UNDERGRADUATE THESIS

IMPLEMENTATION OF A TRANSFER-LEARNING-BASED CONVNEXT-TINY MODEL FOR CLASSIFYING TEA LEAF DISEASES

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ABSTRACT

Nama Mahasiswa / NPM	:	Rajawali Shaktika Anugrah Prasetya/ 22081010146
Judul Skripsi	:	Implementation Of A Transfer-Learning-Based ConvNeXt-Tiny Model For Classifying Tea Leaf Diseases
Dosen Pembimbing	:	1. Eva Yulia Puspaningrum, S.Kom., M.Kom. 2. Chrystia Aji Putra, S.Kom., M.T.

Data from the Central Statistics Agency (BPS, 2024) show that national dried tea leaf production declined from 144,063 tons (2020) to 118,895 tons (2024), while average tea plantation productivity fell from 1,545 kg/ha (2023) to 1,528 kg/ha (2024). The Directorate General of Estate Crops at the Indonesian Ministry of Agriculture reported that Plant Disturbing Organisms (OPT) in the form of pests and leaf diseases remain a limiting factor in tea cultivation, making early and accurate identification of tea leaf disease a specific need to support field-level control efforts. Based on this information, this study implements a ConvNeXt-Tiny model based on transfer learning to classify seven classes of tea leaf conditions, namely Tea Algal Leaf Spot, Brown Blight, Gray Blight, Helopeltis, Red Spider, Green Mirid Bug, and Healthy Leaf, using the teaLeafBD dataset. The model was trained using pretrained ImageNet weights with a freeze-unfreeze strategy over 30 epochs and data augmentation, along with hyperparameter exploration covering learning rate, dropout rate, batch size, and optimizer. The optimal configuration (learning rate 1×10^{-4}, dropout 0.2, batch size 16, Adam optimizer) produced a Test Accuracy of 0.9237 and a Test F1 Macro of 0.9114. Learning rate had the most significant effect on model performance, while dropout rate and batch size were not significant. The Brown Blight class consistently performed the worst due to its visual similarity to Gray Blight and Tea Algal Leaf Spot. This study produced a tea leaf disease classification model implemented on a website-based system using FastAPI and React.js as a real-time support system for classifying tea leaf disease based on user-uploaded images.

Keywords: Tea Leaf Disease Classification, ConvNeXt-Tiny, *Transfer Learning*, *Fine-Tuning*, *Deep Learning*, CNN.

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The author acknowledges that this thesis is far from perfect. Therefore, the author would greatly appreciate constructive criticism and suggestions. In closing,

may this thesis contribute to the advancement of science, particularly in the field of computer science.

Surabaya, July 22^{nd}, 2026

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF CODES