

The Potentials and Limitations of AI Emotion Simulation: Taking Emogpt's Psychological Counseling as An Example

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Abstract. The continuous development of artificial intelligence emotion simulation has triggered in-depth thinking on the similarities and differences between machine emotions and human emotions. The physiological foundation of human emotions is absent from machine emotions, which are only dependent on algorithms and data. This is where the basic differences between the two exist. However, through calculation and programming, artificial intelligence can have a "emotionless" emotion and function as a "emotional machine." In response, a community of robots that provide psychological counseling—represented by EmoGPT—arose with the goal of resolving people's emotional issues and offering individualized care. While EmoGPT can offer crisis detection, sympathetic listening, professional coaching, life advice, and round-the-clock services during psychiatric counseling, it still lacks some of the experience, autonomy, and moral accountability of human emotions. . This study analyzed the potential and ethical and technological challenges of AI psychological counseling in simulating emotional responses through the application case of EmoGPT during the Shanghai epidemic.

Keywords: Artificial intelligence; Emotional simulation; EmoGPT; Potential and limitations.

1. Introduction

According to a report by IMARC Group, the global mental health market reached a size of \$435.2 billion in 2023 and is expected to grow to \$567.3 billion by 2032[1]. The increasing trend in demand for mental health services is reflected in these data, and the advancement of AI technology serves to further encourage and enhance the creativity and accessibility of mental health services. The market for mental health is anticipated to grow due to the growing emphasis on mental health in society, as well as the quick growth of telemedicine and digital platforms. Emotional robots with artificial intelligence, however, make it easier for people to get emotional assistance, but there are concerns that artificial intelligence cannot replicate or embody human emotions. Therefore, a thorough examination of the idea of "emotional machines" and an explanation of the advantages and disadvantages of artificial intelligence in emotional simulation can aid in people's understanding of the distinctions between emotional simulations produced by artificial intelligence and those produced by humans.

2. Machine Emotions and Human Emotions

Human emotions are innate, the result of biological evolution, and a part of physiological functions. In addition, cultural factors have added richer social dimensions to emotions, making the biological roots of emotions closely linked to social effects in human life. Discussions of robot emotions in the field of artificial intelligence currently center more on basic emotions linked to biological evolution than on sophisticated emotions specific to humans. Researchers in technology are trying to find commonalities between human and robot basic emotions and are reproducing these feelings through simulation approaches.

2.1. The Possibility of Emotional Machine

Emotion has long been regarded as a unique trait of living organisms, born from their attitude and experience towards an object or situation. From this perspective, simulating emotions in artificial

intelligence seems unconventional - how can emotions be simulated by machines without a physiological basis? Is this simulated emotion equivalent to human emotion?

2.1.1 Theoretical Basis of Emotional Machine

William James and C.G. Lange argue that emotions have a physiological basis and are a collection of complex physiological responses triggered by external stimuli. James emphasized that emotions are caused by physical changes, rather than physical changes being a direct result of emotions [2]. This viewpoint later became known as the "theory of sensation" and had a profound impact on modern emotional research.

At present, there are two main perspectives in the field of emotion theory: neo Jacobism and cognitivism. Emotions and the body are inextricably linked, according to New Jacobism, which highlights how changes in the body—particularly in the functioning of the autonomic nerve system—cause emotions. Neuroscience experiments that show the intimate relationship between emotions and bodily physiological functions provide credence to this notion. In contrast, cognitivism sees emotions as a mental process that exists outside of the body. This perspective holds that emotions are a state of mind rather than only a physical experience, and that they are dependent on personal assessments, judgments, and beliefs. The idea of "emotional machines"—that is, emotions that can live outside of biological bodies and be replicated by machines—was brought about by this notion. This indicates that although the relationship between emotions and the body is inseparable in humans, the development of technology is exploring the possibilities of emotions in non-biological systems.

2.1.2 The Concept of Emotional Machine is Formed

Based on the theory of cognitivism, the artificial intelligence community has developed a concept that although machines may not yet possess human emotional experiences, they can exhibit a unique emotional "logic"[3].

Taking Marvin Minsky as an example, he believes that emotions are a way for the brain to process information about environmental changes, and emotional responses are a quick assessment of external events, which helps individuals make quick decisions [4]. In his view, human awareness and emotions may be viewed as information processing processes that can be replicated through intricate computational models, supporting the notion of "emotional machines." These simulations do not, however, represent actual emotional experiences or consciousness because they are dependent on algorithms and data processing [5].

Michael A. Arbib's viewpoint coincides with Minsky's. Arbib believes that the presence of robot emotions in the motivational system is reasonable. He distinguished between human emotions typically associated with feelings and the "non feeling" emotions that robots may possess [6]. He believes that even if robots do not possess the same sensory abilities as humans, they can still have an artificial emotion that can be "edited" through computation and programming. This viewpoint expands the definition of emotion, viewing it as an information processing state rather than just a biological experience. According to this theory, rather of being dependent on neuronal activity or physiological processes, robot emotions could be the result of intricate interplay between their internal algorithms and outside stimuli. Robots' "emotions" could take the form of preset reactions to particular inputs, intended to mimic human emotions in situations like driving, making decisions, or interacting with others. EmoGPT, for instance, can produce suitable replies by analyzing users' emotional states using algorithmic models and simulating human emotional responses with the aid of emotion computing technologies. EmoGPT can also be better able to comprehend linguistic subtleties, like humor and metaphor, thanks to natural language processing (NLP). Through the comprehensive application of these technologies, EmoGPT can more accurately identify users' emotions, provide deeper emotional support and empathetic communication.

