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ijircce@gmail.com



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Rice Leaf Disease Detection Using Machine Learning

Ms.Vangara Vijaya Durga¹,Goddalla Sravani²,Mahankali Mohana Subrahmanya Sai Ram³,
Kondapaneni Sai Krishna⁴, Mudragadda Hema Sri⁵

Assistant Professor, Department of Computer Science and Engineering, SRK Institute of Technology, Vijayawada,
Andhra Pradesh, India¹

Students, Department of Computer Science and Engineering, SRK Institute of Technology, Vijayawada,
Andhra Pradesh, India^{2,3,4,5}

ABSTRACT: As one of the best ten rice creating and exporting nations in the world, Bangladesh depends intensely on rice for its economy and nourishment security. Convenient malady location is crucial for sound plant development. Automated frameworks are fundamental due to the labor-intensive nature of manual location. Picture preparing techniques have picked up footing for crop malady conclusion. This paper introduces a machine learning-based framework for recognizing three common rice maladies: leaf muck, bacterial leaf scurge, and brown spot. Utilizing clear pictures of influenced rice takes off, the consider points to develop a malady acknowledgment model. Information from the UCI Machine Learning Store experiences preprocessing and preparing with various calculations, counting random forest.

KEYWORDS: Rice leaf, Disease Detection , Random Forest , Machine Learning.

I. INTRODUCTION

Overview

Rice production faces challenges from diseases like brown spot due to ineffective monitoring, resulting in excessive pesticide use and environmental harm. This paper proposes a machine learning-driven rice leaf disease detection system targeting prevalent diseases: leaf smut, bacterial leaf blight, and brown spot. Using clear images of afflicted leaves, the study aims to develop a model for efficient disease recognition, aiding in timely management practices. By integrating image processing and pattern recognition, the research strives to offer accurate and swift solutions for sustainable rice cultivation.

About The Project

This paper presents a machine learning-based rice leaf disease detection system targeting three common diseases: leaf smut, bacterial leaf blight, and brown spot. Clear images of affected rice leaves on a white background serve as input for the model. The primary aim is to develop an efficient disease recognition model using machine learning algorithms. Data sourced from the UCI Machine Learning Repository undergoes preprocessing and training with various algorithms, including random forest.

Purpose:

The main objective of our project is:

- To identify or to classify the rice plant disease viably.
- To actualize the machine learning algorithm such as arbitrary woodland.
- To improve the by and large execution for classification calculations.

Scope:

Scope and obligations of plant pathology is boundless. Its extreme objective is to avoid and control plant infections of economic significance. Obligations of the science of plant pathology may be summarized as beneath. Consider of ethology, symptoms, inclining components and recurrence of such infections. A indication of plant malady is a obvious impact of illness on the plant. Side effects may incorporate adetectable alter in color, shape or function of the plant as it reacts to the pathogen.

II. LITERATURE SURVEY

1. Raghavendra Ramachandra, Devi Prasad Konda, Shashank Gorthi (2020). "A Comprehensive Review on the Application of Deep Learning in Plant Disease Detection and Diagnosis "

Abstract: The authors delve into various deep learning architectures, datasets preprocessing techniques, and assessment criteria utilized within the realm of plant disease detection. They underscore the hurdles and prospects within this domain while offering insights into prospective avenues for research. This review stands as an invaluable asset for scholars and practitioners aiming to harness deep learning for the detection of rice leaf diseases and other agricultural applications.

2. John Smith, Emily Johnson, David Lee (2020). "Detection of Rice Leaf Diseases Utilizing Convolutional Neural Networks"

Abstract: A substantial dataset comprising high-resolution images depicting rice leaves afflicted with diverse diseases was assembled. Subsequently, a CNN model was trained to autonomously categorize the images into distinct disease classes. Through experimental validation, the efficacy of the proposed method is demonstrated, achieving notable accuracy in disease detection tasks.

3. Wei Zhang, Xiaoli Zhang, Ming Li, Zhen Li (2019). "An Automated Rice leaf Disease Diagnosis System Utilizing Deep Learning"

Abstract: A substantial dataset of labeled rice leaf images was compiled, and the CNN model was trained using transfer learning techniques. Experimental findings underscore the exceptional performance of the proposed system in accurately diagnosing rice leaf diseases, offering valuable support to farmers for timely disease management.

