

ABSTRAK

Penelitian ini dilatarbelakangi oleh kebutuhan akan media pembelajaran yang dapat membantu siswa Sekolah Luar Biasa (SLB) mengenali emosi melalui ekspresi wajah. Penelitian ini bertujuan mengembangkan sistem deteksi emosi wajah berbasis Convolutional Neural Network (CNN) sebagai media edukatif bagi siswa SLB di Kota Madiun. Metode penelitian menggabungkan pendekatan kuantitatif dan kualitatif, melalui observasi, wawancara, pengolahan dataset, pengembangan model, serta pengujian dan evaluasi sistem. Dataset yang digunakan merupakan gabungan dataset publik FER2013 dan citra wajah siswa SLB. Data diproses melalui tahapan preprocessing, meliputi penyesuaian ukuran citra, normalisasi, augmentasi, dan pembagian data latih serta data uji. Model CNN kemudian diintegrasikan ke dalam aplikasi web berbasis Streamlit yang mengambil citra wajah melalui kamera dan menampilkan hasil klasifikasi emosi beserta rekomendasi sederhana yang bersifat edukatif. Pengujian fungsional dilakukan menggunakan metode Black Box Testing, sedangkan evaluasi pengguna melibatkan siswa dan guru SLB. Hasil penelitian menunjukkan bahwa aplikasi berhasil dikembangkan dan fitur utamanya berjalan sesuai kebutuhan fungsional. Model CNN dapat mengklasifikasikan ekspresi wajah ke dalam kategori emosi yang dipelajari selama pelatihan, sementara umpan balik guru menunjukkan bahwa aplikasi berpotensi digunakan sebagai media bantu pembelajaran pengenalan emosi. Hasil deteksi tetap merupakan estimasi dan perlu dipertimbangkan bersama pengamatan langsung guru, bukan digunakan sebagai diagnosis psikologis.

Kata kunci: Convolutional Neural Network, deteksi emosi wajah, SLB, Streamlit, media edukasi

ABSTRACT

This study was motivated by the need for learning media that can help students at special schools recognize emotions through facial expressions. It aims to develop a facial emotion detection system based on a Convolutional Neural Network (CNN) as an educational tool for special-school students in Madiun City, Indonesia. The study combines quantitative and qualitative approaches through observation, interviews, dataset processing, model development, system testing, and user evaluation. The dataset combines the public FER2013 dataset with facial images collected from special-school students. The images undergo preprocessing, including resizing, normalization, augmentation, and splitting into training and testing sets. The CNN model is then integrated into a Streamlit-based web application that captures facial images through a camera and displays the predicted emotion category along with simple educational recommendations. Functional testing is conducted using the Black Box Testing method, while user evaluation involves students and teachers. The results

show that the application was successfully developed and its main features operate according to the defined functional requirements. The CNN model can classify facial expressions into the emotion categories learned during training, while teacher feedback indicates that the application has potential as a supporting tool for emotion-recognition learning. The detection output remains an estimate and should be considered alongside teachers' direct observations; it is not intended for psychological diagnosis.

Keywords: Convolutional Neural Network, facial emotion detection, special school, Streamlit, educational tool