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(57) Abstract :
ABSTRACT: The integration of Artificial Intelligence (AI) in education has opened new frontiers in personalized and adaptive learning. Traditional e-learning platforms often lack the ability to gauge student engagement, leading to passive learning experiences. This project aims to bridge this gap by utilizing multi-modal emotion recognition to analyse students' real-time emotional states, enhancing both student engagement and teacher effectiveness. Our model incorporates Convolutional Neural Networks (CNNs) for facial expression analysis, Wav2Vec for speech emotion recognition, and BERT for textual sentiment detection. These three components work together to capture emotions such as confusion, boredom, frustration, and interest, providing valuable insights into the student's learning process. The system continuously monitors these emotional cues and adjusts teaching methods accordingly to maintain an optimal learning experience. One major application of this project is in AI driven tutoring systems, where virtual tutors can modify their teaching pace, tone, and style based on a student's emotional feedback. If signs of stress or confusion are detected during an assessment, the AI can suggest personalized revision topics or provide simplified explanations to reinforce understanding. Additionally, teachers receive real-time reports on student engagement levels, helping them identify struggling learners and adapt lesson plans more effectively. By implementing emotion-aware learning, this system makes online education more interactive, engaging, and human-like. It fosters a more inclusive and adaptive educational environment, ensuring that students receive the necessary support to enhance their comprehension and academic performance. This innovative approach transforms digital learning into a more intuitive and student centred experience, paving the way for the future of AI-driven education.

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