



லிடரெரி ஃபைண்டிங்ஸ்
பல்துறை அய்வுக்கான பன்னாட்டு அய்விதழ்

LITERARY FINDINGS

A Peer Reviewed International Journal of Multidisciplinary Research - ISSN : 2278-2311

VOL: 15

APRIL - 2026

ISSUE: 2

Machine Learning Approaches in Emotional Intelligence : a Comprehensive Review

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Abstract

Human interaction, decision-making, and prosperity all have been significantly influenced by emotional intelligence (EI). In latest approach of machine learning techniques, interest in using these methods to comprehend measure and improve emotional intelligence. This paper provides an in-depth review of the current state of research at the overlapping of machine learning and emotional intelligence. Various machine learning techniques used in EI research are discussed. It includes data-driven modeling, sentiment analysis, affect labeling and unique intercession. Additionally some challenges, opportunities and future directions in the emerging field are highlighted.

Keywords: Emotional Intelligence, Machine Learning.

Introduction

An ability to understand lead and regulate one's own emotions as well as the feelings of others is recognized as emotional intelligence (EI). The growing importance of it in a variety of fields, like education, psychology, and organizational behavior (Salovey & Mayer, 1990). A great deal of conventional approaches to evaluate emotional intelligence depended on self-report tools, such as questionnaires, which can include prejudices and limitations (Petrides & Furnham, 2001). But by offering more in-depth understanding of emotional intelligence, the incorporation of machine learning (ML) techniques presents viable ways to enhance and supplement these conventional approaches.

ML systems have proven to be able to examine big datasets and spot patterns that human review would miss (Bishop, 2006). This ability creates new avenues for learning about emotional intelligence and its ramifications in a more sophisticated way.

2. Machine Learning Models for Emotional Intelligence

A variety of machine learning methods have been used recently to quantify and comprehend emotional intelligence. These comprise those shown in "Fig. 1," however they are not restricted to it.

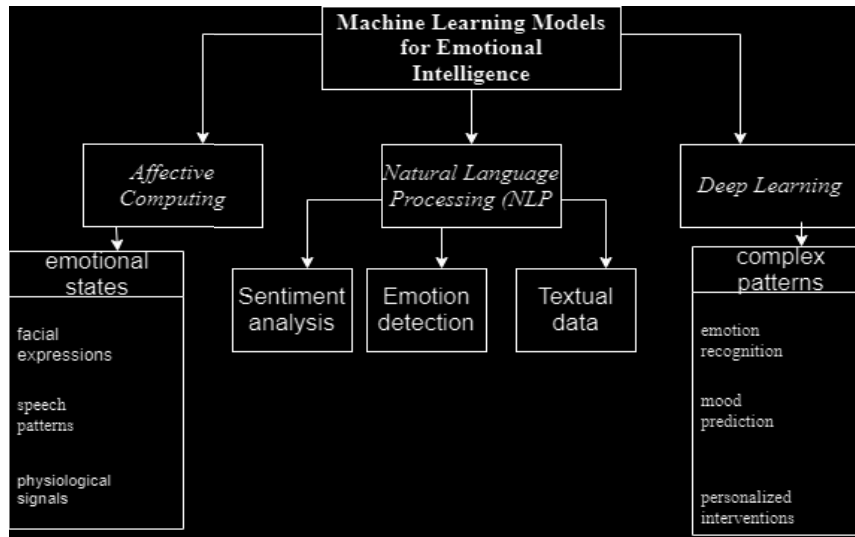


Fig1: Machine learning methods for Emotional Intelligence

Natural Language Processing (NLP): The main uses of natural language processing (NLP) approaches are sentiment analysis, emotion detection, and interpretation of textual data related to emotions. Sentiment analysis of the web forums, feedback from customers, and social media information may provide facts about mental health and behaviors (Pang & Lee, 2008).

Affective Computing: Computing method is used to learn and develop machine that are able to respond human emotions. Such as speech pattern, facial expression and physiological symptoms some machine learning techniques are used such as neural networks and support vector machine (Picard, 1997).

Deep Learning: Deep learning method is used in particular deep neural networkshave been demonstrated in impressive performance on a range of emotional intelligencerelated tasks. More precise mood prediction, emotion identification, and specialized are made possible by deep learning algorithms' ability to extract complex patterns from massive datasets (LeCun et al., 2015).

3.Applications of Machine Learning in Emotional Intelligence

Many real-world applications have emerged from a combination of machine learning methods and emotional intelligence, such as "Fig 2."

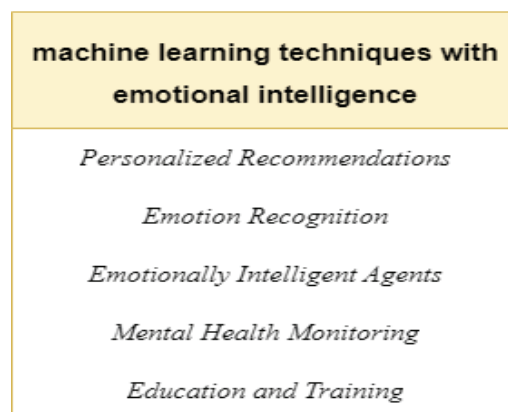


Fig.2: Machine Learning Techniques with emotional intelligence

Personalized Recommendations: In order to offer proposals for material, goods, or services that are tailored to the emotional needs of each individual, machine learning algorithms are able to evaluate the emotional reactions and preferences of each person (Sarwar et al., 2000).

Emotion Recognition: Emotions can be detected from a variety of input sources, including textual data, speech phrases, and facial expressions, applying machine learning models, such as deep learning architectures like CNNs and RNNs (Koelstra et al., 2012).

Emotionally Intelligent Agents: Emotional intelligence has been improved by chatbots and virtual agents that apply machine learning (ML) techniques.(D'Mello et al., 2010).

Mental Health Monitoring: To be able to monitor people's mental health, detect early signs of psychological disorders, and deliver suitable treatments, machine learning algorithms can evaluate textual signals, posted on social media posts, and physiological information (De Choudhury et al., 2013).

Education and Training: Adaptive learning platforms and virtual agents that can understand students' emotional states, provide feedback, and modify teaching methods to improve learning outcomes can be developed with machine learning-based systems (Woolf et al., 2009).

4. Challenges and Future Directions

The integration of machine learning with emotional intelligence continues to face a number of challenges, despite its theoretical benefits. These issues include:

Data Quality and Bias: Machine learning models' performance and generalizability can be significantly affected by the quality and accuracy of the emotional data used to train them. Furthermore, insensitive variables can be like gender or ethnicities are particularly at risk of unfair or incorrect predictions due to errors in training data (Caliskan et al., 2017).

Interpretability and Trustworthiness: Deep learning models in particular are sometimes regarded as "black boxes," which makes it difficult to understand the results as well as their fundamental concepts. Establishing trust and acceptance in real-world applications requires improving these models' interpretability and transparency (Rudin, 2019).

Ethical and Privacy Concerns: The ethical issues approximately consent, privacy, and potential misuse of sensitive data have been brought up by the application of machine learning algorithms in emotional intelligence. To ease these concerns, it is crucial to establish legal processes for data processing, storage, and acquiring (Jobin et al., 2019).

5. Conclusion

Finally, machine learning methods provide beneficial tools for recognizing, evaluating, and improving emotional intelligence. Through the use of complicated algorithms and huge amounts of data, researchers and experts can create unique applications that enhance people's mental wellness, establish relationships with others, and encourage successful outcomes across a variety of areas. To make full use of machine learning in emotional intelligence research and practice, however, issues with data quality, accessibility, and morals must be resolved.

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