Abstract

Rice production in Indonesia often declines due to leaf disease attacks that are difficult to detect early using conventional methods. This study aims to identify rice leaf diseases based on leaf images using a Convolutional Neural Network (CNN). Research data was obtained from an online repository (Kaggle) containing labeled rice leaf images in several disease classes. A custom CNN model was designed and trained after image preprocessing (resizing to 224x224 pixels), normalization, and data augmentation to reduce overfitting. Training was conducted in the Google Collab environment using TensorFlow, with data splits of 70:30, 80:20, and 90:10 to analyze performance. The best results showed a training accuracy of 83.02% and a testing accuracy of 77.33%. In addition, the model is compared with several popular architectures widely used in the literature, such as ResNet 50, VGG16, and Efficient Set 0. The results show that the custom CNN model is able to provide competitive classification performance for early detection of rice leaf diseases, thus having the potential to become a decision support system for farmers in controlling diseases quickly and efficiently.

Keywords: Convolutional Neural Network, Rice Leaf Disease, Leaf Image, Deep Learning, Digital Agriculture.

Abstrak

Produksi padi di Indonesia sering menurun akibat serangan penyakit daun yang sulit dideteksi secara dini dengan cara konvensional. Penelitian ini bertujuan mengidentifikasi penyakit daun padi berdasarkan citra daun menggunakan Convolutional Neural Network (CNN). Data penelitian diperoleh dari repositori daring (Kaggle) yang memuat citra daun padi berlabel dalam beberapa kelas penyakit. Model CNN kustom dirancang dan dilatih setelah dilakukan pra-pemrosesan citra (resize menjadi 224×224 piksel), normalisasi, serta augmentasi data untuk mengurangi overfitting. Pelatihan dilakukan di lingkungan Google Collab menggunakan TensorFlow, dengan pembagian data 70:30, 80:20, dan 90:10 untuk menganalisis performa. Hasil terbaik menunjukkan akurasi pelatihan 83,02% dan akurasi pengujian 77,33%. Selain itu, model dibandingkan dengan beberapa arsitektur populer yang banyak digunakan dalam literatur, seperti ResNet 50, VGG16, dan Efficient Set 0. Hasil penelitian menunjukkan bahwa model CNN kustom mampu memberikan kinerja klasifikasi kompetitif untuk deteksi dini penyakit daun padi, sehingga berpotensi menjadi sistem pendukung keputusan bagi petani dalam pengendalian penyakit secara cepat dan efisien.

Kata kunci: Convolutional Neural Network, Penyakit Daun Padi, Citra Daun, Deep Learning, Pertanian Digital.

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