2.2. The Difference between Emotional Simulation and Human Emotions

At present, EmoGPT mainly achieves emotion recognition through language big models and emotion discriminative expressions. EmoGPT utilizes deep learning techniques to train large-scale

text data, enabling models to learn how to understand and generate natural language. At the same time, EmoGPT also integrates sentiment discrimination, which is an algorithm specifically designed to recognize emotions. It can analyze user input text, identify emotional tendencies, and respond promptly. However, these methods also have clear drawbacks. For instance, biases in the training data may be inherited by EmoGPT, producing biased or unfair outputs. Furthermore, human emotion expression is highly complex, and a single expression can occasionally convey more than one emotion, making it challenging for EmoGPT to precisely detect all minute emotional shifts. Lastly, because people from different cultural backgrounds express their emotions in different ways, EmoGPT needs to be customized for each culture through training and changes.

This indicates that although robots can mimic some basic emotional expressions, they cannot possess true human emotions because they lack human emotional experiences and intrinsic emotional mechanisms. Although artificial intelligence has the potential to simulate emotions and consciousness, there is a fundamental difference between these simulations and real emotional experiences and consciousness. Firstly, at the experiential level, human emotions are a genuine experience that involves multiple levels of physiology, psychology, and society. However, artificial intelligence lacks physical and emotional practice, which limits their ability to experience the world and generate emotional awareness, making it unable to adapt flexibly to different moral contexts like humans [7]. Second, human emotions are freely formed and shaped by the volition and psychological condition of the individual. However, artificial intelligence lacks autonomy because its choices and actions are governed by predefined algorithms and programs rather than by internal self-awareness [8]. Lastly, in terms of moral accountability, artificial intelligence's emotional simulation is incapable of taking on moral responsibility since it lacks the capacity for self-reflection and self-awareness that human consciousness possesses. Artificial intelligence's ability to make moral decisions is frequently restricted to finding the "optimal solution," which complies with utilitarian principles but falls short of the complexity and depth of the human ethical domain [9].

Overall, emotional simulation is a part of artificial intelligence technology aimed at mimicking human emotional responses, but it is not equivalent to human emotions with real emotional experiences, consciousness, or moral judgments. Human emotions, consciousness, and moral judgments are deep and multidimensional psychological states, while artificial intelligence's emotional simulation is more of a superficial behavioral imitation.

3. Case Study of EmoGPT

3.1. Potentials and Limitations

During the Shanghai epidemic in April 2022, the Shanghai Key Laboratory of Mental Health and Crisis Intervention collaborated with Mirror Technology to launch AI psychological assessment and epidemic emotion self-service intervention services within the mini program, serving tens of thousands of stranded Shanghai citizens and receiving unanimous praise from relevant departments. This illustrates how convenient AI psychological counseling is, as clients may simply access services via computers or mobile devices without being constrained by time or location. This round-the-clock service efficiently addresses the issue of inadequate psychological hotline staff and the inability to offer round-the-clock coverage. The features of EmoGPT have expanded since its official launch. It can answer to users' problems, worries, and confusions in a kind and sympathetic way by showing empathy and understanding. At the same time, EmoGPT also has crisis recognition function, which enables it to sensitively identify the emotions and psychological states expressed by users in conversations, including anxiety, depression, or other negative emotions, and can quickly detect and respond in a timely manner to help users obtain support in critical moments. For example, when a user inputs content like 'I want to leave this world', EmoGPT will immediately push the hotline number and output words of concern and comfort.

Compared with real psychological counselors, AI psychological counseling usually has lower costs and can cover a wider range of people with different income levels. The lower threshold for use

can help awaken people's awareness of maintaining mental health and contribute to social stability. In addition, AI psychological counseling services can reduce service quality variations brought on by individual counselor differences by using big data analysis and pattern recognition to deliver clients standardized counseling processes and recommendations. In addition, AI psychological counseling is definitely a better option for people who dislike face-to-face conversation. This may lessen the counselor's psychological barrier to some level, which is good for the accuracy of the counseling outcomes.

This indicates that artificial intelligence can to some extent recognize, understand, and respond to human emotions, which not only enhances the naturalness and effectiveness of human-computer interaction, but also provides innovative solutions for specific fields, improves user experience, and in some cases provides important social support. With the advancement of technology, the application of emotional simulation in artificial intelligence will become more extensive and in-depth.

