DETEKSI CITRA ASLI DAN BUATAN *DEEPFAKE* BERDASARKAN AREA MATA MENGGUNAKAN MODEL EFFICIENTNET

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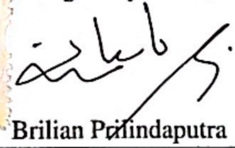

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ABSTRAK

Deteksi Citra Asli dan Buatan *Deepfake* Berdasarkan Area Mata Menggunakan Model EfficientNet

Perkembangan kecerdasan buatan khususnya teknologi *deepfake* semakin pesat, tercatat bahwa konten *deepfake* meningkat sebesar 550% pada tahun 2023. Mirisnya, kemampuan menghasilkan wajah yang tampak realistis namun sepenuhnya sintetik pada teknologi ini banyak disalahgunakan oleh masyarakat, sehingga menimbulkan tantangan signifikan terhadap keamanan dan integritas informasi digital. Meskipun berbagai metode deteksi telah dikembangkan, manipulasi halus pada area mata masih sulit ditiru oleh algoritma *deepfake*. Penelitian ini mengembangkan sistem deteksi citra asli dan buatan *deepfake* berbasis area mata menggunakan *Convolutional Neural Network* (CNN) EfficientNet dengan analisis variasi parameter pelatihan untuk memperoleh performansi model optimal. MediaPipe digunakan sebagai model untuk *cropping* area mata sebelum citra diproses oleh EfficientNet, yang digunakan sebagai metode untuk mengekstraksi fitur dan mengklasifikasikan dataset yang terdiri dari 2050 citra asli dan 2000 citra *deepfake* menggunakan *5-fold cross-validation*. Model optimal ditunjukkan pada *learning rate* 0.001, ukuran *batch size* 32, *dense* tambahan 256, dan *optimizer* RMSProp, menghasilkan akurasi, presisi, *recall*, dan *F1-score* masing-masing 100% dengan lama waktu komputasi 32 menit. Penelitian ini menunjukkan kemampuan EfficientNet dalam membedakan citra asli dan buatan secara akurat sebagai model pengembangan sistem deteksi deepfake yang efektif. Hasil ini juga menegaskan bahwa area mata memiliki pola penting dalam manipulasi citra *deepfake* sehingga memengaruhi hasil deteksi.

Kata kunci: *Convolutional Neural Network*, *Deepfake*, EfficientNet, Mata, MediaPipe

ABSTRACT

Detection of Real and Deepfake Images Based on Eyes Area Using EfficientNet

The development of Artificial Intelligence/AI, particularly deepfake technology, is growing rapidly, with deepfake content increasing by 550% in 2023. Sadly, the ability to produce faces that appear realistic but are completely synthetic in this technology is widely misused by the public, posing a significant challenge to the security and integrity of digital information. Although various detection methods have been developed, subtle manipulations in the eye area remain difficult for deepfake algorithms to replicate. This study develops a system for detecting authentic and deepfake images based on the eye area using the EfficientNet Convolutional Neural Network (CNN) with analysis of training parameter variations to achieve optimal model performance. MediaPipe is used as a model for cropping the eyes area before the image is processed by EfficientNet, which is used as a method to extract features and classify a dataset consisting of 2050 original images and 2000 deepfake images using 5-fold cross-validation. The optimal model is demonstrated at a learning rate of 0.001, a batch size of 32, an additional dense layer of 256, and an RMSProp optimizer, resulting in accuracy, precision, recall, and F1-score of 100% each with a computation time of 32 minutes. This study demonstrates EfficientNet's ability to accurately distinguish between real and fake images as a model for developing an effective deepfake detection system. These results also confirm that the eye area has important patterns in deepfake image manipulation that affect detection results.

Keywords: Convolutional Neural Network, Deepfake, EfficientNet, Eyes, MediaPipe

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