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Plant Disease Detection Using AI

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ABSTRACT:

Plant diseases have a major impact on agricultural productivity and farmer livelihood. Traditional disease diagnosis depends on human experts, which is time-consuming, costly, and often inaccurate. To address this, an AI-based plant disease detection system is developed using image processing and deep learning techniques. Users can upload leaf images through a laptop application, and the system uses EfficientNet-based CNN architecture to classify the disease with high accuracy. The system displays the disease name, confidence level, and suitable remedies. This automated approach helps farmers and agricultural workers identify plant diseases early and reduce crop loss.

Keywords— Plant Disease Detection, Deep Learning, EfficientNet, Image Classification, Agriculture Automation

INTRODUCTION

Agriculture is the backbone of the Indian economy, and plant diseases are one of the primary causes of yield loss. Early and correct disease identification is essential for managing crop health. Manual inspection is tedious and requires skilled professionals. Therefore, a smart AI-enabled system is needed..

This project provides a laptop-based platform where users can upload crop leaf images. The image is processed using a trained deep learning model (EfficientNetB0/B3) to detect diseases instantly. The system also suggests control measures, helping users take preventive actions.

OBJECTIVE:

- To design an automated plant disease detection system using deep learning.
- To classify plant diseases based on uploaded leaf images
- To provide disease-related remedies for user benefit.
- To deploy the model in a laptop-based web application (Streamlit).
- To maintain a scalable and user-friendly interface for farmers and researchers.

LITERATURESURVEY

1. CNN-Based Plant Disease Detection:
Research shows that CNN architectures like ResNet, VGG, and EfficientNet achieve high accuracy in leaf disease classification using datasets such as PlantVillage.

2. Transfer Learning for Agriculture AI:
Pre-trained models such as EfficientNet and MobileNet improve classification performance with small datasets, enabling real-world deployment.

3. Mobile & Web Applications for Farming:
Apps like Plantix inspire real-time diagnosis and user-centric UI designs for farmers.

METHODOLOGY

Manual Plant Disease Detection (Limitations):
Traditional plant disease diagnosis depends on:
- Human experts or agricultural officers
- Visual inspection in farms
- Manual identification using books or experience

WORKFLOW

1. Image Upload:
User uploads a plant leaf image through laptop application (Web UI)

2. Image Pre-Processing:
Resize, normalize and remove noise from the image

3. Disease Classification:
EfficientNetB0/B3 deep learning model predicts disease category

4. Confidence Scoring:
System calculates accuracy percentage for predicted disease .

5. Remedy Suggestion:
System displays prevention & treatment steps.

6 Result Display & Storage:
Final result shown on dashboard and optionally saved in database

EXISTING SYSTEM

Existing systems for disease detection are mostly:

• Manual observation by farmers
• Time-consuming and inaccurate
• Need expert involvement
• Limited coverage of multiple diseases

PROPOSED SYSTEM

1. Image Submission:
Users upload plant leaf images through a web-based interface on a laptop.

2. Image Pre-Processing:
The input image is resized, normalized, and cleaned for efficient model prediction

3. AI-Based Classification:
EfficientNetB0/B3 deep learning model identifies the disease category from the leaf image

4. Confidence Score Generation:
System displays the accuracy percentage for the predicted disease.

5.Remedy Recommendation:
Suggests preventive measures and treatment steps for the identified disease.

6. Result Display & Storage:
Final output is shown on the user dashboard and can be saved for future reference.

EXISTING SYSTEM

Existing systems are mostly:
• Time-consuming and requires expert involvement
• Difficult for farmers in remote areas
• Inaccurate due to human error or lack of knowledge
• Not scalable for large farmlands

PROPOSED SYSTEM

1. Automated Disease Classification
The EfficientNet deep learning model processes leaf images to detect the disease category automatically.

2. Confidence Score Display
The system shows the prediction confidence percentage to ensure reliability and trust.

3 Remedy Recommendation System
Based on prediction, the system provides treatments and preventive suggestions to the user.

