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C O N T E N T S

Generative AI Docent Response Mechanism
based on Natural Language Sentences

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Summary

In recent years, advances in metaverse and AI technologies have led to new forms of art exhibition. Traditional offline exhibitions provide an opportunity to experience and appreciate artworks in person, but time and space constraints limit the opportunity to present exhibitions to a wider audience. To improve these limitations , we propose a metaverse-based exhibition hall that combines a generative A.I. docent to provide customized information in real time to provide an immersive viewing experience . In particular, the AI docent is expected to generate responses to individual questions from visitors to enhance interaction between visitors and artworks , improving the static information delivery method provided by traditional exhibitions to provide an interactive and dynamic experience . In this way , we hope to increase the understanding and accessibility of art between users and AI .

Keywords: Artificial Intelligent Docent, Metaverse Virtual Exhibition, Natural Language Processing

1. Introduction

Offline exhibitions provide viewers with the chance to directly face the artwork, allowing for direct experience [1]. Especially, offline exhibition allows that visitors can vividly experience various elements like texture, size, and color of the artwork, helping them gain a deeper understanding of the artist's intention and the essence of the work [2]. They can also listen to explanations directly from a docent, curator, or the artist, adding depth to their experience [3]. However, offline exhibitions are limited by time and place, as they can only be viewed at a specific location for a limited period. Additionally, when many visitors gather, the quality of the viewing environment can suffer due to congestion [4].

We propose an immersive exhibition space using a metaverse platform enhanced with a generative AI docent to overcome the limitations of offline exhibitions. Through a metaverse environment, viewers can freely enjoy the artwork without being restricted by time or space. Also, a generative AI docent can provide

customized information to meet the individual needs of each viewer, enabling a more personalized experience.

Through this approach, viewers are expected to maximize their immersion and satisfaction with the artwork, enhancing interaction between the viewer and the piece. This experience will use different digital technologies to provide a deeper and more meaningful artistic experience. In Chapter 2, we discuss related studies on existing metaverse technologies and their limitations. Chapter 3 introduces the immersive exhibition space in the metaverse using a generative AI docent proposed in this paper, and Chapter 4 covers the conclusion and directions for future research.

2. Related Works

The way that information is delivered in an exhibition is a key factor that impacts the viewer's experience. The information provided by docents and curators is essential, as it goes beyond simply explaining the artwork. It also guides viewers on how to observe and interact with the artwork in an exhibition. Table 1 shows the methods of providing information about artworks in large exhibition halls in existing virtual reality based exhibitions.

### Table 1. Existing VR Exhibition Information delivery method

No.	Institution / Company	Exhibition Name	Text	Audio Guide	Generative AI
1	Midwest Immersive	\<Mona Lisa Room\>	O	O	X
2	Louvre	\<Mona Lisa: Beyond the Glass\>	O	O	X
3	The Smithsonian	\<Beyond The Walls\>	O	O	X
4	V&A Museum	\<Curious Alice\>	O	O	X
5	The National Museum of Natural History in Paris	\<Journey into the heart of Evolution\>	O	O	X
6	Hyundai Gallery	\< Briefly Gorgeous\>	O	X	X
7	Natural History Museum	\<Hold the World\>	X	O	X
8	Cinétévé Experience	\<The Scream\>	X	O	X
9	Borrowed Light Studios	\<A VR Tribute to Van Gogh\>	X	X	X

Most exhibition halls provided through virtual environments, like those shown in Table 1, use rule-based text or audio guides with preset responses to deliver information. Rule-based text and audio guides have difficulty reflecting the diverse needs and interests of viewers, making it challenging to provide a personalized experience. This approach limits interactivity, makes it hard to include up-to-date information or new interpretations, and can reduce the viewer's sense of immersion.

3. Metaverse-based Immersive Exhibits with Generative A.I. Docents Approach

We propose a metaverse-based exhibition hall that utilizes generative AI to provide information to visitors. The AI docent generates responses through the ChatGPT API, answering questions based on user input.

