

Literature Review: Emotion Recognition Technologies in Educational Contexts

Student Name: Muteb Fawaz Almughyiri

Institution: Midocean University

Professor: Dr. Ashraf Elsayed

Course: Thesis AI900 First Trimester 2025

Date: 15.03.2025

Literature Review:

Emotion Recognition Technologies in Educational Contexts

Emotion recognition technologies (ERT) are AI, computer vision, and educational psychology-based emotion recognition technologies to perceive emotion using facial expressions and body gestures (Diwan et al., 2024). Researchers and educators are drawn to these systems because they influence learning outcomes and engagement (Olider et al., 2024). As an application of ERTs, traditional summative assessments that simply ignore emotional aspects of learning become transformed into insight and into children's emotional states (Indra Saputra et al., 2024). This review discusses the applications of recent developments of emotion recognition technologies in educational contexts along with ethical considerations.

Technological Foundations and Approaches

In recent technological advances, emotion recognition systems have become more and more able. In their work, Salloum et al. (2025) generated a refined CNN model for educational settings that is able to correctly predict seven basic emotions that are anger, disgust, fear, happiness, sadness, surprise, and neutral with 95% accuracy. However, they used extensive preprocessing techniques such as normalization augmentation to provide robust performance and generalizability in their method. Different convolutions with appropriate batch normalization and dropout were run through to improve the classification metrics. The high accuracy shows that the algorithms implemented in this system can be used in real time in an educational environment.

At the same time, Diwan et al. (2024) gave an in-depth survey of recent emotion classification developments from 2019 to 2023, including complete transfer learning, putting as

much as lightweight convolutional neural networks, which are assigning to us futuristic as well as novel techniques, such as sign based measurement system. Nevertheless, as indicated by their work, emotion recognition should be conducted based on a holistic criterion that respects both facial expressions and body gestures, which would ensure higher accuracy and possible applicability to different educational environments.

Educational Applications and Implications

Conventional approaches to educational assessment suffer from several shortcomings, such as a lack of personalization, inefficient ways to give feedback, and overemphasizing lower-order thinking skills. AI-based assessment systems can help address these challenges by providing adaptive, personalized feedback, encouraging student engagement, and enabling individualized learning paths, as discussed by Indra Saputra et al. (2024). During their systematic literature review, they found that AI technologies, such as machine learning and natural language processing, can provide real-time feedback and assessment of higher-order critical thinking and creativity skills.

A study by Demekash Asregid et al. (2023) analyzed that teacher educators' use of feedback to improve pre-service teachers' reflective practices through microteaching sessions. They found traditional feedback mechanisms typically lack dialogue and feed-forward (forward-looking) components. This points to a gap that emotion recognition technologies can fill by offering objective, real-time emotional data that can improve the quality and timeliness of feedback within teacher education programs.

Preliminary analysis of the proposed face recognition system for emotion analysis in educational settings indicates that the system can identify actual teaching moments that cause engagement or confusion in real-time. Therefore, this capability could help instructors change how they teach during lectures rather than waiting for end-of-course evaluations (Indra Saputra et al., 2024). These constitute a major improvement over the old assessment methods, which do not consider the students' emotional engagement in the learning process.

Cultural and Developmental Considerations

In a cross-cultural study, Möller et al. (2022) investigated how much the emotions in preschoolers in Germany and Singapore are recognizable and understandable. Results showed that Singaporean preschoolers were more accurate (i.e., precise) in identifying emotions from facial stimuli relative to German preschoolers, and they argued that emotional understanding was linked to particular socialization practices. The results of this research indicate that when designing and implementing emotion recognition technologies, cultural factors should be taken into consideration as they significantly condition the perception of the technology in educational institutions of various kinds.

Long this theme, Olider et al. (2024) conducted a systematic literature review in order to identify the application of AI in emotion assessment in learning environments. In their research, they analyzed four topics: emotion recognition in education, technology integration, learning outcomes, special education, assistive technology, and affective computing. In addition, they pinpointed some emerging factors, such as federated learning, convolutional neural networks,

recurrent neural networks, facial expression databases, and ethical issues of intelligent systems development.

Ethical Considerations and Challenges

Many important ethical considerations remain on the use of emotion recognition technologies in education applications. Katirai's (2023) structural review of the ethics of emotion recognition technologies showed three areas of concern: outcomes biased and unfair due to faulty premises, the sensitivity of emotion data, and potential harm in consequential settings such as education. Additionally, the review synthesized proposed ethical guidelines applicable during design and implementation, which require clearly defined scope, ethical decision-making processes, fairness, non-discrimination, and privacy protection.

These ethical concerns are relevant in educational settings, where children, adolescent cohorts and vulnerable populations might be exposed to emotion perception systems. Widespread implementation in educational settings is an issue that will inevitably have to be faced owing to the massive potential for algorithmic bias, privacy violations, and misinterpretation of emotional data.

References

- Demekash Asregid, Dawit Mekonnen Mihiretie, & Solomon Areaya Kassa. (2023). Teacher educators use of feedback to facilitate reflective practice among pre-service teachers during microteaching. *Cogent Education*, 10(2).
<https://doi.org/10.1080/2331186x.2023.2257121>
- Diwan, A., Reshma Sunil, Mer, P., Rajesh Mahadeva, & Shashikant P. Patole. (2024). Advancements in Emotion Classification via Facial and Body Gesture Analysis: A Survey. *Expert Systems*. <https://doi.org/10.1111/exsy.13759>
- Indra Saputra, Kurniawan, A., Merita Yanita, Elviza Yeni Putri, & Mahniza, M. (2024). The Evolution of Educational Assessment: How Artificial Intelligence is Shaping the Trends and Future of Learning Evaluation. *Indonesian Journal of Computer Science*, 13(6).
<https://doi.org/10.33022/ijcs.v13i6.4465>
- Katirai, A. (2023). Ethical considerations in emotion recognition technologies: a review of the literature. *AI and Ethics*. <https://doi.org/10.1007/s43681-023-00307-3>
- Möller, C., Bull, R., & Aschersleben, G. (2022). Culture shapes preschoolers' emotion recognition but not emotion comprehension: a cross-cultural study in Germany and Singapore. *Journal of Cultural Cognitive Science*. <https://doi.org/10.1007/s41809-021-00093-6>
- Olider, A., Deroncele-Acosta, A., Luis, J., Barrasa, A., López-Granero, C., & Martí-González, M. (2024). Integrating artificial intelligence to assess emotions in learning environments: a systematic literature review. *Frontiers in Psychology*, 15.
<https://doi.org/10.3389/fpsyg.2024.1387089>

Salloum, S. A., Alomari, K. M., Alfaisal, A. M., Aljanada, R. A., & Basiouni, A. (2025).

Emotion recognition for enhanced learning: using AI to detect students' emotions and adjust teaching methods. *Smart Learning Environments*, 12(1).

<https://doi.org/10.1186/s40561-025-00374-5>