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Tomato Leaf Disease Detection and Remedy Suggestion Using Machine Learning

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ABSTRACT

Tomato plants have a high specificity of different diseases, which reduce crop yield and fruit quality, directly reducing agricultural productivity. Most current solutions are restricted to disease detection alone and do not provide an integrated system to detect plant diseases with suggestions for remedies. Moreover, these models are not user-friendly and do not represent environmental heterogeneity, therefore, their applicability is constrained for farmers in different environmental conditions.

AgroAI is a machine learning-based algorithm that utilizes Convolutional Neural Networks (CNN) for crop disease detection and provides solutions based on disease severity. Using a curated dataset of tomato leaf images for diseases like Target Spot, Late Blight, and Bacterial Spot, the system processes images uploaded by farmers, classifying diseases. Data augmentation and pre-processing techniques were applied to enhance model robustness, and a straightforward interface was developed to facilitate ease of use for farmers.

The prototype has shown good accuracy on test data, thus demonstrating promising prospects for valid disease identification. A confusion matrix was drawn with an F1 score evaluation, which threw some light on class-wise performance and highlighted the need for further optimization.

Keywords: Plant disease detection, machine learning, tomato leaf diseases, remedy suggestions, Convolutional Neural Network (CNN)

Subject Descriptors:

- Computing methodologies → Machine learning → Machine learning approaches → Neural networks
- Applied computing → Life and medical sciences → Agriculture → Agricultural system