

ABSTRAK

Hidayat, Ageng Putra. 2024. Penerapan Algoritma CNN Untuk Pengenalan Ekspresi Wajah. Tugas Akhir. Program Sarjana. Program Studi Teknik Informatika. Universitas Muhammadiyah Jember.

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Ekspresi wajah merupakan media komunikasi non-verbal yang biasa digunakan oleh manusia untuk menggambarkan keadaan emosinya. Seiring berkembangnya teknologi, banyak penelitian yang membahas tentang sistem pengenalan ekspresi wajah yang sangat berguna dalam bidang industri, kesehatan hingga deteksi kebohongan. Namun tantangan untuk mendapatkan mengembangkan sistem pengenalan ekspresi wajah yaitu akurasi yang kecil. Sehingga tujuan penelitian ini adalah mengembangkan model CNN yang mampu mengenali 4 kelas ekspresi wajah yaitu *angry*, *happy*, *neutral* dan *sad*. Dataset yang digunakan sebanyak 18.623 gambar *greyscale* berukuran 48x48 piksel. Dataset dibagi menjadi 2 yaitu 80% data *training* dan 20% data validasi. Data di *training* menggunakan 4 optimizer yaitu Adam, Adamax, Nadam dan SGD. Untuk menguji performa akhir model, penelitian ini menggunakan data test sebanyak 40 data gambar yang belum pernah dikenali model disaat *training*. Dalam mengembangkan CNN, penelitian ini menggunakan teknik augmentasi data dan hyperparameter. Model yang berhasil dibangun terdiri dari 24 *layer*. Berdasarkan proses *training*, model yang menggunakan optimizer Adam memiliki performa akurasi terbaik selama pelatihan. Sedangkan hasil penelitian, model yang diuji menggunakan data test menunjukkan akurasi 97,5%, presisi 100%, *recall* 97,5%, dan *F1-score* 98,7%.

Kata Kunci: Pengenalan Ekspresi Wajah, CNN, Augmentasi Data, *Hyperparameter*

ABSTRACT

Hidayat, Ageng Putra. 2025. *Implementation of CNN Algorithm for Facial Expression Recognition. Final Project. Undergraduate Program. Informatics Engineering Study Program. Muhammadiyah University of Jember.*

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Facial expression is a non-verbal communication medium commonly used by humans to describe their emotional state. Along with the development of technology, many studies have discussed facial expression recognition systems that are very useful in industry, health and lie detection. However, the challenge in developing a facial expression recognition system is its low accuracy. So the purpose of this study is to develop a CNN model that is able to recognize 4 classes of facial expressions, namely angry, happy, neutral and sad. The dataset used was 18,623 grayscale images measuring 48x48 pixels. The dataset is divided into 2, namely 80% training data and 20% validation data. The data in training uses 4 optimizers, namely Adam, Adamax, Nadam and SGD. To test the final performance of the model, this study used 40 test data images that had never been recognized by the model during training. In developing CNN, this study used data augmentation and hyperparameter techniques. The model that was successfully built consisted of 24 layers. Based on the training process, the model using the Adam optimizer has the best accuracy performance during training. While the results of the study, the model tested using test data showed an accuracy of 97.5%, precision of 100%, recall of 97.5%, and F1-score of 98.7%.

Keywords: Facial Expression Recognition, CNN, Data Augmentation, Hyperparameters