Research on Human-Robot Interaction Methods Based on Audience Cognition

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Abstract: There are various ways of information transmission, but due to factors such as temporal and spatial differences, semantic expressions, and cultural differences, some information would inevitably be lost during the transmission process. Fortunately, in the information age, various modern information technologies can effectively compensate for the shortcomings of human communication, and social robots have become emerging communication tools. This article analyzes the dilemma of human-robot communication from the perspective of audience cognition and finds that there are still problems with the positioning of social robots and their technology, as well as individual human cognitive limitations and usage challenges. These factors significantly impede the innovative evolution of human-robot communication modes. To address these challenges, the article proposes several response strategies aimed at offering insights and inspiration for the advancement of human-robot communication.

Keywords: Audience cognition; Human-robot interaction; Effective methods

1. Introduction

Science and technology in China have advanced tremendously along with rapid socio-economic development, and various modern information technologies have been applied in all aspects of social production and life. Artificial intelligence, as a typical representative of modern technology, integrates multiple disciplines and technologies. Its innovative development and widespread application led to the popularization of human-robot communication [1]. Artificial intelligence was developed based on robotics and big data technology. It is significant for the stable development of the national economy and the liberation of human labor. In today's information age, characterized by technologies such as data analytics, intelligent algorithms, and computing prowess, the reach of information dissemination media continues to expand across time and space. Moreover, their interaction with audiences is increasingly enriched, fostering favorable conditions for the advancement of artificial intelligence.

2. Interpersonal communication difficulties from the perspective of audience cognition

2.1. Social robot localization and technological challenges

2.1.1. The positioning and attributes of social robots

The era of artificial intelligence is mainly driven by technologies such as data, algorithms, and computers. At present, social robots are positioned in two ways, with the first one being a tool to answer questions, and the other being an intelligent robot with some form of self-awareness and autonomy. While social robots may not have achieved complete autonomy akin to unmanned systems, they can convey emotions based on technological algorithms. Nonetheless, the method of positioning robots to intervene in human life requires further exploration. The attributes of social robots can be categorized into external attributes, such as physical appearance, and intrinsic attributes like personality traits and emotions. There is some controversy over the classification of social robot attributes [2]. For instance, when considering the design of social robots, a key question arises: should they resemble traditional robots with mechanical features, or should they be anthropomorphic, covered in skin, and exhibit human-like characteristics? Moreover, there is a debate on whether social robots need to replicate human facial expressions to effectively communicate with users. Additionally, there is an inquiry into whether social robots can possess independent personalities based on their intrinsic attributes. If so, how can these personalized characteristics be maintained to ensure consistency? Furthermore, defining the concept of an independent personality is crucial in determining whether it can generate internal emotions.

2.1.2. Contradiction between robot control and resistance

The initial purpose of designing robots was to better meet human needs, promote innovative development in the field of technology, and offer technical assistance for advancing social productivity in China. Consequently, humans naturally possess control over robots. However, in the era of machine autonomous learning, it becomes imperative to reassess the relationship between human control rights and robots. Although robots are developed and created by humans, it is not conducive for humans to have absolute control or allow the unrestricted development of robots.

2.2. Human individual cognitive and usage dilemmas

2.2.1. Cognitive deconstruction and reconstruction

Machine technology has to some extent broken the stereotype of many things, causing the cognitive deconstruction and reconstruction of many. This includes both the perception of robots and their impact on human life. In the past, the general understanding of robots was largely confined to mechanical apparatus and the central figures of science fiction narratives. However, with the emergence of social robots in everyday life, the preconceived notions of robots have been deconstructed and reconstructed [3]. In the process of communicating and interacting with social robots, users will have different perceptions of social robots based on their level of satisfaction.

From a human perspective, individuals may encounter cognitive biases when attempting to deconstruct and reconstruct their understanding of robots, influenced by their own personalities, making it challenging to correct these biases. Conversely, from the robot's standpoint, audiences attribute them with newfound cognitive abilities, yet quantifying emotional awareness mechanically proves difficult. This ambiguity in human-robot cognition confounds audience understanding, potentially altering individual psychological perceptions.

2.2.2. "Information cocoon"

In the era of information technology, the total amount of information continues to grow, and the complexity

and personalization characteristics are becoming increasingly evident. Personalized recommendations can save users time and effort in retrieving information. Although it can enhance user stickiness, it can also create an information cocoon [4]. Specifically, the audience is in their own "information comfort zone" for a long time and is more willing to accept information they believe is correct or interested in. Over time, they will become trapped in an "information cocoon" and refuse to accept or listen to different information from the outside world. Social robots in human-robot communication are designed to cater to the audience's information preferences and constantly cater to them, which can easily lead to the audience being trapped in a digital cage.

