



**UNDERGRADUATE THESIS**

**PERFORMANCE ANALYSIS OF FINE-TUNED  
EFFICIENTNET-B0 AND MOBILENETV2 FOR  
RICE LEAF DISEASE CLASSIFICATION WITH  
OPTIMIZER VARIATIONS ON MOBILE-BASED  
APPLICATION**

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SURABAYA  
2026**

## APPROVAL SHEET

### PERFORMANCE ANALYSIS OF FINE-TUNED EFFICIENTNET-B0 AND MOBILENETV2 FOR RICE LEAF DISEASE CLASSIFICATION WITH OPTIMIZER VARIATIONS ON MOBILE-BASED APPLICATION

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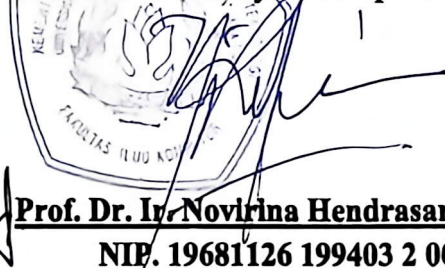
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## ABSTRACT

Student Name / NPM: Egar Firmansyah / 22081010012  
Thesis Title: Performance Analysis Of Fine-Tuned Efficientnet-B0 And Mobilenetv2 For Rice Leaf Disease Classification With Optimizer Variations On Mobile-Based Application  
Advisor: 1. Dr. Faisal Muttaqin, S.Kom., M.T.  
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Rice leaf disease is one of the primary factors contributing to the decline of rice productivity in Indonesia. Accurate early detection is essential to enable farmers to take appropriate countermeasures before the disease spreads further. This study aims to analyze the performance of deep learning models based on Convolutional Neural Network (CNN) in classifying six classes of rice leaf diseases, namely Bacterial Leaf Blight, Brown Spot, Healthy Rice Leaf, Leaf Blast, Rice Hispa, and Sheath Blight, as well as implementing the best-performing model into a mobile application. Three model architectures were comparatively evaluated: MobileNetV2 with a frozen transfer learning approach, frozen EfficientNet-B0, and Fine-tuned EfficientNet-B0 which allows all base model parameters to be retrained. The search for optimal hyperparameter configurations was conducted through four sequential testing stages encompassing variations in batch size, epoch, learning rate, and optimizer (Adam, RMSprop, SGD) using a dataset of 4,770 images divided into training (3,333), validation (958), and testing (479) sets.

The results demonstrate that the Fine-tuned EfficientNet-B0 model with a configuration of batch size 16, epoch 50, learning rate 0.001, and Adam optimizer achieved the best performance with a testing accuracy of 99.79% and a macro average f1-score of 0.9981, with only 1 misclassification out of 479 images. In comparison, MobileNetV2 achieved an accuracy of 92.48%, while frozen EfficientNet-B0 experienced a complete failure in the form of class collapse with an accuracy of only 19.62%. The best model was subsequently converted to TensorFlow Lite Standard format with a size of 16.56 MB (a 67.4% reduction from the original model) and integrated into the SIPADI mobile application (Sistem Pendeteksi Awal Penyakit Daun Padi) developed using the Flutter framework. Testing on a mobile device showed that the application is capable of performing accurate classification with an inference time of 198 ms, accompanied by educational information including disease descriptions, symptoms, treatment steps, and prevention measures for each disease class.

**Keywords:** Rice Leaf Disease Classification, EfficientNet-B0, Fine-tuning, MobileNetV2, TensorFlow Lite, Mobile Application

## ACKNOWLEDGEMENTS

Praise be to Allah SWT for all His graces, guidance, and gifts to the author so that the thesis proposal with the title "**Performance Analysis Of Fine-Tuned Efficientnet-B0 And Mobilenetv2 For Rice Leaf Disease Classification With Optimizer Variations On Mobile-Based Application**" can be completed properly.

