ABSTRAK

Penurunan produksi padi akibat penyakit daun memerlukan sistem deteksi dini yang akurat dan ringan untuk diimplementasikan. Penelitian ini bertujuan membandingkan kinerja arsitektur *Deep Learning* EfficientNetV2-S dan ResNet50 dalam klasifikasi penyakit daun padi (Blas, Bercak Coklat, Hawar Daun Bakteri, dan Sehat), serta menguji algoritma OpenCV (ruang warna HSV) untuk estimasi tingkat keparahan penyakit. Sebanyak 2.569 citra digunakan setelah melalui pra-pemrosesan menggunakan metode CLAHE dan augmentasi. Pengujian pada data uji menunjukkan model EfficientNetV2-S lebih unggul dan stabil dengan akurasi 98% dan *F1-Score* 0,98, dibandingkan ResNet50 yang mencapai akurasi 97% dan *F1-Score* 0,97. EfficientNetV2-S mencatat tingkat galat (*validation loss*) yang lebih rendah yakni 0,0414 berbanding 0,0853. Di sisi lain, modul OpenCV berhasil menghitung rasio area infeksi untuk penentuan tingkat keparahan sesuai standar IRRI, meski memiliki sedikit kerentanan terhadap bias warna latar belakang. Hasil evaluasi secara keseluruhan merekomendasikan EfficientNetV2-S sebagai arsitektur terbaik karena memiliki keseimbangan antara akurasi tinggi dan efisiensi komputasi, serta telah berhasil diintegrasikan dengan algoritma pengolahan citra ke dalam purwarupa aplikasi *web* hibrida.

Kata Kunci: *computer vision*, *deep learning*, efficientnetv2-s, opencv, penyakit padi, resnet50

ABSTRACT

The decline in rice production due to leaf diseases requires an accurate and lightweight early detection system. This study aims to compare the performance of EfficientNetV2-S and ResNet50 Deep Learning architectures in classifying rice leaf diseases (Blast, Brown Spot, Bacterial Leaf Blight, and Healthy), and to test the OpenCV algorithm (HSV color space) for disease severity estimation. A total of 2,569 images were utilized after undergoing preprocessing using the CLAHE method and augmentation. Evaluation on the test set showed that the EfficientNetV2-S model was superior and more stable with 98% accuracy and an F1-Score of 0.98, compared to ResNet50 which achieved 97% accuracy and an F1-Score of 0.97. EfficientNetV2-S recorded a lower validation loss of 0.0414 versus 0.0853. Furthermore, the OpenCV module successfully calculated the ratio of the infected area for severity grading according to IRRI standards, despite a slight vulnerability to background color bias. The overall evaluation results recommend EfficientNetV2-S as the best architecture for its balance of high accuracy and computational efficiency, and it has been successfully integrated with image processing algorithms into a hybrid web application prototype.

***Keyword**: computer vision, deep learning, efficientnetv2-s, opencv, resnet50, rice disease*