DA312 Project Proposal

Plant Disease Detection

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Objective

To develop a machine learning model capable of detecting plant diseases from leaf images. The project aims to assist farmers in early diagnosis of plant health issues, reducing plant losses and improving yield quality through timely intervention.

Motivation

Agriculture plays a critical role in global food security, yet it is threatened by plant diseases that can devastate plants. Traditional methods of disease detection are labor-intensive and often require expert knowledge. An AI-driven solution can provide quick, accurate, and scalable disease detection, helping farmers take timely actions to protect their plants.

Dataset Used

About: The PlantVillage dataset, consisting of over 50,000 images of various plants and their corresponding diseases.

Link: (https://github.com/spMohanty/PlantVillage-Dataset)

Proposed Methodology

Data Preprocessing: Resize and normalize images, apply data augmentation (e.g., rotation, flipping) to enhance model robustness.

Model Development:
- Implement a Convolutional Neural Network (CNN) to classify images into healthy or diseased categories.
- Use transfer learning with pre-trained models like ResNet or Inception to improve accuracy.

Training and Evaluation: Split the data into training, validation, and test sets. Evaluate model performance using accuracy, precision, recall, and F1-score.

Deployment: Develop a prototype web or mobile application to allow users to upload leaf images and receive disease diagnosis.

Expected Outcome

A robust machine learning model that can classify plant diseases with high accuracy.
A user-friendly interface for farmers to diagnose plant diseases.
Contribution to precision agriculture, leading to better plant management and reduced losses.

References

Mohanty, S. P., Hughes, D. P., & Salathé, M. (2016). Using Deep Learning for Image-Based Plant Disease Detection. *Frontiers in Plant Science*, 7, 1419. DOI: 10.3389/fpls.2016.01419