Figure 1 illustrates the operational mechanism of the proposed generative AI-based docent in a metaverse-based immersive content exhibition hall. The AI docent's question selection UI is a key element for user interaction, allowing users to engage with the docent by selecting from basic questions related to the
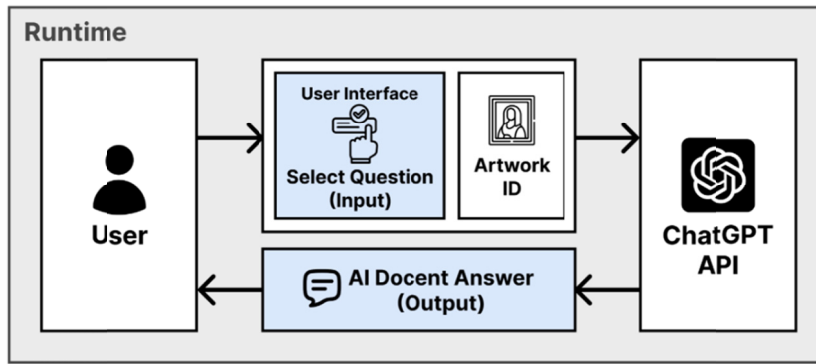
artwork displayed on-screen. This question selection UI simplifies the interaction by letting users choose questions without needing to type or use voice commands.

The range of questions covers various topics, such as descriptions of the artwork, background information about the artist, historical context, and unique features of the piece. This variety helps users satisfy their curiosity and gain a deeper understanding of different aspects of the exhibition. The questions are presented in a concise and intuitive format, allowing users to easily choose details or complex information to explore more about the exhibition. When a user selects a question from the UI, the chosen question and the artwork ID, a unique identifier for the most recently viewed piece, are sent to the AI docent. The artwork ID is automatically collected based on the time the user views the artwork, ensuring that the AI docent provides accurate information about the specific piece the user is interested in. Once the question and artwork ID are sent, the AI docent uses the ChatGPT API to combine the context of the question with the artwork's characteristics, generating an optimized response.

We apply the mechanism proposed in this paper to a prototype of a metaverse-based exhibition hall. Within the metaverse exhibition, users can directly interact by clicking on the basic questions provided by the AI docent using a controller.
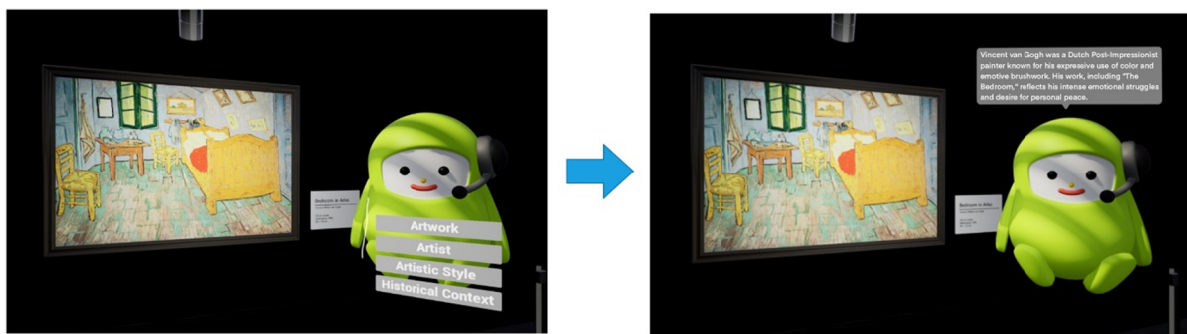

Figure 2 illustrates user interaction with the AI docent in the metaverse-based exhibition hall prototype. The user selects a question to ask the AI docent, who then provides an answer to that question. In the image on the right, the user stands in front of an artwork and selects the "Artist" option from the set of questions offered by the docent. Based on the artwork's ID and the selected question, the AI docent delivers an answer along with new follow-up questions. This setup allows the user to continue engaging with the AI docent through further questions that arise from each answer provided.

4. Conclusion

This paper proposes a metaverse-based immersive exhibition hall with a generative AI docent to overcome the time, location, and congestion limitations of traditional offline exhibitions. By offering an exhibition space accessible anytime and anywhere, the metaverse environment enables a more flexible viewing experience. Additionally, the generative AI docent significantly enhances immersion and satisfaction by providing personalized information tailored to each viewer's needs and preferences. The proposed metaverse-based exhibition not only addresses the limitations of traditional offline exhibitions but also introduces a new form of artistic experience through digital technology. It is expected to increase interactivity between the viewer and the artwork, broaden accessibility to art exhibitions, and provide a richer experience for diverse audiences.

Future research will involve the actual implementation and user experience analysis to verify the effectiveness of the proposed metaverse-based exhibition hall. Additionally, interaction technologies will be further refined to enhance the interactive capabilities of the generative AI docent.

Acknowledgement

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