3. Exploring interpersonal communication strategies from the perspective of robot development

3.1. Viewing technology rationally and constructing different forms of interpersonal coexistence

Firstly, the impact of artificial intelligence technology on information exchange should be perceived rationally. There are always two sides to everything, even more so for artificial intelligence technology. The innovative development of human society is a double-edged sword. Social robots have gradually developed with the help of network technology, further enhancing the scope and efficiency of information dissemination, strengthening the correlation between humans and robots, and becoming an important tool to compensate for human communication. The development of communication technology from telegraphy to modern network technology is achieved by constantly breaking the temporal and spatial limitations of information exchange and interaction. The emergence of social robotics has broken through the limitation that the subjects of online communication must be humans. Social robots can provide companionship offline, which is a technological breakthrough. For example, the robot companion will remind one to take their medicine on time, detect abnormal physiological indicators, and so on. To some extent, it can help the elderly integrate into today's society. The continuous advancement of science and technology will certainly bring about the improvement of quality of life.

Secondly, it is essential to improve the technical functions and practicality of technologies. Technology can achieve significant results and promote social productivity. However, if technology is only used as a tool for production, its role in social and cultural development will be overlooked [5]. Therefore, from the perspective of audience cognition, it becomes crucial to prioritize endowing social robots with increased creativity and technological value. This entails optimizing technological efficiency to yield tangible benefits for human society. For example, driverless technology has expanded from the field of autonomous driving to the entire intelligent transportation system This shift has effectively realized the trajectory toward intelligent driving, thereby enhancing convenience and efficiency in human travel.

Thirdly, it is crucial to adhere to technical independence. Nowadays, technological rationality has replaced universal rationality. However, technological development can be controlled by capital and serve specific groups, thereby exacerbating the digital divide between classes. Based on the perspective of audience cognition, human-robot communication should adhere to technological independence and achieve open, transparent, and orderly development. For example, 80% of the basic financial work can be optimized by financial robots, which can realize intelligent reconciliation, online banking, billing and collection, tax payment, accounting, reporting, etc.

3.2. Creating suitable laws and regulations

Relevant laws and regulations must be established to govern human behavior in the manufacturing and utilization of machinery. Primarily, artificial intelligence technology should be integrated into legal frameworks

as normative standards. This includes deliberating whether robots should be granted subject status, whether they ought to possess distinct personalities, and how property rights generated by robots should be allocated. These considerations should be codified within legal norms to mitigate the potential adverse impacts of human-robot communication on society. Secondly, social robots should have the ability to "forget something." Specifically, if a user wants to delete information after publishing it, the robot should thoroughly remove the relevant information to avoid violation of the user's privacy. Thirdly, research and development personnel should strictly abide by relevant rules, be responsible for the robots they produce, and adhere to the ethics of scientific and technological development.

The boundaries between humans and robots should be clarified, and the behavior of robots should be standardized. Firstly, robots must not harm humans or stand idly when humans are in danger. Secondly, robots must obey the instructions given by humans. However, if the instructions given threaten the safety of other humans, they may be disregarded. Thirdly, robots can protect themselves to the maximum extent without violating the first and second rules.

3.3. Establishing relationships and strengthening caregiving

The relationship between humans and robots should be well-defined. Human beings use information technology to establish connections with the world, and technology can bring humans into specific usage scenarios, truly achieving human-robot integration [6]. It can be said that technology is an effective extension of human self-awareness and perception and a mediator in establishing connections between humans and the world. With the innovative development of information technology, robots are no longer dependent on humans, and their technological rationality has strengthened. Despite lacking the physiological structure of humans, robots have the capacity to develop empathetic perception systems alongside humans. When robots participate in social interactions and communication, they disrupt conventional notions of what it means to be human, leading to a more diverse society. Recognizing robots as independent entities can improve the relationship between humans and robots.

Moreover, humans should be more tolerant to different living. Robots should be regarded as living beings and incorporated into modern society with independent rights. Besides, humans should be inclusive and accepting of different types of life forms and encourage the development of all things. In recent years, human-computer interaction has experienced rapid advancement. The integration and progression of technologies such as video capture, speech recognition, infrared remote sensing, and multi-channel technology promise unprecedented breakthroughs in human-computer interaction. Future computer systems will prioritize a "human-oriented," "natural and harmonious" interaction mode to facilitate efficient collaboration between humans and machines.

4. Conclusion

In summary, it is essential to analyze the difficulties and coping strategies in human-robot communication from the perspective of audience cognition. Due to the inherent ambiguity, regional variations, and cross-cultural complexities of language, individuals may encounter biases in understanding language semantics during communication. In response to this challenge, humans have begun to reflect on traditional language communication methods, recognizing language as merely a tool for interpersonal interaction that may not fully meet the diverse needs of human communication. As a result, there is a growing desire to transcend the limitations of language. This has led to the emergence of human-robot communication modes. Faced with the challenges of human-robot communication from the perspective of audience cognition, various measures

have been proposed. These measures include adopting a rational approach to technology, fostering forms of interpersonal coexistence between humans and robots, implementing contemporary rules and concepts, empowering humans to navigate complex communication scenarios, establishing meaningful relationships with artificial entities, and emphasizing the importance of care in human-robot interactions. By implementing these strategies, favorable conditions are created for the integration of artificial intelligence technology into human society. This, in turn, opens up new possibilities for addressing communication challenges in real-life scenarios.

Disclosure statement

The author declares no conflict of interest.

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