ABSTRAK

Perkembangan teknologi generative AI telah memungkinkan penciptaan gambar wajah sintetis yang sangat realistis, seperti yang dihasilkan oleh situs *This Person Not Exist* (TPNE). Hal ini memunculkan tantangan dalam membedakan gambar sintetis dari wajah manusia asli. Penelitian ini bertujuan mengimplementasikan algoritma Convolutional Neural Network (CNN) untuk mengklasifikasikan gambar wajah menjadi dua kelas: AI (sintetis) dan Human (asli). *Dataset* terdiri atas 17.642 gambar, dengan 9.792 gambar sintetis dari TPNE dan 7.850 gambar asli dari Kaggle (1.000 Gambar) dan Github (6.850 Gambar). Proses *preprocessing* mencakup *rescaling*, konversi ke grayscale, dan augmentasi seperti rotasi serta pergeseran posisi. Model CNN terdiri dari empat lapisan konvolusi menggunakan fungsi aktivasi ReLu pada hidden layer, masing-masing memiliki filter berturut-turut 64, dan 16, disertai *average pooling*, Dropout (0.2–0.4), dan lapisan dense (128 neuron). Enam skenario pengujian dilakukan dengan variasi *learning rate* (0.01–0.0001), fungsi aktivasi output (*tanh/sigmoid*), dan tingkat Dropout. Model terbaik (CNN6) dengan *learning rate* 0.0001, aktivasi sigmoid, dan Dropout 0.4. Analisis *confusion matrix* menunjukkan tantangan utama pada klasifikasi wajah sintetis yang sangat menyerupai asli (5 false positive, 2 false negative). Uji data baru menunjukkan akurasi 99%, namun tingkat keyakinan model menurun pada gambar yang diaugmentasi. Fitur pembeda utama mencakup tekstur kulit, simetri wajah, dan artefak latar belakang. Hasil ini menunjukkan bahwa CNN efektif dalam mendeteksi wajah sintetis, namun disarankan penguatan strategi augmentasi dan tuning parameter untuk peningkatan performa dan generalisasi.

Kata Kunci: *Convolutional Neural Network,* Wajah Sintetis, *Generative* AI, Klasifikasi, Augmentasi

ABSTRACT

The development of generative AI technology has enabled the creation of highly realistic synthetic facial images, such as those produced by the website This Person Not Exist (TPNE). This advancement raises challenges in distinguishing synthetic images from real human faces. This study aims to implement the Convolutional Neural Network (CNN) algorithm to classify facial images into two classes: AI (synthetic) and Human (real). The dataset consists of 17,642 images, including 9,792 synthetic images from TPNE and 7,850 real images from Kaggle (1,000) and GitHub (6,850). The preprocessing process includes rescaling, grayscale conversion, and data augmentation techniques such as rotation and positional shifting. The CNN model consists of four convolutional layers using the ReLU activation function in the hidden layers, each with filter sizes of 64 and 16, respectively. The architecture also includes average pooling, dropout (0.2–0.4), and a dense layer with 128 neurons. Six testing scenarios were conducted, varying the learning rate (0.01–0.0001), output activation function (tanh/sigmoid), and dropout rate. The best-performing model (CNN6) was achieved using a learning rate of 0.0001, a sigmoid activation function, and a dropout rate of 0.4. Confusion matrix analysis revealed that the main challenge lies in classifying synthetic faces that closely resemble real ones, with 5 false positives and 2 false negatives. Testing on new data showed an accuracy of 99%, although the model's confidence level decreased on augmented images. Key distinguishing features include skin texture, facial symmetry, and background artifacts. The results demonstrate that CNN is effective in detecting synthetic faces. However, it is recommended to strengthen data augmentation strategies and perform parameter tuning to improve performance and generalization.

Keywords: *Convolutional Neural Network, Synthetic Faces, Generative AI, Classification, Augmentation*