4. User-Friendly Dashboard
Users can easily upload images, view results in real time, and analyze disease history.

5 Scalable Model
The architecture supports multiple crops and can add more diseases with retraining

SYSTEM REQUIREMENTS

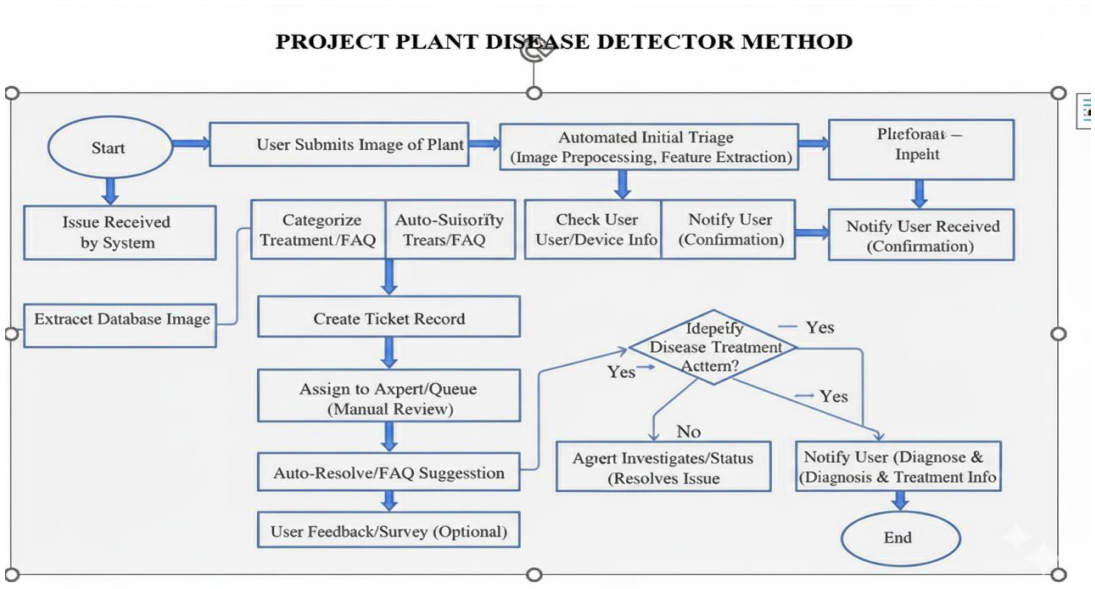
HARDWARE SPECIFICATIONS:

• 8 -16 GB RAM,
• Intel (or)AMD Ryzen processor,
• 500 GB hard disk space,
• Good Image Resolution Source (Camera / Mobile)

SOFTWARE SPECIFICATIONS:

• OS: Windows/Mac/Linux
• Languages: HTML, CSS, JavaScript
• Database: PlantVillage or Customized Dataset
• Tools: VS Code,mongodb

