Exploring the Implementation Methods of AI-Driven Robots in Media Interaction Experience Design

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Abstract. The purpose of this study is to deeply explore the innovative implementation methods of artificial intelligence (AI)-driven robots in media interactive experience design. Firstly, this paper expounds how AI-driven robot technology can provide users with a more natural and intelligent interactive experience through natural language processing (NLP), speech recognition, computer vision and other technologies, thus enhancing users' sense of participation and immersion. In order to realize the efficient application of AI-driven robot in media interaction, this study proposes a series of implementation methods, including improving the accuracy and personalization of robot interaction by using NLP and deep learning algorithm; Identify user expressions and gestures through computer vision technology to enhance the naturalness of interaction; Multi-modal interactive technology is used to integrate multi-sensory channel information to provide comprehensive interactive experience; Use deep learning technology to train the robot's ability to perceive and understand users' needs, and introduce emotion analysis technology to realize more humanized service; By constructing user portraits, we design personalized interaction schemes that adapt to different scenarios and users. In the experimental part, three different scenes, library, shopping mall and museum, are selected to verify the effectiveness of the design scheme. The results show that the AI-driven robot significantly improves the user's satisfaction and emotional experience under the personalized interaction scheme.

Keywords: Media interactive, experience design, artificial intelligence, robot.

1. Introduction

With the rapid development of science and technology, artificial intelligence (AI) and robotics have become hot topics in today's society. These advanced technologies not only shine brilliantly in industrial manufacturing, medical health, military security and other fields, but also show great potential in the design of media interactive experience. Media interactive experience design, as a key link to enhance user experience, is increasingly attracting extensive attention from the industry and academia.

In this context, AI-driven robot technology brings new possibilities for media interactive experience design. Robots can interact with users more naturally and intelligently through AI technologies such as natural language processing (NLP), speech recognition and computer vision, thus enhancing users' sense of participation and immersion [1]. However, how to effectively integrate these technologies into the design of media interactive experience is still a problem worthy of discussion.

The purpose of this study is to explore the implementation method of AI-driven robot in media interactive experience design. Through in-depth research and analysis, a design scheme that can give full play to the advantages of robot and AI technology is found, thus enhancing the interactive experience of users.

2. Application of AI-driven robot in media interactive experience design

With the continuous progress of AI technology, robots are widely used in media interactive experience design. They inject new vitality into traditional media by providing unique interactive methods and enhancing user experience. A notable application of robots in media interaction is as an intelligent navigation and information provider. In museums, exhibition halls or large conference

centers, robots can guide visitors, provide exhibition information, and even provide customized navigation services for individual visitors through voice and visual recognition technology. This not only improves the efficiency of the visit, but also enables each visitor to get a more personalized experience.

Robots also play an important role in the production and dissemination of media content. For example, in news reports, robots can collect and transmit field data in real time, providing accurate and timely information for news reports. Robots generate and broadcast news through NLP and speech synthesis technology, thus greatly improving the efficiency and accuracy of news reporting. Robots have a significant effect in improving users' sense of participation and immersion [2-3]. In the game and entertainment industry, robots can interact with users in real time through speech recognition and motion capture technology, providing an immersive game experience. In addition, robots can also recommend personalized entertainment content according to users' preferences and behaviors through intelligent algorithms, thus enhancing users' satisfaction and loyalty.

Robots also show great potential in the field of media education and training. By simulating real scenes and providing interactive learning materials, robots can help learners better understand and master media-related knowledge [4]. Robots can also provide personalized learning advice and guidance for learners through intelligent evaluation and feedback systems, thus improving their learning effect and interest.

AI-driven robots have broad application prospects in the design of media interactive experience. By providing intelligent navigation, personalized content recommendation, immersive game experience and efficient education and training services, robots are changing the way we interact with the media and bringing more rich and diverse media experiences.

3. Realization method

3.1. Using AI technology to improve robot interaction mode

NLP technology can make robots understand and respond to users' natural language input more accurately. Through deep learning algorithms, robots can identify the semantics and intentions of users, thus providing more accurate and personalized responses. In media interaction, this means that robots can talk to users more naturally, not limited to preset commands and responses, but can understand and respond to broader and more complex problems and needs [5]. Collect a large number of corpus data of interaction between users and robots, and use it to train NLP model, so that it can accurately identify and understand users' intentions. The trained NLP model is integrated into the robot system so that it can use these abilities in real-time interaction. According to the feedback from users and the actual interaction effect, the NLP model is constantly adjusted and optimized to improve the accuracy and fluency of interaction.

