

**Klasifikasi Penyakit Daun Padi Berdasarkan Citra Daun Menggunakan
Ekstraksi Fitur *Gray Level Co-occurrence Matrix* (GLCM) dan
Metode *Convolutional Neural Network* (CNN)**

ABSTRAK

Padi merupakan salah satu komoditas pertanian terpenting di Indonesia karena berperan sebagai sumber pangan utama bagi masyarakat. Namun, produktivitas padi masih sering terganggu oleh serangan penyakit daun yang dapat menurunkan kualitas dan kuantitas hasil panen. Identifikasi penyakit secara dini diperlukan agar penanganan dapat dilakukan lebih cepat, tepat, dan objektif. Penelitian ini mengusulkan metode klasifikasi penyakit daun padi berdasarkan citra daun dengan memanfaatkan *Gray Level Co-occurrence Matrix* (GLCM) sebagai ekstraksi fitur tekstur dan *Convolutional Neural Network* (CNN) dengan arsitektur *MobileNet* sebagai model klasifikasi. Dataset yang digunakan terdiri dari 931 citra daun padi yang berasal dari *Kaggle* dan data primer lapangan, kemudian terbagi ke dalam tiga kelas penyakit, yaitu *Bacterial Leaf Blight*, *Leaf Blast*, dan Tungro. Dataset dibagi menjadi 70% data pelatihan, 10% data validasi, dan 20% data pengujian. Tahap praproses citra meliputi perubahan ukuran citra menjadi 224×224 piksel, normalisasi piksel, dan augmentasi data berupa rotasi, pembalikan citra, serta penyesuaian kecerahan. Selanjutnya, fitur tekstur diekstrak menggunakan GLCM untuk memperoleh karakteristik tekstur daun berdasarkan nilai *contrast*, *energy*, *homogeneity*, dan *entropy*. Setelah tahap ekstraksi fitur tekstur, proses klasifikasi dilakukan menggunakan model CNN berbasis *MobileNet*. Kinerja model dievaluasi menggunakan *confusion matrix*, akurasi, presisi, recall, dan F1-score. Hasil pengujian menunjukkan bahwa model yang diusulkan mampu mencapai akurasi sebesar 89%. Hasil tersebut menunjukkan bahwa penggunaan ekstraksi fitur GLCM dapat mendukung kinerja model CNN berbasis *MobileNet* dalam mengklasifikasikan penyakit daun padi. Model yang telah dilatih kemudian diimplementasikan ke dalam aplikasi berbasis web bernama *RiceGuard AI* untuk membantu proses identifikasi penyakit daun padi secara lebih praktis di lapangan.

Kata Kunci: Penyakit Daun Padi, GLCM, CNN, *MobileNet*, Klasifikasi Citra

***Rice Leaf Disease Classification Based on Leaf Images Using Gray-Level
Co-Occurrence Matrix (GLCM) Feature Extraction and Convolutional
Neural Network (CNN) Methods***

ABSTRACT

Rice is one of the most important agricultural commodities in Indonesia because it serves as the main food source for the community. However, rice productivity is still often disrupted by leaf disease attacks that can reduce the quality and quantity of the harvest. Early disease identification is necessary so that treatment can be carried out more quickly, precisely, and objectively. This study proposes a rice leaf disease classification method based on leaf images by utilizing Gray Level Co-occurrence Matrix (GLCM) as a texture feature extraction and Convolutional Neural Network (CNN) with MobileNet architecture as a classification model. The dataset used consists of 931 rice leaf images originating from Kaggle and primary field data, then divided into three disease classes, namely Bacterial Leaf Blight, Leaf Blast, and Tungro. The dataset is divided into 70% training data, 10% validation data, and 20% testing data. The image preprocessing stage includes resizing the image to 224×224 pixels, pixel normalization, and data augmentation in the form of rotation, image flipping, and brightness adjustment. Next, texture features were extracted using GLCM to obtain leaf texture characteristics based on contrast, energy, homogeneity, and entropy values. After the texture feature extraction stage, the classification process was carried out using a MobileNet-based CNN model. Model performance was evaluated using a confusion matrix, accuracy, precision, recall, and F1-score. The test results showed that the proposed model was able to achieve an accuracy of 89%. These results indicate that the use of GLCM feature extraction can support the performance of the MobileNet-based CNN model in classifying rice leaf diseases. The trained model was then implemented into a web-based application called RiceGuard AI to assist the process of identifying rice leaf diseases more practically in the field.

Keywords: Rice Leaf Disease, GLCM, CNN, MobileNet, Image Classification