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Research on the Current Status of Emotion Recognition and Response Strategies for Chatting Robots based on Deep Learning

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Abstract. With the rapid development of artificial intelligence technology, emotion recognition capability has become an important branch of the AI field. This study explores the current status of emotion recognition and response strategies for chatbots based on deep learning, focusing on analyzing the current state of emotion recognition and response strategies for chatbots. This research studies the problem through a questionnaire survey and literature research methods. The results show that chatbots still need to continuously improve their emotional algorithms to meet the growing needs of users, as well as the diversity and naturalness of various languages to provide users with a good experience.

Keywords: Chatting Robots, Emotion Recognition, Response Strategies, artificial intelligence, questionnaire survey.

1. Introduction

In recent years, with the development of the times and the progress of society, various types of chatbots have emerged in the public eye and are widely used in various fields such as e-commerce customer service, smart homes, medical care, education and training. With the continuous development of modern artificial intelligence technology, people have increasingly high expectations for human interaction, hoping to integrate some emotions into information exchange [1]. Emotional robots have the ability to recognize human emotions and express them, making communication between robots and humans not just a simple mechanical and rigid way, but more natural and harmonious [2]. These chatbots not only need to have the ability to understand and generate natural language, but also need to be able to accurately recognize users' emotional states in order to provide more intelligent and humanized services. The research questions of this article are mainly divided into the following three sections: the current status of deep learning based chatbot emotion recognition, how to effectively carry out emotion recognition, and how to formulate response strategies based on emotional states. This article adopts a combination of questionnaire survey and literature research methods for research. Through a questionnaire survey, collect users' opinions and needs on emotion recognition and response strategies for chatbots, and provide empirical support for the research. At the same time, through literature research, we will review the current research progress on deep learning based emotion recognition technology and response strategies, providing theoretical support and methodological references for the research in

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this paper. The significance of this study mainly lies in improving user experience. Through emotion recognition and response strategy formulation, chatbots can more accurately understand users' intentions and needs. Moreover studying the emotion recognition and response technology of interactive digital humans not only helps to enhance the maturity and breadth of technology applications, but also provides new perspectives for understanding human emotions and cognitive processes [3].

2. The current status of deep learning based chatbot emotion recognition

To ensure the reliability of the questionnaire data and the effectiveness of its structure, it is imperative to assess the reliability and validity of the questionnaire scale before conducting a detailed analysis of the collected data. Utilizing SPSS software, we will employ the Cronbach's Alpha coefficient to evaluate the questionnaire's reliability. Additionally, the Bartlett's test of sphericity will be conducted to confirm the structural validity of the questionnaire.

Table 1. Reliability Analysis

Reliability Coefficient		
Alpha	The Cronbach's Alpha based on standardized items	Number of items
.888	.888	5

Table 2. Validity Test

KMO and Bartlett		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.878
Bartlett's Test of Sphericity	Approximate Chi-Square	263.431
	degrees of freedom	10
	significance	.000

As evidenced by Table 1, the aggregate standardized reliability coefficient is 0.888. The value of the reliability coefficient ranges from 0 to 1, with higher values indicating higher credibility. Overall, the reliability analysis of this survey result is relatively high.

As shown in Table 2 that the coefficient of KMO test is 0.878, and the coefficient range of KMO test is between 0-1. The closer it is to 1, the better the validity of the questionnaire.

At the same time, the Bartlett sphericity test results showed a significance P-value of 0.000 * * *, which is significant at the horizontal level and rejects the null hypothesis. There is a correlation between the variables, indicating that this questionnaire has good validity.

2.1. Analysis and Summary of Research on Emotion Recognition and Response Strategies for Chatbots Based on Deep Learning

This questionnaire aims to gain a deeper understanding of the public's perception, expectations, and user experience of deep learning based chatbot emotion recognition technology, attracting a total of 102 respondents to participate. The questionnaire covers a wide range of aspects, including respondents' understanding, evaluation, expectations, frequency of use, improvement suggestions, and future prospects of chatbot emotion recognition technology. Through this survey, we aim to collect genuine feedback from the public and provide valuable references for the future development and optimization of chatbot emotion recognition technology. The following content will show the results of this questionnaire survey.

2.1.1. Awareness of Emotion Recognition Technology. In this survey, 72.55% of respondents indicated that they are aware of the emotion recognition technology in chatbots, suggesting that this technology is gradually becoming well-known to the public. However, 27.45% of respondents still expressed ignorance, indicating that there is room for improvement in the popularization and promotion of this technology.

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2.1.2. Evaluation of Emotion Recognition Accuracy. A significant majority (58.82%) of respondents believe that chatbots have very high accuracy in emotion recognition, while 18.63% consider it relatively high, 9.8% think it is average, 8.82% believe it is low, and 3.92% think it is very low. This demonstrates that while chatbots have made progress in identifying emotions, there is still need for development, particularly in terms of increasing recognition accuracy and stability.

2.1.3. Expectations for Emotion Response Capabilities. Respondents most hope that chatbots possess the ability to understand users' anger (75.49%), express sympathy (86.27%), provide advice (54.9%), and engage in humorous interactions (38.24%). This indicates that chatbots need to focus more on understanding and responding to users' emotions in emotional interactions, as well as providing practical advice and light-hearted interactions.

2.1.4. Importance of Response Speed. 48.04% of respondents consider the response speed of chatbots in handling users' emotions to be very important, and 20.59% believe it is important. This suggests that response speed is a crucial factor in evaluating chatbots' emotional interaction capabilities. Therefore, improving the response speed of chatbots, especially in emotional interactions, is key to enhancing user experience.

