An Inclusive Concurrent Approach to Diagnosing Oryza Sativa Leaf Disease Using Machine Learning Techniques

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Abstract. Rice diseases, impacting half the world's food supply, threaten yields by 37% annually.Machine learning (ML) and deep learning (DL) offer promising solutions for early detection. These powerful tools have revolutionized computer vision, enabling automated and accurate disease identification through image analysis. While existing algorithms like Logistic Regression and KNN show potential, research is limited. This study delves into rice diseases, explores ML/DL applications, and evaluates their effectiveness. It highlights recent advances and their performance, paving the way for effective disease control and safeguarding rice production.

Keywords: Rice Leaf disease detection, Machine Learning, Deep Learning, Artificial Intelligence, Dataset, Supervised learning.

1 Introduction

Rice, the world's top food source, faces threats from numerous diseases throughout its growth cycle [4]. Early detection and timely treatment are crucial for bountiful, high-quality harvests. Unfortunately, rural areas often lack access to timely agricultural guidance, hindering their ability to effectively combat these threats.

Early disease detection and prompt treatment are key for healthy rice plant growth. Manual methods are time-consuming and inefficient, making an automated system crucial. This research presents a machine learning system capable of identifying three common rice diseases: Leaf Smut, Bacterial Leaf Blight, and Brown Spot. The system analyzes clear images of diseased rice leaves on a white background.

After proper pre-processing, diverse machine learning algorithms, including KNN, J48, Naive Bayes, and Logistic Regression, were trained on the dataset. Notably, the Decision Tree method

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Page 1 of 1 (1 results)

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Page size: **10** 25 50