ABSTRAK

Penelitian ini membandingkan performa dua model *Convolutional Neural Network* (CNN), yaitu VGG-16 dan ResNet-50, dalam mendeteksi ekspresi wajah senang dan takut pada *dataset* FER-2013. Pengujian dilakukan dengan dua *optimizer*, *Adam* dan SGD. Hasil penelitian menunjukkan bahwa *model* ResNet-50 dengan optimizer Adam memberikan performa terbaik dengan *accuracy* sebesar **92,5%**, nilai *loss* **0,18**, dan skor AUC **0,96**. Pada *model* VGG-16 dengan *Adam*, diperoleh *accuracy* **90,2%**, *loss* **0,22**, dan AUC **0,94**. Sementara dengan *optimizer* SGD, ResNet-50 memperoleh *accuracy* **89,7%**, loss **0,24**, dan AUC **0,92**; sedangkan VGG-16 dengan SGD menghasilkan *accuracy* **87,8%**, *loss* **0,27**, dan AUC **0,90**. Berdasarkan hasil pengujian *model*, VGG-16 dengan *Adam* berhasil mengklasifikasikan ekspresi senang dan takut dengan *accuracy* terhadap data uji sebesar **90%**. Hasil ini menunjukkan bahwa VGG-16 dengan *optimizer Adam* paling optimal untuk deteksi ekspresi wajah dalam mengklasifikasi ekspresi senang dan takut, sehingga dapat direkomendasikan untuk pengembangan sistem pengenalan ekspresi wajah yang akurat dan andal.

Kata Kunci: *Convolutional Neural Network*, Ekspresi Wajah, VGG-16, ResNet-50, *optimizer*, *loss*, AUC, *accuracy*

ABSTRACT

This research compares the performance of two Convolutional Neural Network (CNN) models, namely VGG-16 and ResNet-50, in detecting happy and fearful facial expressions using the FER-2013 dataset. The experiments were conducted using two optimizers, Adam and SGD. The results show that the ResNet-50 model with the Adam optimizer provides the best performance with an accuracy of ***92.5%****, a loss value of* ***0.18****, and an AUC score of* ***0.96****. For the VGG-16 model with Adam, an accuracy of* ***90.2%****, a loss of* ***0.22****, and an AUC of* ***0.94*** *were achieved. Meanwhile, with the SGD optimizer, ResNet-50 obtained an accuracy of* ***89.7%****, a loss of* ***0.24****, and an AUC of* ***0.92****; while VGG-16 with SGD achieved an accuracy of* ***87.8%****, a loss of* ***0.27****, and an AUC of* ***0.90****. Based on the model evaluation, VGG-16 with Adam successfully classified happy and fearful expressions with a test data accuracy of* ***90%****. These results indicate that VGG-16 with the Adam optimizer is the most optimal for facial expression detection in classifying happy and fearful expressions, and thus can be recommended for the development of accurate and reliable facial expression recognition systems.*

Keywords*: Convolutional Neural Network, Facial Expression, VGG-16, ResNet-50, optimizer, loss, AUC, accuracy*