

DEVELOPMENT OF AN AI-BASED INTERACTIVE LEARNING APPLICATION WITH FACIAL EMOTION RECOGNITION

Fikri Faqih Al Fawwaz

Study Program of Informatics Engineering

Majoring of Information Technology

ABSTRACT

This study presents the design and evaluation of a web-based adaptive learning application that incorporates facial emotion recognition to individualize problem difficulty for primary school students aged 7-9 years old. To develop this system, we used Adaptive Software Development (ASD) and Design-Based Research (DBR), with the design phase guided by a preliminary survey of parents and teachers that identified classroom needs. Facial expression classification of students taken from webcam is done using a Convolutional Neural Network (CNN) which has been trained on FER2013 dataset with four emotion categories; Happy, Engaged, Confused and Frustrated. Based on the detected emotion, the system automatically adjusts question difficulty for each emotion group at the end of every round, while providing teachers with a real-time monitoring dashboard, action suggestions, and session-based performance reports. The System Usability Scale (SUS) score for 10 participants (3 teachers, 7 students) during the usability test was 80.0, suggesting that the app is usable. Qualitative feedback affirmed that emotion detection and adaptive difficulty were widely identified as the system's most important outputs across both user groups. While there are still limitations in the model's accuracy and the size of the evaluation sample, results demonstrate that the system is a promising platform for emotion-aware adaptive learning systems in primary education.

Keywords: Facial Emotion Recognition, Artificial Intelligence, Personalized Learning, Primary Education