

INTISARI

Perkembangan *computer vision* dan *deep learning* memungkinkan identifikasi penyakit tanaman berbasis citra secara otomatis dengan tingkat akurasi tinggi. Namun, model *deep learning* masih memiliki keterbatasan dalam interpretabilitas karena proses pengambilan keputusan yang bersifat *black box*. Penelitian ini bertujuan untuk menganalisis kinerja MobileNetV3-Large dalam klasifikasi penyakit daun mangga serta memberikan interpretasi menggunakan metode Grad-CAM. Dataset yang digunakan adalah MangoLeafBD yang terdiri dari 4.000 citra daun mangga dengan delapan kelas penyakit, yaitu *healthy*, *anthracnose*, *bacterial canker*, *cutting weevil*, *die back*, *gall midge*, *powdery mildew*, dan *sooty mould*. Penelitian dilakukan melalui tahap *preprocessing*, augmentasi data, pelatihan model menggunakan *transfer learning*, serta evaluasi menggunakan Stratified 5-Fold Cross Validation dengan metrik *accuracy*, *precision*, *recall*, dan *F1-score*. Model dilatih menggunakan MobileNetV3-Large dengan penerapan *label smoothing* untuk meningkatkan kemampuan generalisasi. Model terbaik kemudian dianalisis menggunakan *Grad-CAM* untuk mengetahui area citra yang menjadi fokus model dalam proses klasifikasi. Hasil penelitian menunjukkan bahwa MobileNetV3-Large memiliki performa klasifikasi yang stabil dengan nilai *accuracy* antara 95,50% hingga 96,38%. Performa terbaik diperoleh pada *Fold 1* dengan *accuracy* 96,38%, *precision* 96,51%, *recall* 96,38%, dan *F1-score* 96,36%. Visualisasi *Grad-CAM* menunjukkan bahwa model mampu memusatkan perhatian pada area daun yang mengalami gejala penyakit, sehingga meningkatkan interpretabilitas hasil prediksi. Dengan demikian, MobileNetV3-Large efektif digunakan untuk klasifikasi penyakit daun mangga berbasis citra dengan performa tinggi dan keputusan model yang lebih mudah dipahami.

Kata kunci: MobileNetV3, MangoLeafBD, Deep Learning, *K-Fold Cross Validation*, Grad-CAM.

ABSTRACT

Advancements in computer vision and deep learning have enabled the automated, high-accuracy identification of plant diseases based on images. However, deep learning models often face limitations regarding interpretability due to their "black-box" decision-making processes. This study aims to analyze the performance of MobileNetV3-Large in classifying mango leaf diseases and to provide interpretations using the Grad-CAM method. The study utilizes the MangoLeafBD dataset, comprising 4,000 mango leaf images across eight disease classes: healthy, anthracnose, bacterial canker, cutting weevil, dieback, gall midge, powdery mildew, and sooty mold. The research process involved preprocessing, data augmentation, model training via transfer learning, and evaluation using Stratified 5-Fold Cross-Validation based on accuracy, precision, recall, and F1-score metrics. The model was trained using MobileNetV3-Large with label smoothing applied to enhance generalization capabilities. The best-performing model was subsequently analyzed using Grad-CAM to identify the specific image regions the model focused on during classification. Results indicate that MobileNetV3-Large delivers stable classification performance, with accuracy values ranging from 95.50% to 96.38%. Peak performance was achieved in Fold 1, yielding an accuracy of 96.38%, precision of 96.51%, recall of 96.38%, and an F1-score of 96.36%. Grad-CAM visualizations demonstrate the model's ability to focus on leaf areas exhibiting disease symptoms, thereby enhancing the interpretability of prediction results. Consequently, MobileNetV3-Large proves effective for image-based mango leaf disease classification, offering high performance alongside more understandable model decisions.

Keywords: MobileNetV3, MangoLeafBD, Deep Learning, K-Fold Cross Validation, Grad-CAM.