Through computer vision technology, robots can identify and analyze the visual information in the environment, such as the user's facial expressions, gestures and surrounding objects and scenes. This enables the robot to respond more intelligently according to this information, and improves the naturalness and depth of interaction [6]. Using deep learning technology to develop an efficient visual recognition model, so that it can accurately identify the user's facial expressions, gestures and so on. Ensure that the robot system can process and analyze visual data in real time, so as to respond immediately in interaction. A mechanism is designed to enable the robot to adjust its interaction strategy according to the visual recognition results, for example, to judge the emotional state of the user by recognizing his expression, and adjust the response mode accordingly.

Multi-modal interaction technology allows robots to process and understand information from multiple sensory channels at the same time, such as voice, text, vision and so on. By integrating this information, robots can understand users' intentions and needs more comprehensively, thus providing a more comprehensive and efficient interactive experience [7]. Develop algorithms to fuse data from different sensory channels to create a more comprehensive and accurate user intention model. Based on the fused data, an interactive strategy is designed, which enables the robot to make a

comprehensive response according to various expressions of users. Test the performance of the multi-modal interactive system in the actual environment, and make necessary adjustments and optimizations according to user feedback.

3.2. Improve the robot's ability to perceive and understand the needs of users

In the design of media interactive experience, it is very important to improve the robot's ability to perceive and understand users' needs. The improvement of this ability can make the robot respond to the needs of users more accurately, thus providing more personalized and efficient services. Through deep learning technology, robots are trained to better understand and analyze users' language and behavior patterns. Using large-scale corpus and user behavior data to train the model, the robot can capture the user's intentions and needs more accurately. Collect the interaction data between users and robots widely, including voice, text, behavior and other forms. Use deep learning algorithms, such as recurrent neural network (RNN) or Transformer model, to train the robot's perception and understanding of user input [8-9]. With the continuous increase of user data, the model is updated regularly to ensure that the robot's ability to perceive and understand user needs continues to improve.

Emotion analysis technology can help robots identify and analyze users' emotions, so as to better understand users' needs and expectations. By integrating emotion analysis technology, the robot can adjust its response mode according to the user's emotional state and provide more intimate and humanized services. Use NLP and machine learning technology to develop a model that can accurately identify users' emotions. The results of emotional analysis are combined with user interaction data to provide a more comprehensive understanding of user needs for robots. According to the user's emotional state, the robot's response strategy is designed to provide more personalized and humanized services.

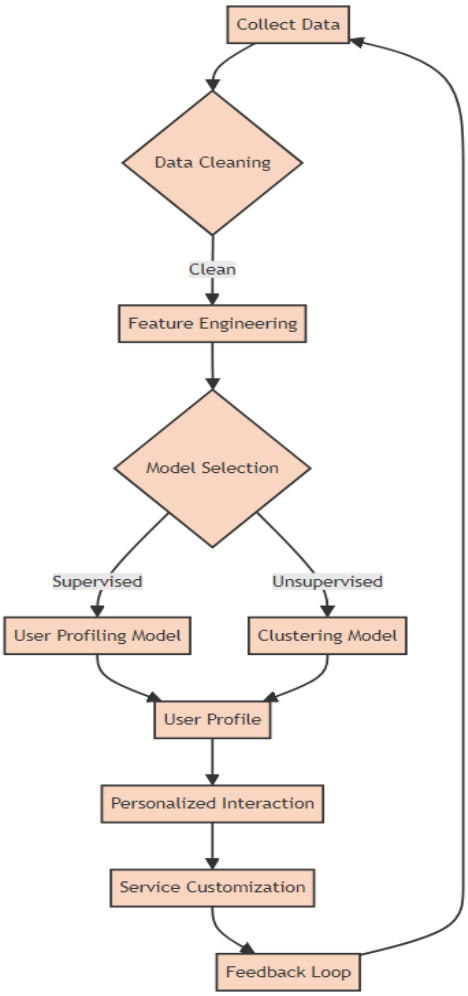

Figure 1. User portrait construction method

By constructing user portraits, robots can better understand users' preferences, habits and needs (Figure 1). User portraits can be constructed based on multi-dimensional data such as historical interaction data, personal information and social media behavior of users. Collect and integrate all kinds of data of users, including interaction records, personal information, social media behaviors, etc. Using data mining and machine learning technology, a user portrait model that can fully reflect user characteristics is constructed. Based on the user's portrait, the personalized interaction strategy and service content are designed for the robot to meet the unique needs of users.

