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PENGEMBANGAN MODEL *CONVOLUTIONAL NEURAL NETWORK* METODE *TRANSFER LEARNING* MOBILENETV3 UNTUK KLASIFIKASI PENYAKIT DAUN PADI

SKRIPSI

Diajukan untuk memenuhi sebagian dari persyaratan untuk memperoleh gelar Sarjana Komputer pada Program Studi Rekayasa Perangkat Lunak

Oleh

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PROGRAM STUDI REKAYASA PERANGKAT LUNAK

KAMPUS UPI DI CIBIRU

UNIVERSITAS PENDIDIKAN INDONESIA

2024

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Komputer pada Program Studi Rekayasa Perangkat Lunak

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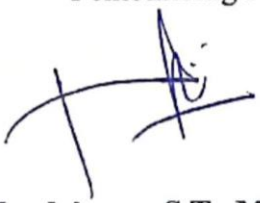
disetujui dan disahkan oleh pembimbing:

Pembimbing I



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PERNYATAAN
KEASLIAN SKRIPSI DAN BEBAS PLAGIARISME

Dengan ini saya menyatakan bahwa skripsi dengan judul "PENGEMBANGAN MODEL *CONVOLUTIONAL NEURAL NETWORK* METODE *TRANSFER LEARNING* MOBILENETV3 UNTUK KLASIFIKASI PENYAKIT DAUN PADI" ini beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam Masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung risiko/sanksi apabila di kemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

Bandung, 22 Juli 2024

Yang membuat pernyataan,

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ABSTRAK

PENGEMBANGAN MODEL *CONVOLUTIONAL NEURAL NETWORK* METODE *TRANSFER LEARNING* MOBILENETV3 UNTUK KLASIFIKASI PENYAKIT DAUN PADI

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Tanaman padi adalah salah satu komoditas pangan yang menjadi kebutuhan pokok di Indonesia, ditunjukkan dengan kebutuhan beras mencapai 31,90 juta ton pada tahun 2023. Namun, hal ini tidak diimbangi dengan produksi padi menurun dari 59,2 juta ton menjadi 53,98 juta ton pada tahun yang sama, salah satunya disebabkan oleh serangan hama dan penyakit. Deteksi dini penyakit padi dengan teknologi AI dapat membantu petani mengambil tindakan tepat untuk mencegah kegagalan produksi padi akibat serangan penyakit terhadap daun padi. *Deep learning* telah berhasil diterapkan dalam klasifikasi gambar, namun masih ada keterbatasan seperti kurangnya variasi data dan efisiensi model. Penelitian ini mengembangkan model *Convolutional Neural Network* (CNN) dengan metode *transfer learning* MobileNetV3Large untuk klasifikasi penyakit daun padi, membandingkan model dengan dataset *original* dan *oversampling*, serta melakukan *hyperparameter tuning* pada *epoch* dan *batch size*. Data yang digunakan adalah 5.932 gambar daun padi dengan 4 jenis penyakit yakni hawar daun, blas, bercak coklat, dan tungro, serta 1.600 gambar daun padi normal. Parameter pelatihan model menggunakan *batch size* 64, *optimizer* Adam, dan *epoch* 50, dengan evaluasi menggunakan *confusion matrix*. Hasilnya, *oversampling* meningkatkan akurasi *train* sebesar 0,20% dan menurunkan *loss train*, namun tidak pada akurasi dan *loss validation*. *Hyperparameter tuning* dengan menambah *epoch* menjadi 100 meningkatkan akurasi model hingga 99,80% dengan *precision*, *recall*, dan *f1-score* masing-masing sebesar 99,80%, namun perubahan *batch size* menjadi 32 tidak signifikan meningkatkan akurasi.

Kata Kunci: Penyakit Daun Padi, CNN, MobileNetV3Large, *Oversampling, Hyperparameter tuning.*

ABSTRACT

DEVELOPMENT OF A CONVOLUTIONAL NEURAL NETWORK MODEL USING TRANSFER LEARNING METHOD MOBILENETV3 FOR RICE LEAF DISEASE CLASSIFICATION

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Rice plants are one of the staple food commodities in Indonesia, as evidenced by the rice demand reaching 31.90 million tons in 2023. However, this is not matched by a decrease in rice production from 59.2 million tons to 53.98 million tons in the same year, partly due to pest and disease attacks. Early detection of rice diseases using AI technology can help farmers take appropriate actions to prevent rice production failures caused by disease attacks on rice leaves. Deep learning has been successfully applied in image classification, but there are still limitations such as a lack of data variation and model efficiency. This research develops a Convolutional Neural Network (CNN) model using the MobileNetV3Large transfer learning method for classifying rice leaf diseases, comparing the model with original and oversampled datasets, and performing hyperparameter tuning on epoch and batch size. The data used consists of 5,932 images of rice leaves with 4 types of diseases: leaf blight, blast, brown spot, and tungro, as well as 1,600 images of normal rice leaves. The model training parameters used a batch size of 64, Adam optimizer, and 50 epochs, with evaluation using a confusion matrix. The results showed that oversampling increased training accuracy by 0.20% and reduced training loss, but did not affect validation accuracy and loss. Hyperparameter tuning by increasing the epochs to 100 improved the model accuracy to 99.80%, with precision, recall, and f1-score all at 99.80%, but changing the batch size to 32 did not significantly improve accuracy.

Keywords: Rice Leaf Disease, CNN, MobileNetV3Large, Oversampling, Hyperparameter tuning.

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