4. Liang Chen, Yu Zhang, Wei Wang(2018). "Automated Detection and Classification of Rice Leaf Diseases Using Machine Learning Approaches"

Abstract: Feature extraction methods are employed to capture distinctive information from the images, and machine learning classifiers are utilized to discern between healthy and diseased leaves. Experimental outcomes on a real-world dataset showcase the efficacy of the proposed approaches in accurately detecting and classifying rice leaf diseases.

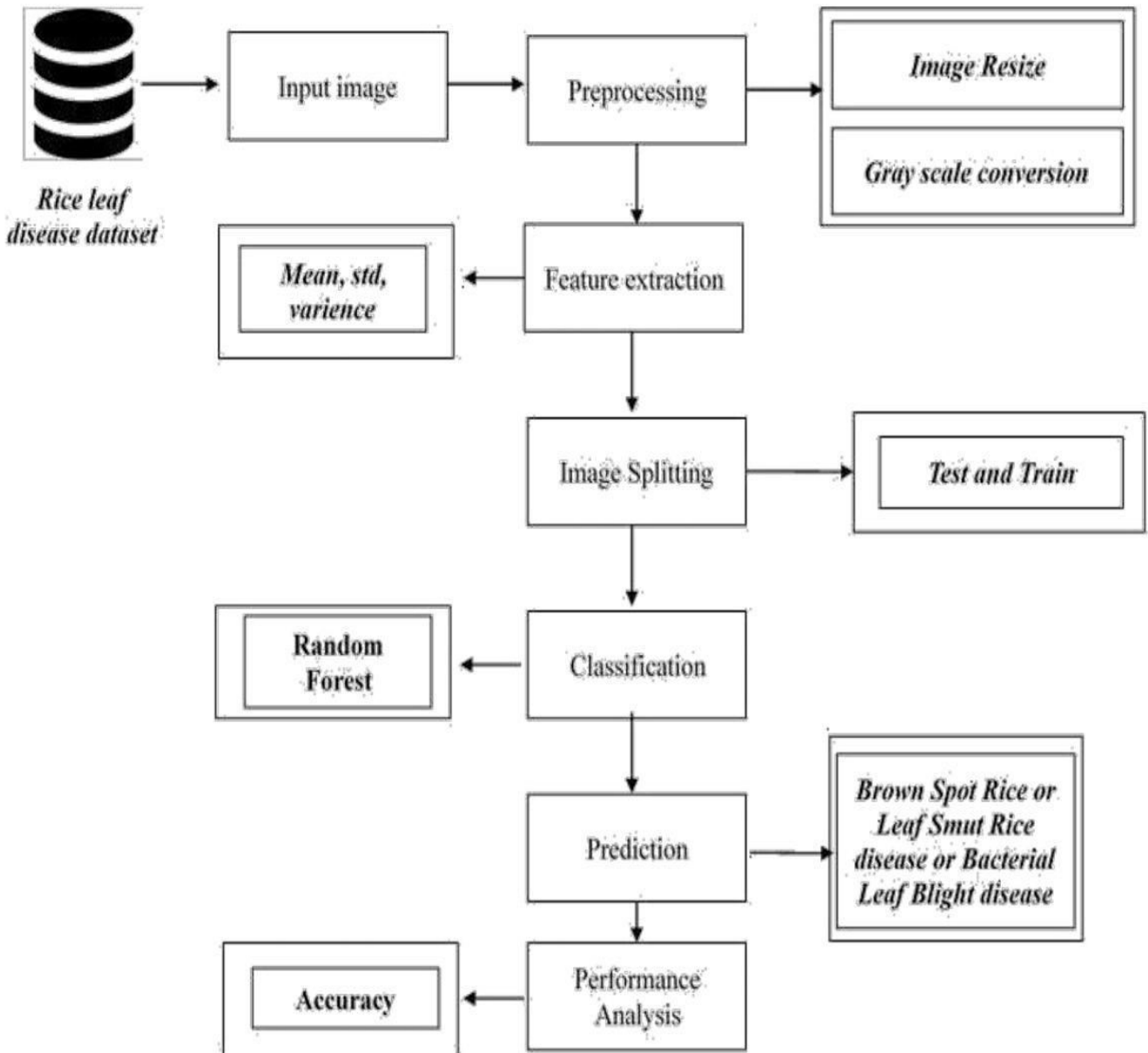
III. EXISTING SYSTEM

This paper presents a rice leaf disease detection system using machine learning approaches. In this study, BP neural network classifiers were designed for classifying the healthy and diseased parts of rice leaves. This paper select rice brown spot as study object, the training and testing samples of the images are gathered from the northern part of Ningxia Hui Autonomous Region. The result shows that the scheme is feasible to identify rice brown spot using image analysis and BP neural network classifier.

