

ABSTRAK

Perkembangan teknologi kecerdasan buatan pada bidang *image generation* memungkinkan terciptanya citra wajah sintetis dengan tingkat realisme tinggi sehingga semakin sulit dibedakan dari citra wajah asli. Kondisi ini menimbulkan tantangan dalam keamanan digital dan verifikasi keaslian informasi. Penelitian ini bertujuan menerapkan arsitektur *ResNet-18* dengan penambahan *Squeeze-and-Excitation (SE) Block* untuk mengklasifikasikan citra wajah asli dan hasil generasi AI serta menganalisis pengaruh *SE Block* terhadap performa model. *Dataset* terdiri atas 8.000 citra yang terbagi ke dalam dua kelas, yaitu citra wajah asli dan hasil generasi AI. Citra wajah asli diperoleh dari *dataset FFHQ* dan data primer, sedangkan citra wajah hasil generasi AI diperoleh dari *dataset Stable Diffusion*, *StyleGAN3*, serta data primer yang dihasilkan menggunakan *DALL-E*, *Leonardo AI*, dan *Playground AI*. Penelitian menggunakan metodologi *CRISP-DM* yang meliputi tahapan *Business Understanding*, *Data Understanding*, *Data Preparation*, *Modeling*, *Evaluation*, dan *Deployment*. Evaluasi dilakukan menggunakan metrik *Accuracy*, *Precision*, *Recall*, dan *F1-Score* pada data normal serta pengujian *robustness* menggunakan *Gaussian Blur* dan *Gaussian Noise*. Hasil pengujian menunjukkan bahwa model *ResNet-18* dengan *SE Block* memperoleh performa terbaik pada data normal dengan *Accuracy* sebesar 98,92%, *Precision* sebesar 99,00%, *Recall* sebesar 98,83%, dan *F1-Score* sebesar 98,92%, lebih baik dibandingkan model *ResNet-18 baseline*. Pada pengujian *robustness*, *SE Block* belum memberikan peningkatan performa signifikan pada citra *Gaussian Blur*, namun mampu meningkatkan performa secara signifikan pada citra *Gaussian Noise*. Model terbaik diimplementasikan ke dalam aplikasi *Android* menggunakan *ONNX Runtime*. Hasil penelitian menunjukkan bahwa *SE Block* efektif meningkatkan performa klasifikasi pada kondisi data normal serta meningkatkan ketahanan model terhadap *Gaussian Noise*.

Kata kunci: *Computer Vision*, Klasifikasi Citra Wajah Asli dan Hasil Generasi AI, *ResNet-18*, *Squeeze-and-Excitation Block*

ABSTRACT

The advancement of artificial intelligence in image generation has enabled realistic synthetic facial images, making them difficult to distinguish from authentic images. This poses challenges to security and information authenticity verification. This study aims to implement ResNet-18 enhanced with a Squeeze-and-Excitation (SE) Block to classify authentic and AI-generated facial images and analyze the impact of the SE Block on model performance. The dataset consists of 8,000 images evenly distributed into two classes: authentic and AI-generated facial images. Authentic images were obtained from the FFHQ dataset and primary data, while AI-generated images were collected from the Stable Diffusion and StyleGAN3 datasets, as well as data generated using DALL·E, Leonardo AI, and Playground AI. This research adopts the CRISP-DM methodology, comprising Business Understanding, Data Understanding, Data Preparation, Modeling, Evaluation, and Deployment. Evaluation used Accuracy, Precision, Recall, and F1-Score on the original dataset, followed by robustness testing with Gaussian Blur and Gaussian Noise perturbations. Results show that ResNet-18 with the SE Block achieved the best performance on the original dataset, with 98.92% Accuracy, 99.00% Precision, 98.83% Recall, and 98.92% F1-Score, outperforming baseline ResNet-18. In robustness testing, the SE Block did not significantly improve performance under Gaussian Blur but significantly enhanced performance under Gaussian Noise. The best-performing model was deployed as an Android application using ONNX Runtime. Overall, integrating the SE Block improved classification performance under normal conditions and enhanced model robustness against Gaussian Noise. The findings demonstrate its effectiveness for authentic and AI-generated facial image classification in applications.

Keywords: Authentic and AI-Generated Facial Image Classification, Computer Vision, ResNet-18, Squeeze-and-Excitation Block