3.3. Design a personalized interaction scheme that adapts to different scenarios and users

In the design of media interaction experience, in order to meet the needs of different scenes and users, it is very important to design personalized interaction schemes. Personalized interaction scheme can improve user experience, make users feel more comfortable and convenient, and enhance users' interest and participation in media content.

Robots need to have the ability to recognize different scenes and adjust the interaction mode according to the characteristics of the scenes. For example, in a quiet library environment, robots should reduce the volume and unnecessary voice interaction, while in a noisy exhibition site, robots may need to increase the volume or use more eye-catching visual cues to attract users' attention. Collect and analyze the environmental characteristics of different scenes, such as noise level, lighting conditions, crowd density, etc. Using machine learning technology to train the scene recognition model, the robot can automatically judge the current environment. According to the identified scene type, the robot's interaction strategy is automatically adjusted, including volume, speech speed and interaction mode.

In order to provide personalized interactive experience, robots need to understand users' preferences, habits and needs. By constructing user portraits and customizing a unique interaction scheme for each user according to the user portraits, user satisfaction can be significantly improved [10]. Collect users' historical interaction data, personal information and possible social media behavior data, and analyze users' interests and preferences. Based on the collected data, a user portrait that can reflect the characteristics of users, including age, gender, hobbies and so on, is constructed. According to the user's portrait, design a unique interactive interface, recommended content and feedback mechanism for each user.

Personalized interaction scheme not only needs to be designed based on the initial user portrait and scene recognition, but also needs to be dynamically adjusted according to the real-time feedback of users during the interaction. In the process of interaction, the user's feedback data, including voice, expression, behavior and so on, is continuously collected. Use NLP and sentiment analysis technology to identify users' emotions and intentions. According to the real-time feedback and emotional state of users, the interaction strategy of robots is dynamically adjusted to provide more intimate and humanized services.

4. Experimental results and analysis

In order to verify the effectiveness of the proposed implementation method —— designing personalized interaction scheme suitable for different scenarios and users, three different scenarios are selected: library, shopping mall and museum. In each scene, 30 users of different ages, genders and occupations were invited to participate in the experiment. During the experiment, let the robot interact with the user and record the feedback from the user. In the library scene, the robot adopts a low-volume, concise and clear interaction mode to avoid disturbing other readers. In the shopping mall scene, robots adopt a more lively and friendly tone and attract customers' attention through visual elements. In the museum scene, robots provide customized tour and explanation services according to users' interests.

Users' satisfaction scores with robot interaction and their emotional experience data during the interaction were collected. The data shows that under the personalized interaction scheme, users' satisfaction is generally higher and their emotional experience is more positive (Table 1).

Table 1. User satisfaction

scene	Average satisfaction score
library	4.3
market	4.1
museum	4.5

Robots can automatically adjust their interaction strategies according to the scene changes, and better integrate into the environment. Personalized interaction makes users more willing to interact with robots and improves users' participation. Users generally reflect that their emotional experience is more pleasant and comfortable under personalized interaction. This scheme will continue to be optimized in the future to provide a more natural, intelligent and humanized robot interaction experience.

5. Conclusion

Through advanced technologies such as NLP, computer vision and multimodal interaction, robots can interact with users more naturally and intelligently, thus enhancing users' sense of participation and immersion. Robots can provide customized services according to user portraits and real-time feedback, such as personalized navigation service, news broadcast and education and training content, which significantly improves the personalization and satisfaction of user experience. The application of emotion analysis technology enables robots to identify and analyze users' emotions, further adjust their response modes and provide more humanized services. Robots can automatically adjust their interaction strategies according to the characteristics of different scenes, such as reducing the volume in the library, using lively tone in the shopping mall, and providing customized tours in the museum to better integrate into the environment and meet the needs of users. The experimental results in library, shopping mall and museum show that the personalized interaction scheme can significantly improve user satisfaction and positive emotional experience, which proves the effectiveness of the proposed method. It is pointed out that these schemes will continue to be optimized in the future to provide a more natural, intelligent and humanized robot interaction experience.

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