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Enhancing Crop Quality of Paddy Using Object Detection Techniques

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Abstract

Crop diseases significantly impact paddy crop quality during harvesting, leading to approximately 40% average loss in rice crops, according to IRRI's Rice Knowledge Bank. Early detection of diseases is crucial for effective crop management and high yields, especially during the vegetative phase when susceptibility is high. The researchers suggest a way to early identify the diseases using image-processing algorithms. An initial image dataset is gathered according to an order either row-wise or column-wise. Then the gathered dataset is labelled and categorized into 4 groups: Yellow Blight, Tungro, Brown Spot, and Normal crops, and applied as the input for the YOLO V8 object detection algorithm. The system allows users to input a captured image, which will display the percentages of each disease's existence on the plot of land. The research culminates in a web application with an interface showing the field as a rectangle divided into sub-plots based on row and column coordinates. This interface facilitates convenient monitoring of disease outbreaks within selected plots. The YOLO V8 algorithm successfully detected visually imperceptible diseases on leaf blades in most images, even at the micro level. It performed well with multi-scaled images, but researchers aim to enhance precision and recall by adjusting the architecture and parameters. However, variations in lighting conditions, image quality, and occlusions can impact its performance. The dataset used in the study focused on a limited number of common diseases, necessitating further research to apply it to a broader range of diseases in paddy cultivation.

Keywords: *Paddy disease, YOLO V8, Crop quality*