achieve optimal design results.

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