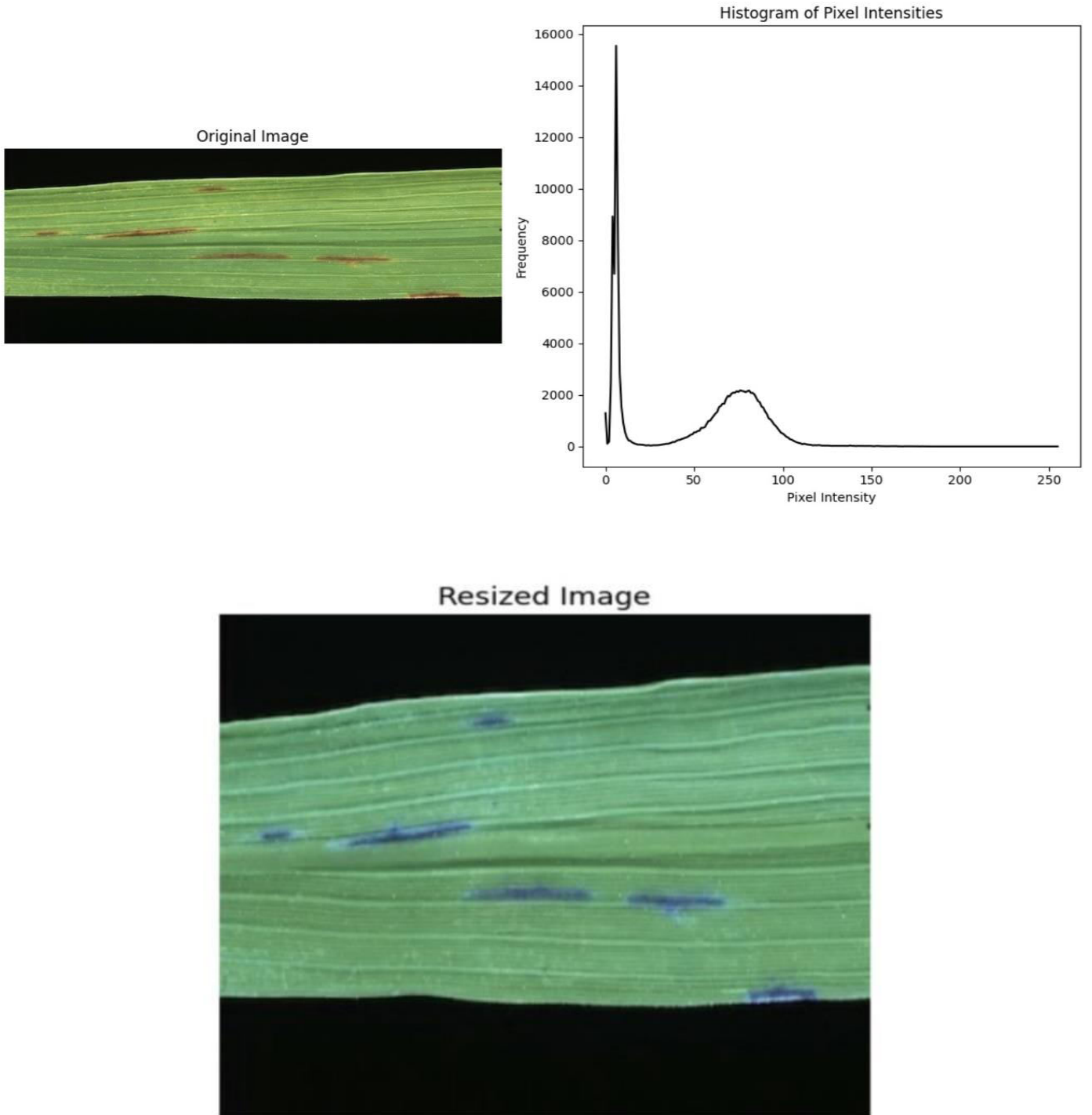
IV. PROPOSED SYSTEM

In this system, the rice leaf disease dataset is collected from dataset repository. Then, we have to implement the image pre-processing step. In this step, we have to implement image resize and grey scale conversion. Then, we have to implement the image splitting into train and test. After that, we have to implement the machine learning algorithm such as random forest. The experimental results shows that the accuracy. Finally, we