

ABSTRACT

This study aimed to develop an effective Convolutional Neural Network (CNN) model for classifying emotions from facial images in the FER-2013 dataset. The proposed CNN model featured an architecture consisting of multiple convolutional, pooling, and fully connected layers optimized for peak performance. The dataset used comprised grayscale facial images sized 48×48 pixels. Data augmentation methods and dropout techniques were applied to prevent overfitting and enhance the variety of training data. The model was compiled using the Adam optimizer and categorical_crossentropy loss function, and trained with a batch size of 32 and a maximum of 10,000 epochs with EarlyStopping and ModelCheckpoint callbacks. The results indicated that the combination of max pooling and oversampling augmentation techniques yielded the best performance with a validation accuracy of 95% and a validation loss of 0.19. Visualization of prediction results and the confusion matrix showed that the model could accurately recognize most emotions, although there were some mispredictions among similar emotions. In conclusion, this model demonstrated significant potential for practical applications in emotion recognition based on facial images.

Kata Kunci : *Convolutional Neural Network, Emotion Classification, FER-2013, Image Processing, Data Augmentation, Face Recognition*