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In Collaboration with

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Plant Disease Detection System
GreenShield

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ABSTRACT

Plant diseases result in major agricultural losses thus demanding prompt and specific disease detection methods to implement proper management. Large-scale farming faces inefficiencies because traditional identification methods need expert knowledge while being time-consuming to complete. The main goal of this research is to design an automated plant disease detection system to classify visually similar plant diseases through deep learning to enhance both detection precision and operational scope.

The convolutional Neural Network (CNN) model was designed with multiple convolutional layers (32–512 filters), max-pooling, dropout layers to prevent overfitting and a final dense layer with SoftMax activation for classification. The training of the model happened on the New plant dataset which contains 80000+ RGB images with 38 classes using the Adam optimizer with a learning rate of 0.0001 and categorical cross-entropy loss as the training objective. The model benefited from data augmentation methods together with batch normalization along with early stopping procedures to boost its generalization capability.

The trained model achieved 99% accuracy in validating samples while maintaining high classification ability and recognition performance across various plant disease groups. The system achieved successful classification results according to precision, recall, F1-score measurements, and confusion matrix evaluation. The suggested system serves as a dependable framework that helps farmers detect plant diseases shortly after their emergence for early corrective actions and crop security.

Subject Descriptors:

- Computer Science -> Artificial Intelligence -> Machine Learning -> Image Processing
- Agricultural Engineering -> Precision Agriculture -> Plant Disease Detection -> Severity Estimation

Keywords: Plant Disease Detection, Machine Learning, Convolutional Neural Networks, Image Processing, Disease Severity Assessment, Agricultural Technology.