UNDERGRADUATE THESIS

ANALYSIS OF THE COMBINATION OF K NEAREST NEIGHBOR (KNN) AND K-MEANS IN THE CLASSIFICATION OF RICE LEAF DISEASES USING AN IMAGE SEGMENTATION METHOD

RIZAL AFANDI
NPM 19081010146

SUPERVISOR
Dr. Ir. Kartini, S.Kom. MT.
Retno Mumpuni, S.Kom., M.Sc

MINISTRY OF HIGHER EDUCATION, SCIENCE, AND TECHNOLOGY
UNIVERSITAS PEMBANGUNAN NASIONAL VETERAN JAWA TIMUR
FACULTY OF COMPUTER SCIENCE
INFORMATICS STUDY PROGRAM
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APPROVAL SHEET

ANALYSIS OF THE COMBINATION OF K-NEAREST NEIGHBOR (KNN) AND K-MEANS IN THE CLASSIFICATION OF RICE LEAF DISEASES USING AN IMAGE SEGMENTATION METHOD

By:
RIZAL AFANDI
NPM. 190810010146

Has been defended before and accepted by the Thesis Examination Committee of the Informatics Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur, on June 22, 2026:

Dr. Ir. Kartini, S.Kom. MT. **NIP. 19611110 199103 2 001**	.....	**(Advisor I)**
Retno Mumpuni, S.Kom., M.Sc **NIP. 198707162025212045**	.....	**(Advisor II)**
Eka Prakarsa Mandyartha, S.T., M.Kom **NIP. 19800907 202121 1 005**	.....	**(Head Asesor)**
Dr. Intan Yuniar Purbasari, S.Kom. **NIP. 19800602 202521 2 029**	.....	**(Asesor I)**

Acknowledged by,
Dean of the Faculty of Computer Science

Prof. Dr. Ir. Novirina Hendrasarie, MT
NIP. 19681126 199403 2 001

AGREEMENT SHEET

ANALYSIS OF THE COMBINATION OF K-NEAREST NEIGHBOR (KNN) AND K-MEANS IN THE CLASSIFICATION OF RICE LEAF DISEASES USING AN IMAGE SEGMENTATION METHOD

By :

RIZAL AFANDI

NPM. 19081010146

Approved for

Approved by:

Coordinator of Informatics Study Program

Faculty of Computer Science

Dr. Intan Yuniar Purbasari, S.Kom.

NIP. 19800602 202521 2 029

STATEMENT OF ORIGINALITY

The undersigned below:

Student Name/NPM	: RIZAL AFANDI/190810010146
Study Program	: Informatics
Supervisors	: 1. Dr. Ir. Kartini, S.Kom. MT.
	2. Retno Mumpuni, S.Kom., M.Sc

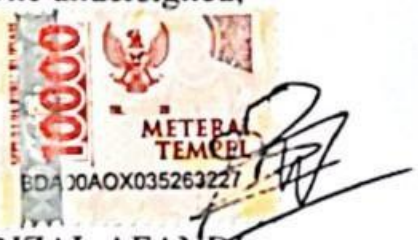
hereby declares that the content, partially or wholly, of the thesis with the title:

"ANALYSIS OF THE COMBINATION OF K-NEAREST NEIGHBOR (KNN) AND K-MEANS IN THE CLASSIFICATION OF RICE LEAF DISEASES USING AN IMAGE SEGMENTATION METHOD"

is the result of my own work, is original, and is written following scientific writing principles. If in the future there are discrepancies with this statement, I am willing to accept sanctions in accordance with the applicable regulations at the University of Pembangunan Nasional Veteran East Java.

Surabaya, 22 June 2026

The undersigned,



RIZAL AFANDI

NPM. 19081010146

ABSTRACT

Student Name / NPM	:	Rizal Afandi/190810010146
Thesis Title	:	Analysis of the Combination of K-Nearest Neighbor (KNN) and K-Means in Rice Leaf Disease Classification Using Image Segmentation Methods
Advisor	:	1. Dr. Ir. Kartini, S.Kom. MT. 2. Retno Mumpuni, S.Kom., M.Sc

ABSTRACT

Rice is a primary food commodity in Indonesia that plays an essential role in national food security. However, rice productivity is often reduced due to leaf diseases such as Bacterial Blight, Blast, Brown Spot, and Tungro. Manual disease identification is considered inefficient as it requires expert knowledge and considerable time. Therefore, an automated system based on image processing and machine learning is needed to assist in the fast and accurate classification of rice leaf diseases.

This study aims to implement a combination of K-Means and K-Nearest Neighbor (KNN) algorithms for classifying rice leaf diseases using image segmentation methods. The dataset used consists of 5,932 rice leaf images divided into four disease classes: Bacterial Blight, Blast, Brown Spot, and Tungro. The research stages include image preprocessing (grayscale conversion, resizing, and flattening), segmentation using K-Means, and classification using KNN. Testing is conducted using various training and testing data ratios as well as different K values to determine the optimal performance.

The results show that the combination of K-Means and KNN is capable of classifying rice leaf diseases with high accuracy. The best performance is achieved using a 90:10 training-to-testing ratio with an optimal K value, producing highly accurate predictions based on confusion matrix evaluation. Therefore, the proposed method is effective in supporting automatic identification of rice leaf diseases.

This research is expected to contribute to the development of image-based plant disease detection systems and assist farmers in diagnosing diseases more quickly and accurately, thereby improving agricultural productivity.

Keywords: K-Means, K-Nearest Neighbor, classification, rice leaf disease, image processing.

PREFACE

All praise be to Allah SWT for all His grace, guidance, and blessings, so that the author can complete this thesis entitled "**Analysis of the Combination of K-Nearest Neighbor (KNN) and K-Means in Rice Leaf Disease Classification Using Image Segmentation Method**" well and on time.

This thesis is submitted as one of the requirements to obtain a Bachelor's degree in the Informatics Engineering Study Program, Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jawa Timur. In the process of writing this thesis, the author realizes that many parties have provided assistance, support, and guidance, either directly or indirectly.

Therefore, on this occasion, the author wishes to express gratitude to:

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repay you all for your kindness and love. I express my deepest gratitude and love you all so much.

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8. Friends and all parties who cannot be mentioned one by one who have helped in the preparation of this thesis.

The author realizes that there are still many shortcomings in the preparation of this thesis. Therefore, the author expects constructive criticism and suggestions for the improvement of this work in the future.

Finally, the author hopes that this thesis can provide benefits for readers and can serve as a reference for future research, especially in the field of digital image processing and plant disease classification.

Surabaya, May 25 2026

Rizal Afandi

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