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Leaf Disease Detection

PROJECT REPORT



Proper watering

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Leaf Disease Detection

1. Introduction

1.1 Project Overview

This project presents a web-based application for detecting diseases in plant leaves using machine learning. Users can upload leaf images and receive instant predictions about the leaf's health status or specific disease

1.2 Importance in Agriculture

- Prevents crop losses through early detection
- Reduces unnecessary pesticide use
- Increases agricultural productivity
- Supports sustainable farming practices
- Enhances food security

2. Objectives and Target Users

2.1 Main Goals

Develop an accurate machine learning model for leaf disease detection
Create a user-friendly web interface. Provide instant and reliable disease predictions. Contribute to improved plant health management

2.2 Target Users

- Farmers
- Gardeners
- Agricultural researchers
- Plant enthusiasts
- Agricultural extension workers

3. Methodology

3.1 Data and Preprocessing

Dataset: "leaf-disease-detection-dataset" from Kaggle

Preprocessing: Images resized to 128x128 pixels

Data augmentation: Random flipping, rotation, and zooming normalizing

3.2 Model Architecture and Training

Architecture:

- Convolutional Neural Network (CNN)
- Multiple convolutional and max pooling layers
- Dropout layers for preventing overfitting
- Dense layers for classification

Training:

- Optimizer: Adam (learning rate: 0.0001)
- Loss function: Categorical Crossentropy
- Metrics: Accuracy
- Epochs: 10
- Batch size: 32

4. Implementation

4.1 System Architecture

Client-side: Streamlit web interface

Server-side: Python backend for image processing and model inference

4.2 Key Functions

- `model_prediction(test_image)`: Processes images and generates predictions
- Streamlit interface functions for user interaction and result display

4.3 User Interface

- Clean, intuitive design with navigation menu
- Image upload functionality
- Prediction display area
- "About" section with project information


Contron Panel

Disease Prediction


ABOUT

Disease Dectection

Choose an Image:

 Drag and drop file here
Limit 200MB per file

Browse files

 PotatoEarlyBlight1.JPG 20.6KB

×

PREDICT

The Disease of the Leaf is

Predicted : Potato__Early_blight

5. Results and Performance

5.1 Model Accuracy

- Training Accuracy: 97.87%
- Test Accuracy: 96.60%

5.2 Disease Detection Capabilities

Can identify 38 different leaf conditions across various plant species

5.3 Limitations

- May struggle with diseases not in the training data
- Performance affected by image quality and lighting
- Potential difficulty with mixed or early-stage infections

6. User Guide

6.1 Using the Application

- Navigate to the application [URL](#)
- Select "Disease Prediction" from the menu
- Upload a leaf image
- Press "PREDICT"
- View the prediction result

6.2 Interpreting Results

- Application displays the predicted leaf condition (e.g., "Apple__Black_rot" or "Apple__healthy")
- Users should use this as a starting point for further investigation

7. Future Enhancements

7.1 Potential Improvements

1. Expand the dataset
2. Implement real-time detection using device cameras
3. Add disease information and treatment recommendations
4. Develop a mobile application

7.2 Scalability Considerations

- Cloud deployment for increased user load
- Model optimization for mobile devices
- API development for integration with other agricultural software

8. Conclusion

This project successfully developed a high-accuracy leaf disease detection system. It demonstrates the practical application of machine learning in agriculture, providing a valuable tool for quick and accurate plant leaf disease identification. The system has the potential to improve crop management, support sustainable agriculture, and contribute to food security by promoting healthier crop production.



Thank you
Green Today, Greener Tomorrow"