PROCESSING

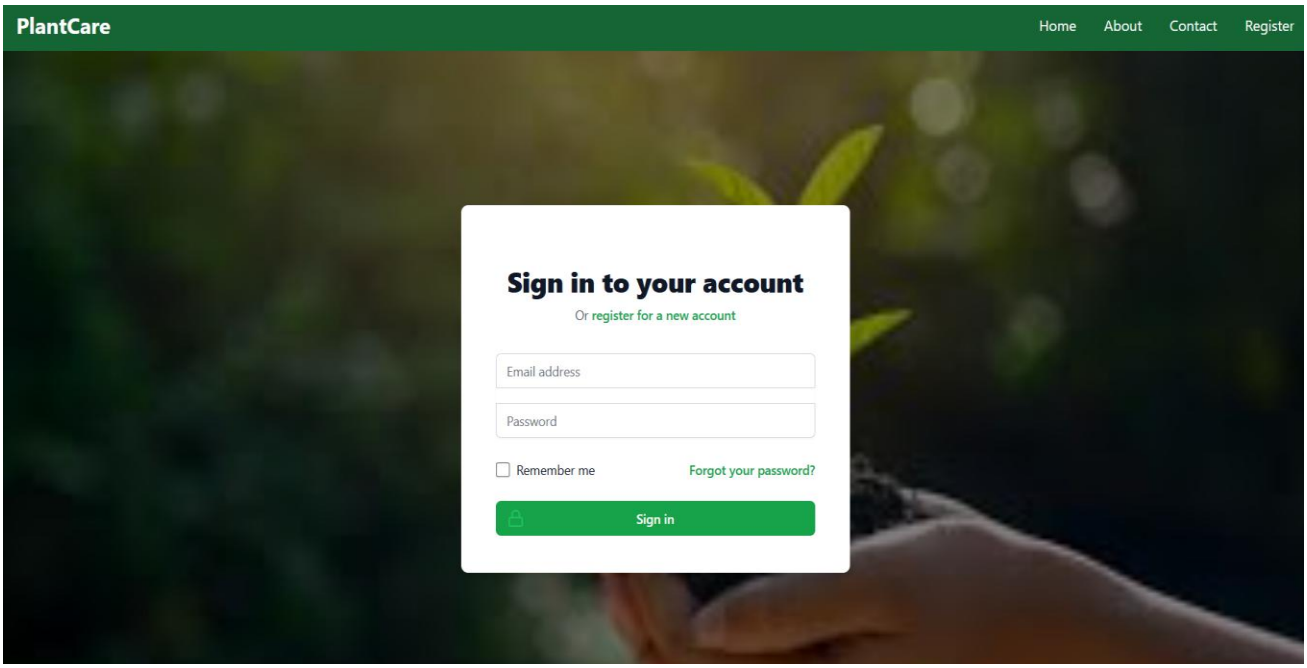


MODE OF DESCRIPTION

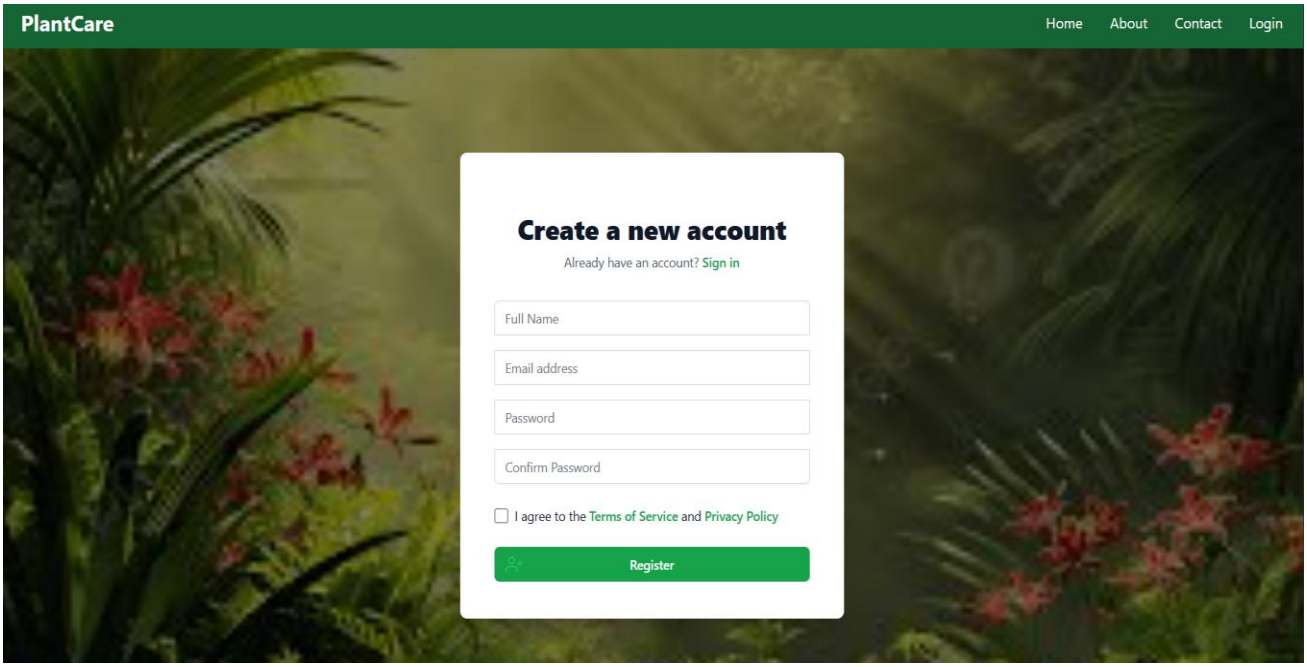
1. Homepage
2. login page
3. register page
4. upload page
5. image diagnosis page
6. Forgot password page