However, EmoGPT also has some shortcomings. For example, while EmoGPT can respond to users' questions with a comforting tone when simulating emotional responses, it lacks the ability to truly understand or experience emotions, and therefore cannot feel sympathy or understand the user's emotional state. However, EmoGPT's emotional response is limited in its capacity to comprehend and react creatively in many settings because it is merely a component of programming and is based on predetermined rules rather than true understanding and autonomous decision-making. These flaws might impair the diagnostic and assessment's accuracy, which would erode user confidence. For instance, EmoGPT uses keywords to capture answers that correspond to the emotions expressed by users using comparable terms. This template-based response makes people feel much more apart from robots than they would otherwise, which makes them less inclined to communicate with and trust AI.

In addition, when dealing with certain complex psychological issues or mental illnesses, EmoGPT cannot achieve the depth and delicacy of a professional psychological counselor, and requires more in-depth professional knowledge and skills. EmoGPT still struggles to adapt to the psychological counseling needs of different cultural backgrounds when it comes to cultural differences. At present, EmoGPT only supports one language mode, Chinese. Finally, although EmoGPT provides anonymous services, data privacy and security remain a challenge.

These limitations indicate that although artificial intelligence has made some progress in emotional simulation, there is still a long way to go to reach a level close to human emotions. At the same time, with the development of technology, ethical and social responsibility issues related to emotional simulation also need to be constantly examined and addressed.

3.2. Development Trends

With the continuous development of artificial intelligence technology, EmoGPT is expected to become more accurate and natural in emotion recognition, language understanding, and response generation. It could incorporate additional features like precise emotional and psychological state intervention, real-time assessment of users' emotional states, analysis of multimodal data including voice, text, and facial expressions, more personalized service provision, and early detection and intervention of potential psychological issues. Simultaneously, EmoGPT might broaden its scope beyond its present concentration on student organizations and particular mental health concerns. This would enable it to serve users with varying needs and ages in areas including adult emotional support, senior companionship, metaverse, and intelligent robots.

In addition, in the future, EmoGPT may collaborate more with human psychologists to undertake preliminary screening, continuous monitoring, and basic support, allowing professionals to focus on more complex cases and in-depth counseling. As the service deepens, EmoGPT will also pay more attention to privacy protection and ethical issues when processing user data. In terms of privacy protection, a sound data security governance system can be gradually established based on measures such as data encryption, anonymization, and strict control of data access permissions. A normalized data security risk assessment mechanism should be developed, and comprehensive system assessments should be conducted regularly.

In addition, to avoid bias in the long-term data accumulation process of users, the dataset used to train AI should reflect the diversity of the real world as much as possible, including different genders, races, ages, and cultural backgrounds. Simultaneously, it needs to be constantly observed to make sure that it doesn't become biased over time. AI Fairness 360 from IBM and the What If Tool from Google are two examples of bias detection tools that can be used to find and lessen biases in AI decision-making.

With the development of AI products such as EmoGPT, "de mystification" and "de stigmatization" mental health services will become more popular, and society's awareness and acceptance of mental health will also increase, thereby affecting the pattern of the mental health industry - reducing service costs and creating new business opportunities. This presents additional demands and difficulties for conventional mental health providers. Simultaneously, additional pertinent policies and regulations might be implemented to control the use of AI and safeguard user rights.

These development trends indicate that EmoGPT and similar AI mental health products have broad application prospects in the future, but at the same time, attention needs to be paid to various challenges such as technology, ethics, and society [10].

4. Conclusion

Though artificial intelligence's emotion simulation has many limitations and machine emotions are not the same as human emotions, it is thought that as emotion computing advances, artificial intelligence will be able to transcend its current limitations and meet people's emotional needs as well as generate more natural and immersive interactions than just preset reactions to phrases. . It is also important to carefully consider and formulate relevant ethical and legal guidelines while promoting technological progress, to ensure that the development of artificial intelligence is in line with human interests and values.

References

- [1] Mental Health Market Trends, Size, Share & Analysis [2032] (imarcgroup.com)
- [2] William James and Lange C. G., *The Emotions*, Baltimore: Williams & Wilkins, 1922.
- [3] Liu Yuedi. Artificial Intelligence, Emotion Machines, and the 'Emotion Intelligence Paradox' [J]. *Exploration and Competition*, 2019, (06): 76-88+158.
- [4] Minsky, M. (1986). "Matter, Mind, and Models: An Outline for a Theory of Mental Processes."
- [5] Minsky, M. (2006). "The Emotion Machine: Commonsense Thinking, Artificial Intelligence, and the Future of the Human Mind."
- [6] Michael A. Arbib, "Beware the Passionate Robot", in Jean-Marc Fellous, and Michael A. Arbib, eds., *Who Needs Emotions: The Brain Meets the Robot*, Oxford: Oxford University Press, 2005, pp. 336.
- [7] Damasio, A. R. (1999). "The Feeling of What Happens: Body and Emotion in the Making of Consciousness." Harcourt.
- [8] Searle, J. R. (1980). "Minds, Brains, and Programs." *Behavioral and Brain Sciences*.
- [9] Moor, J. H. (2006). "The Nature, Importance, and Difficulty of Machine Ethics." *IEEE Intelligent Systems*.
- [10] William James, "What is an Emotion", Robert C. Solomon ed., *What is an Emotion?: Classic and Contemporary Reading*, New York and Oxford: Oxford University Press, 2003, pp. 66-67.