2.1.5. Dissatisfaction Due to Misrecognition of Emotions. 79.41% of respondents have felt dissatisfied due to chatbots' misrecognition of emotions. This further emphasizes the importance of improving the accuracy of chatbots' emotion recognition. Reducing misjudgments and misunderstandings, and enhancing the precision of emotion recognition, are crucial for improving user satisfaction.

2.1.6. Main Application Scenarios for Emotion Recognition. Respondents believe that the main application scenarios for chatbots' emotion recognition include customer service (87.25%), psychological counseling (92.16%), and social interaction (85.29%). This indicates that chatbots have broad application prospects in these fields, especially in providing personalized services and emotional support.

2.1.7. Frequency of Use. The frequency of respondents' use of chatbots is relatively dispersed, but the highest proportion is those who use it weekly (32.35%), followed by monthly use (22.55%) and daily use (19.61%). This shows that chatbots have become daily tools for some users, but there is still room for expanding the user base and increasing usage frequency.

2.1.8. Shortcomings of Emotion Recognition. Respondents believe that the shortcomings of chatbots in emotion recognition mainly include inadequate contextual understanding (87.25%), slow feedback speed (72.55%), inaccurate emotion classification (64.71%), and unnatural responses (40.2%). This points out the key areas for improvement in chatbots' emotion recognition, especially in enhancing contextual understanding and the accuracy of emotion classification, as well as optimizing response speed and naturalness.

2.1.9. Areas Most Needing Improvement. Respondents believe that the areas most needing improvement in chatbots' emotion recognition include text understanding (28.43%), emotion analysis algorithms (26.47%), and speech recognition (24.51%). This indicates that enhancing the performance of text understanding and emotion analysis algorithms, as well as optimizing speech recognition technology, are key directions for the development of chatbots' emotion recognition technology. Accurately identifying and understanding the emotional information contained in speech is of great significance for improving the accuracy and efficiency of emotion recognition tasks [4].

2.1.10. Attitudes Towards Future Development. A majority of respondents (38.24% and 31.37%) hold optimistic attitudes towards the future development of chatbots' emotion recognition technology, but a

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certain proportion (14.71%) hold neutral attitudes, 8.82% hold pessimistic attitudes, and 6.86% hold very pessimistic attitudes. This shows that although most people are confident in the future development of chatbots' emotion recognition technology, there is still a group of people who remain skeptical. Therefore, it is necessary to further strengthen technology research and development and promotional efforts to increase public awareness and acceptance.

2.1.11. Expectations for Language Styles. Respondents hope that chatbots can use language styles in emotional responses that are formal (86.27%), colloquial (54.9%), humorous (38.24%), and empathetic (36.27%). This indicates that chatbots need to pay attention to the diversity of language and the naturalness of emotional expression in emotional interactions to meet the needs and preferences of different users. Robots with emotional computing can enhance the naturalness and harmony of the interaction process, effectively reducing the sense of loss caused by computer stiffness, rigidity, and mechanized services to participants [5].

2.1.12. Expectations for Understanding and Responding to Emotions. A significant majority (48.04% and 24.51%) of respondents strongly hope or somewhat hope that chatbots can better understand and respond to their emotions. This shows that users have high expectations for chatbots in emotional interactions and require further enhancements in their ability to understand and respond to emotions.

2.1.13. Willingness for In-depth Emotional Communication. 56.86% of respondents are very willing to engage in deeper emotional communication with chatbots that can accurately recognize and respond to their emotions. This indicates that users have a strong demand for chatbots in emotional communication and require further technology research and development and user experience optimization to meet users' emotional needs.

The above results show that chatbots have achieved certain results in emotion recognition and response but still face many challenges and shortcomings. To improve chatbots' emotional interaction capabilities, it is necessary to continuously optimize emotion analysis algorithms, enhance the performance of text understanding and speech recognition technologies, and pay attention to the diversity of language and the naturalness of emotional expression. At the same time, it is essential to focus on users' expectations and needs for chatbots in emotional interactions to provide more personalized and intelligent services. In the future, with the continuous advancement of technology and the expansion of application scenarios, chatbots will play a greater role in emotional interactions and provide users with more high-quality and convenient service experiences.In dialogue and communication, humans are not only accompanied by the transmission of information, but also by the exchange of emotions Research has shown that introducing emotions into dialogue systems can effectively improve user satisfaction and reduce the probability of system failures Therefore, accelerating the research progress of emotional dialogue response tasks is of great significance[6]

3. Conclusion

This article explores the current status of emotion recognition and response strategies for chatbots based on deep learning. Through questionnaire surveys and literature research, this study analyzed the public's perception, evaluation, expectations, and frequency of use of chatbot emotion recognition technology. Research has found that chatbot technology has a high level of popularity, but there is still room for improvement, and accuracy has been recognized but still needs improvement. Users expect chatbots to have stronger emotional responsiveness, especially in understanding anger, expressing sympathy, and hoping to improve response speed. At the same time, users also pointed out the shortcomings of chatbots in emotion recognition, such as insufficient context understanding and slow feedback speed, and proposed improvement directions. Although most users are optimistic about future development, there is still a need to strengthen technology research and development, as well as promotion and publicity. In addition, users have high expectations for chatbots in terms of language style and emotional communication, and further optimization of user experience is needed to meet user needs.This

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experiment also has its limitations. Firstly, the sample size is limited, and all respondents are from China. Secondly, there is insufficient in-depth analysis: although the article provides a preliminary analysis of the questionnaire survey results. In the future, further research can be conducted by expanding the sample size and conducting in-depth technical discussions.

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