The author would like to thank Mr. Dr. Faisal Muttaqin, S.Kom., M.T. as Advisor I and Mrs. Afina Lina Nurlaili, S.Kom., M.Kom. as Advisor 2 who are willing to take their time to provide guidance, advice and motivation to the author. In addition, during the preparation of the thesis proposal, the author also received a lot of assistance from various parties. For this the author would like to thank the:

1. My beloved parents, who have always provided unwavering support, prayers, and boundless love. Without their prayers and blessings, the process of completing this thesis would not have been possible.
2. Mrs. Prof. Dr. Ir. Novirina Hendrasarie, M.T., as the Dean of the Faculty of Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur.
3. Mrs. Dr. Intan Yuniar Purbasari, S.Kom., MSc., as the Head of the Informatics Study Program, Faculty of Social Sciences and Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur.
4. Mr. Dr. Faisal Muttaqin, S.Kom., M.T., as the first thesis supervisor, for his attentiveness, guidance, direction, patience, and unwavering support throughout the thesis writing process, enabling the author to complete this research successfully.
5. Mrs. Afina Lina Nurlaili, S.Kom., M.Kom., as the second thesis supervisor, for her direction, constructive feedback, and invaluable academic guidance throughout the research process, enabling the author to complete this thesis in a more structured and focused manner.
6. Mr. Dr. Firza Prima Aditiawan, S.Kom., M.T.I, M.C.F, M.O.S. as the first examiner, for all the constructive criticism and suggestions provided during the thesis defense seminar.

7. Mr. Andreas Nugroho Sihananto, S.Kom., M.Kom. as the second examiner, for all the constructive criticism and suggestions provided during the thesis defense seminar.
8. All lecturers and staff of the Informatics Study Program, Faculty of Social Sciences and Computer Science, Universitas Pembangunan Nasional "Veteran" Jawa Timur, who have generously shared their knowledge, time, teachings, and opportunities with the author throughout the academic years.
9. My family and relatives, who have always offered their prayers, support, and encouragement. Thank you for the love that never diminishes, the care that never ceases, and the faith that has always been placed in the author at every step of this journey. The prayers and support from family and relatives have been the greatest source of strength for the author to keep striving, to rise from exhaustion, and to continue believing that this entire process will be worthwhile in due time. Your presence has served as a foundation and a comforting place to return to, ultimately enabling the author to complete this thesis successfully.
10. Mayhikal Ferdiananta, who throughout the four years of university life has always been present to help and accompany the author until the end of this academic journey. Thank you for the companionship, support, and unwavering encouragement from searching for a place to live together, residing and growing together, going through the supervision process, to the completion of this final report. Thank you for walking side by side, for being a discussion partner, and for being a friend who was always ready to help during times of fatigue and doubt. Your presence has been an essential part of the author's academic journey through to its completion.
11. All fellow students of the Informatics Class of 2022, for their assistance, support, and advice throughout the academic years and the thesis writing process. Thank you for four years of togetherness, academic discussions, teamwork across various courses, and for strengthening one another amid the pressures of assignments and research. Your presence made this academic journey not only full of learning but also rich with stories, laughter, and cherished memories.

12. All parties who cannot be mentioned individually yet have accompanied the author from the beginning of university life through the completion of this thesis. Thank you for the assistance, moral support, insights, and companionship throughout this academic journey. Every contribution, whether great or small, holds significant meaning and has helped the author navigate every stage to finally reach this point.
13. Lastly, the author would also like to express appreciation to himself, Egar Firmansyah. Thank you for enduring, for standing firm, and for not giving up even when the steps often felt heavy. Thank you for every night spent in exhaustion, for the tears hidden from view, for the courage to try, and for the courage to believe that this journey was worth fighting for. In the end, the author realizes that it is not only the final result that is valuable, but also the long process that has shaped the author into someone stronger than before.

The author acknowledges that there are many shortcomings in the preparation of this thesis. Therefore, constructive criticism and suggestions from all parties are highly appreciated for the improvement of this thesis. Finally, with all the limitations the author possesses, it is hoped that this report may be of benefit to all parties in general and to the author in particular.

Surabaya, June 08<sup>th</sup> 2026

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