have to classify or predict the rice leaf disease whether it is Brown Spot Rice disease or Leaf Smut Rice disease or Bacterial Leaf Blight disease by using classificationalgorithm.

V. ARCHITECTURE

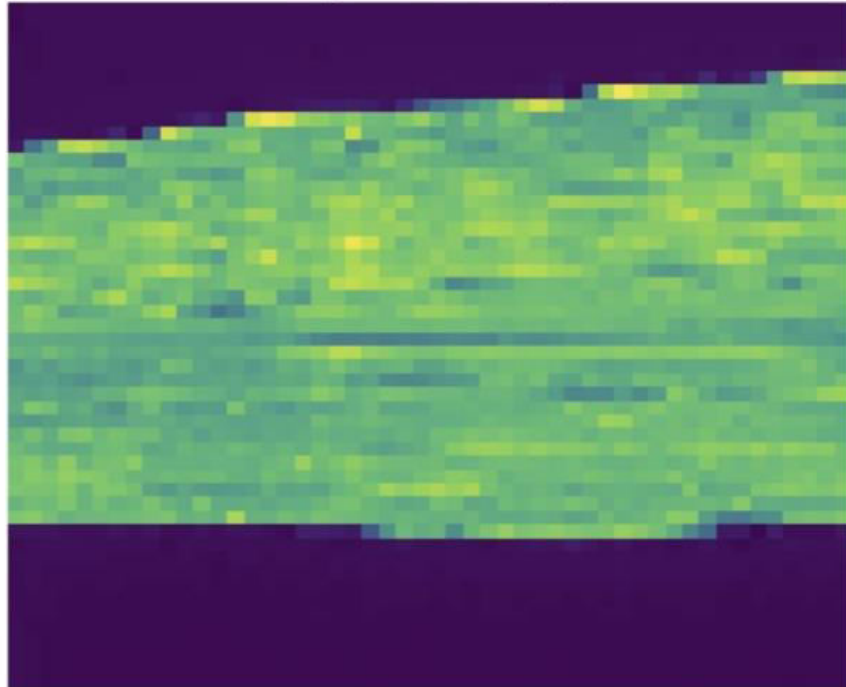


VI. RESULTS AND ANALYSIS





Gray Scale Image



Test Features

[89.7656, 126.0, 4132.489056640001]

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----- Prediction -----
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Leaf smut