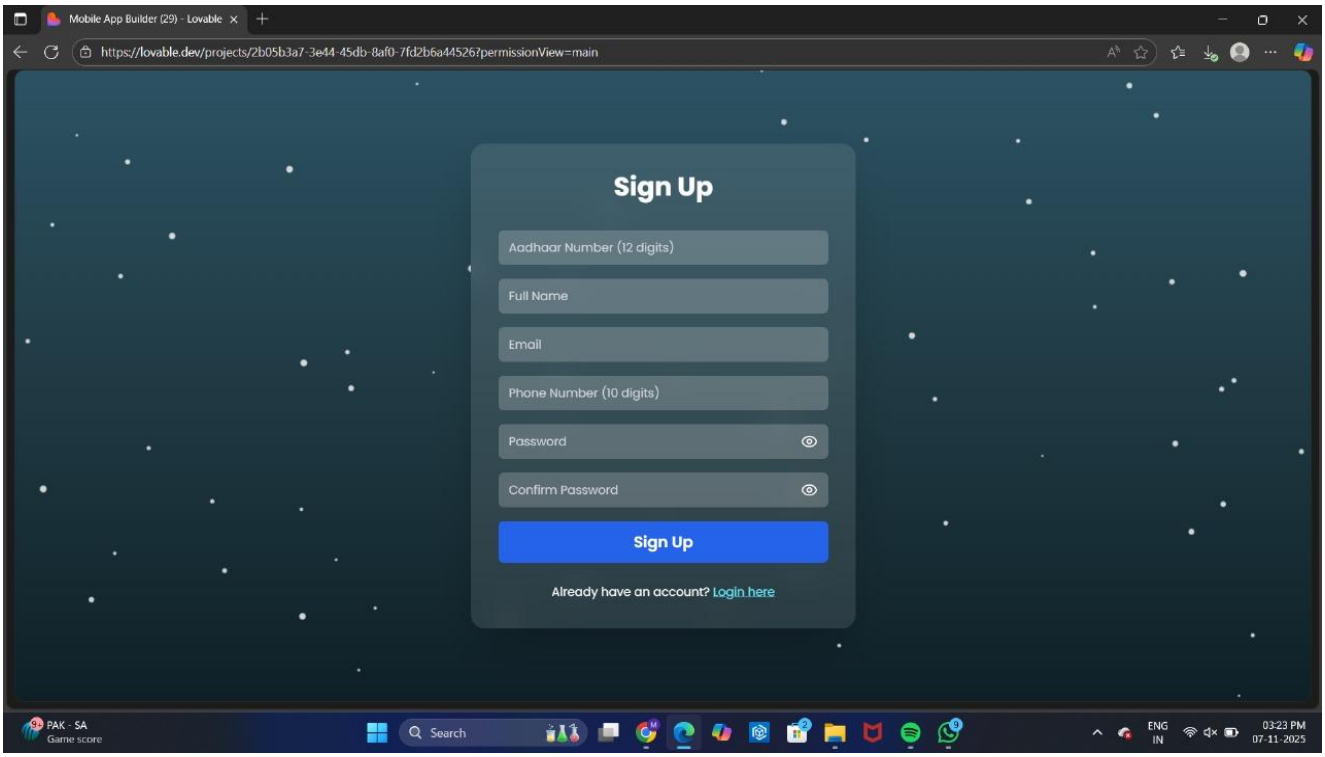
HOMEPAGE:

LOGIN PAGE:

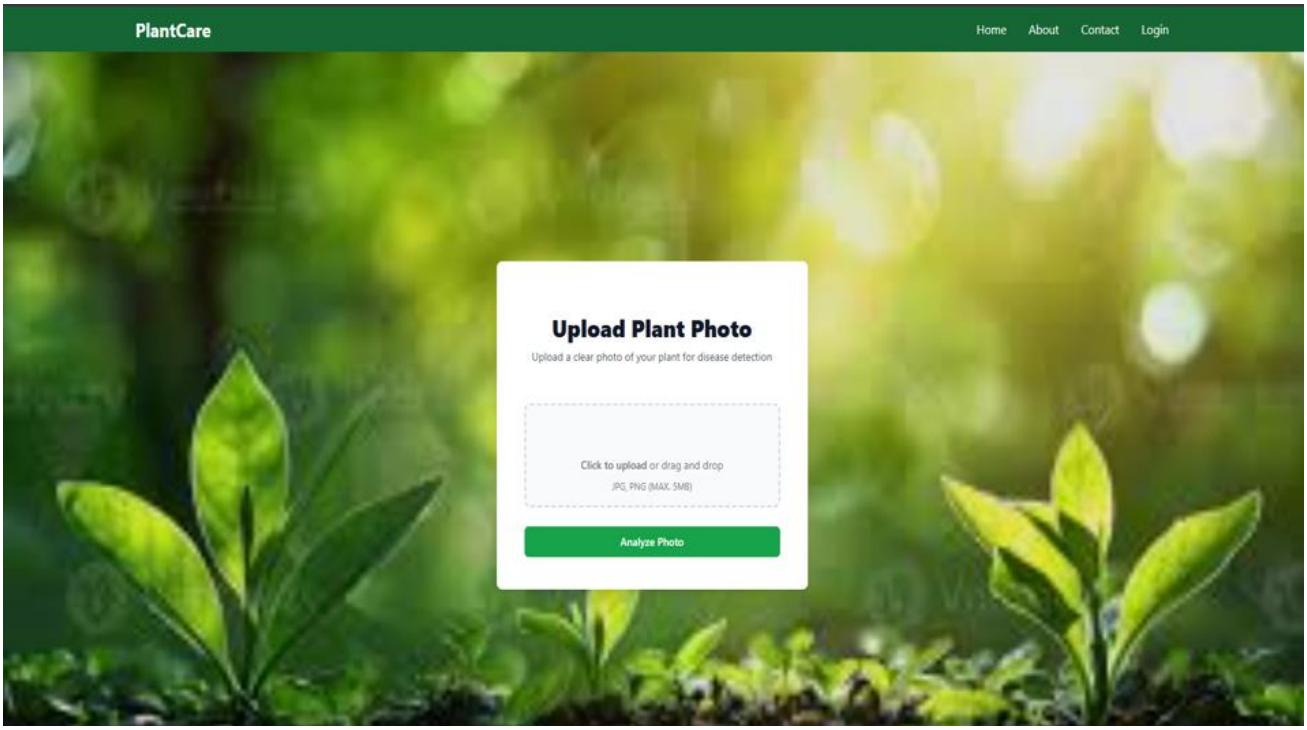


Register Page:

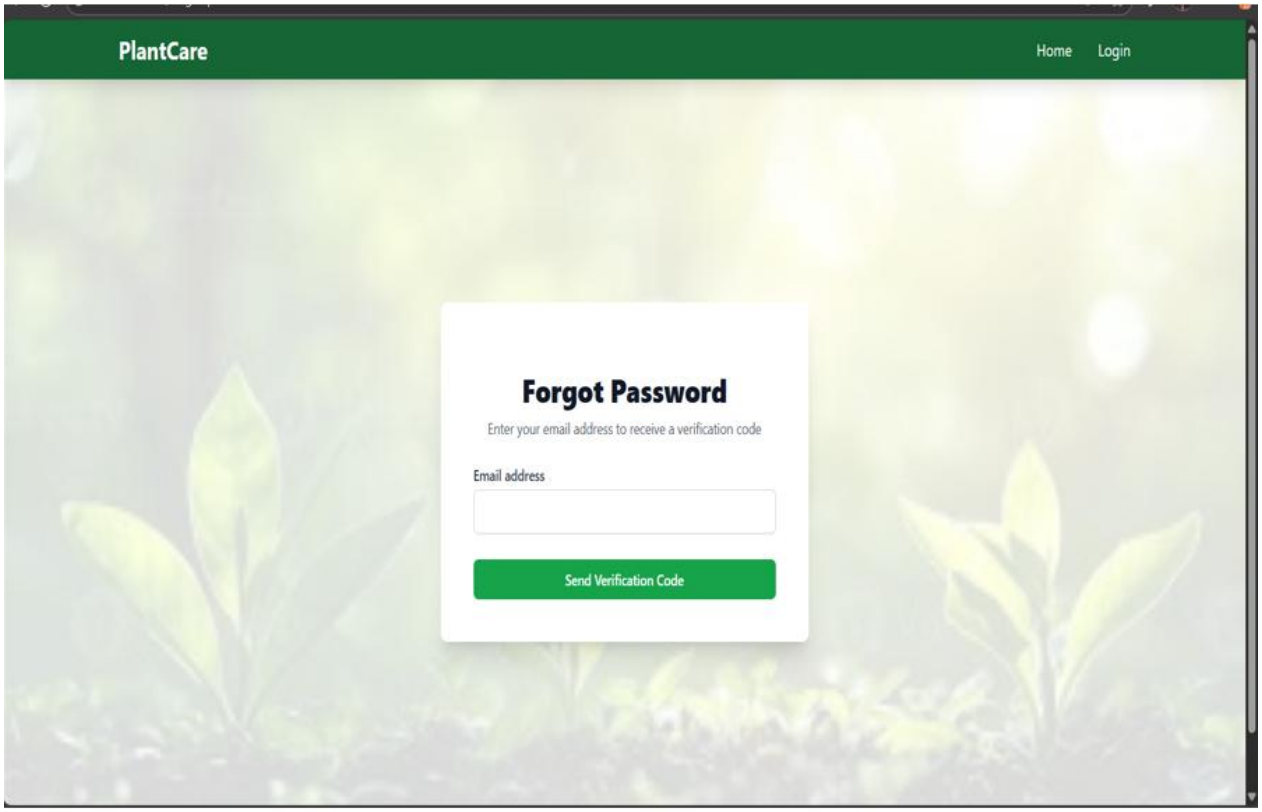




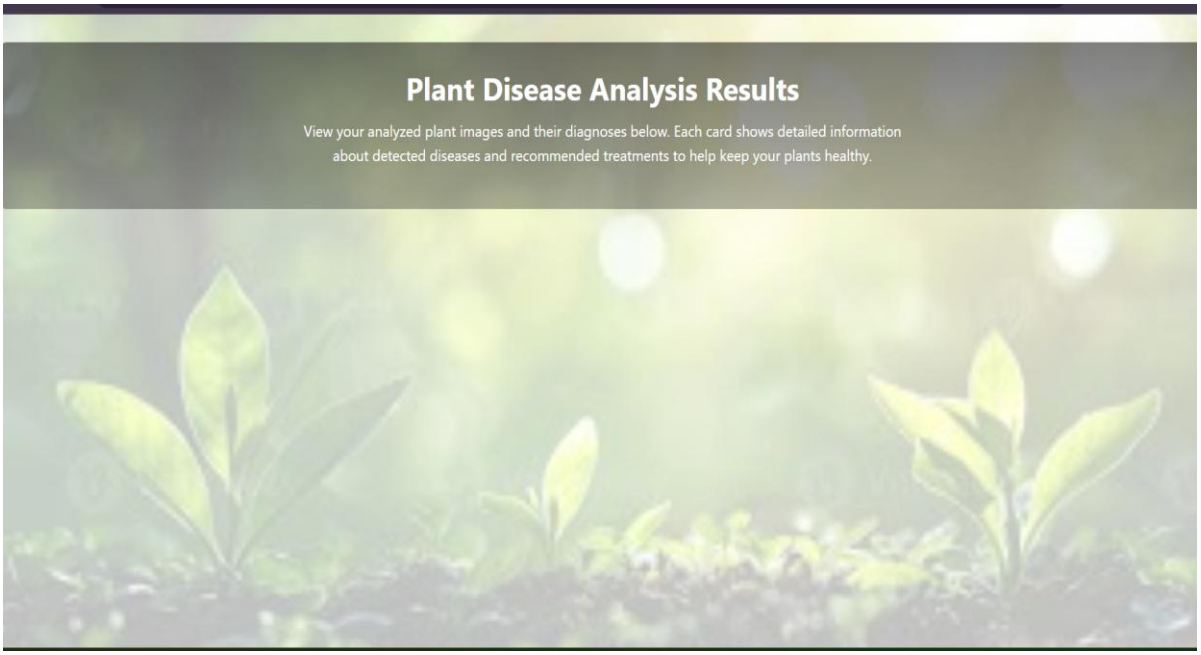
Upload page



Forgot password page:



Plant diagnosis page:



CONCLUSION

The AI-Based Plant Disease Detection System provides an efficient and intelligent solution for identifying plant diseases using deep learning techniques. By allowing users to upload leaf images through a laptop interface, the system performs automated disease diagnosis with high accuracy using the EfficientNet model. This approach reduces dependency on agricultural experts and speeds up the decision-making process, helping farmers take timely preventive actions.

REFERENCE:

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2 PlantVillage Public Dataset for Plant Disease Classification

3. “Deep Learning Techniques for Plant Disease Identification” – IEEE Journals

4 “Transfer Learning in Agriculture Applications” – Springer Publications