

ABSTRAK

Pisang merupakan salah satu komoditas hortikultura yang memiliki nilai ekonomi tinggi dan berperan penting dalam mendukung ketahanan pangan nasional. Namun, produktivitas pisang sering mengalami gangguan akibat berbagai penyakit daun yang disebabkan oleh jamur, antara lain Cordana, Pestalotiopsis, Sigatoka, dan Fusarium. Deteksi penyakit secara dini sangat diperlukan guna mencegah penyebaran lebih luas serta meminimalisir kerugian. Penelitian ini bertujuan untuk mengembangkan sistem deteksi penyakit daun pisang secara real-time menggunakan algoritma YOLOv8n (You Only Look Once versi nano).

Metode penelitian yang digunakan meliputi tahap pengumpulan data dari platform Kaggle, pra-pemrosesan data, pelabelan, augmentasi, pelatihan model, serta evaluasi performa dan implementasi sistem berbasis web. Model dilatih menggunakan dua skenario epoch, yaitu 50 dan 75 epoch. Berdasarkan hasil evaluasi, model terbaik diperoleh pada 50 epoch dengan hasil precision sebesar 82,4%, recall sebesar 78,5%, mAP50 sebesar 83,4%, dan mAP50-95 sebesar 61,7%. Sistem yang dikembangkan mampu mendeteksi lebih dari satu jenis penyakit daun dalam satu frame, baik pada citra, video, maupun kamera eksternal secara real-time.

Berdasarkan hasil pengujian, sistem memiliki kinerja akurasi pengujian sebesar 82,83% dengan pengujian optimal pada jarak 40 cm, dan mampu memberikan hasil deteksi yang cukup akurat serta responsif. Meskipun demikian, terdapat beberapa kendala yang memengaruhi akurasi sistem, seperti kesamaan warna antara objek dan latar belakang serta pengujian pada jarak yang ekstrem. Secara keseluruhan, penelitian ini menunjukkan bahwa algoritma YOLOv8n efektif diterapkan dalam sistem deteksi penyakit daun pisang dan dapat dikembangkan lebih lanjut untuk mendukung sektor pertanian berbasis teknologi digital.

Kata Kunci: YOLOv8n, deteksi penyakit, daun pisang, real-time, deep learning

ABSTRACT

Banana is one of the horticultural commodities with high economic value and plays an important role in supporting national food security. However, its productivity is often disrupted by various leaf diseases caused by fungi, including Cordana, Pestalotiopsis, Sigatoka, and Fusarium. Early detection of these diseases is crucial to prevent further spread and minimize losses. This study aims to develop a real-time banana leaf disease detection system using the YOLOv8n (You Only Look Once version nano) algorithm.

The research method includes data collection from the Kaggle platform, data preprocessing, labeling, augmentation, model training, performance evaluation, and implementation of a web-based system. The model was trained using two epoch scenarios: 50 and 75 epochs. Based on evaluation results, the best model was obtained at 50 epochs with a precision of 82.4%, recall of 78.5%, mAP50 of 83.4%, and mAP50-95 of 61.7%. The developed system is capable of detecting multiple types of leaf diseases in a single frame, either on images, videos, or via external cameras in real-time.

Based on testing, the system achieved a testing accuracy of 82.83% at an optimal detection distance of 40 cm, providing accurate and responsive detection results. However, some challenges affected the system's accuracy, such as color similarities between objects and backgrounds, and extreme testing distances. Overall, this study demonstrates that the YOLOv8n algorithm is effective for detecting banana leaf diseases and can be further developed to support technology-based agricultural practices.

Keywords: YOLOv8n, disease detection, banana leaf, real-time, deep learning