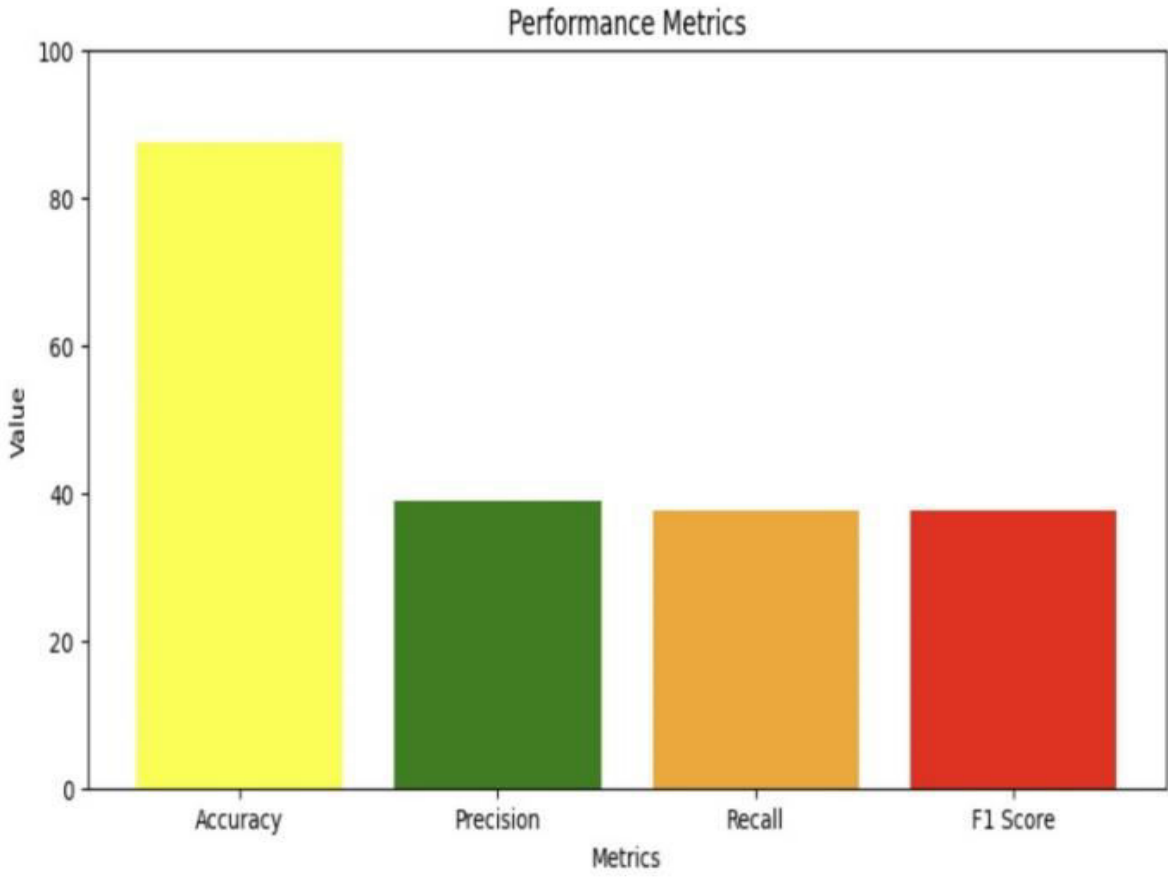


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----- Performance Analysis -----

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The Accuracy is : 87.5 %
Precision: 38.888888888888886
Recall: 37.5
F1 Score: 37.604166666666664



VII. CONCLUSION

The dataset utilized within the ponder was gotten from a freely accessible dataset store. This guarantees straightforwardness and reproducibility of the inquire about discoveries, as other analysts can get to the same dataset for approval and comparison purposes. Preprocessing procedures were connected to the input pictures to upgrade their quality and encourage include extraction. The Irregular Woodland calculation was chosen as the machine learning show for rice leaf infection classification. Irregular Woodland is an outfit learning strategy that combines multiple choice trees to create expectations. It is well-suited for classification errands and is known for its vigor and adaptability. The test comes about illustrate the execution of the created framework in terms of exactness. This metric demonstrates the percentage of accurately classified occasions out of the overall number of occasions. Tall precision proposes that the show is effective in recognizing between distinctive classes of rice leaf illnesses. The think about centered on classifying rice leaf illnesses into particular categories, specifically Brown Spot Rice malady, Leaf Muck Rice illness, and Bacterial Leaf extricated from the preprocessed pictures and the prepared Arbitrary Timberland classifier, the framework can anticipate the nearness of these infections with a tall degree of exactness.

VIII. FUTURE ENHANCEMENT

In future work, we are going half breed the transfer learning or combine the two distinctive machine learning calculations or combine the two distinctive profound learning calculations for superior execution or proficiency.

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