

INTISARI

Tanaman padi merupakan salah satu penghasil bahan makanan pokok yang sangat penting, terutama di Indonesia. Namun, produktivitasnya sering menurun sementara impor beras meningkat akibat permintaan yang tetap tinggi. Salah satu penyebab utama penurunan produktivitas adalah kegagalan panen yang sering disebabkan oleh serangan penyakit, seperti *bacterial leaf blight* (BLB) atau hawar daun bakteri. Penyakit ini memiliki ciri visual yang dapat dideteksi oleh model *deep learning*, seperti arsitektur *You Only Look Once* (YOLO). Penelitian ini bertujuan membandingkan kinerja beberapa model YOLO, yaitu YOLOv5m, YOLOv6m, YOLOv7, dan YOLOv8m dalam mendeteksi area terinfeksi penyakit BLB pada citra daun tanaman padi. Model-model ini dilatih menggunakan 150 citra, divalidasi dengan 120 citra, dan diuji dengan 30 citra dari kelas penyakit BLB. Kinerja model dibandingkan berdasarkan beberapa aspek, yaitu akurasi deteksi melalui nilai mAP@0.50, kompleksitas model berdasarkan jumlah parameter, dan waktu komputasi yang mencakup waktu pelatihan dan deteksi. Dari hasil pengujian, model YOLOv5m menunjukkan kinerja paling baik dengan nilai mAP@0.50 sebesar 0,733 pada pengujian menggunakan dataset utama dan 0,072 pada pengujian menggunakan dataset tambahan, jumlah parameter sebanyak 20,8 juta, dan waktu komputasi 6 menit 32 detik. Model ini dipilih karena memiliki performa terbaik pada ketiga aspek tersebut dan berhasil melakukan deteksi dengan baik.

Kata kunci : *deep learning*, *Convolutional Neural Network* (CNN), *You Only Look Once* (YOLO), deteksi objek, penyakit tanaman padi

ABSTRACT

Rice has become one of the main staple food, especially in Indonesia. However, its productivity has often declined, resulting in increased imports due to the high demand. One of the main causes of decreased productivity is crop failure, often caused by diseases such as bacterial leaf blight (BLB). This disease has visual characteristics that can be detected by deep learning models, such as the You Only Look Once (YOLO) architecture. This study aims to compare the performance of several YOLO models, namely YOLOv5m, YOLOv6m, YOLOv7, and YOLOv8m in detecting areas infected by the BLB disease in rice plant leaf images. These models were trained using 150 images, validated with 120 images, and tested with 30 images of the disease class as named before. Model performance was compared based on several aspects, namely detection accuracy based on mAP@0.50 values, model complexity based on the number of parameters, and computation time which includes training and detection time. From the test, the YOLOv5m model showed the best performance with a mAP@0.50 value of 0.773 for testing with the main dataset and 0.072 for testing with the additional dataset, a parameter count of 20.8 million, and 6 minutes and 32 seconds of computation time. This model was chosen because it has the best performance in all three aspects and successfully performs the tasks given.

Keywords : deep learning, Convolutional Neural Network (CNN), You Only Look Once (YOLO), object detection, rice leaf disease