Smart Plant Disease Detection System

Submitted for

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Artificial Intelligence and Machine Learning CSET301

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   <Create a Github account and add your code, dataset and readme file,PPT>

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Abstract

This project presents a Smart Plant Disease Detection System that combines machine learning classification with generative AI for agricultural aid. Based on textual descriptions of symptoms, the model predicts plant diseases and generates a realistic image using Stable Diffusion. The system is designed to assist farmers and agriculturists in identifying diseases early and accurately.

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1. Introduction

Agriculture forms the backbone of many economies, yet it suffers major setbacks due to plant diseases. Early detection and treatment are crucial for improving crop yield. This project aims to develop an intelligent system that utilizes symptom-based machine learning classification and generative image models to identify and visualize plant diseases effectively.

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2. Related Work (If Any)

Previous works in plant disease detection mostly relied on image classification using convolutional neural networks. However, few systems exist that use textual symptom descriptions, and none integrate generative models to visualize predicted diseases, making this system a novel contribution.

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3. Methodology

a. Data Preprocessing:

- Loaded dataset: *Plant Disease Symptoms Updated.csv*
- Symptoms vectorized using CountVectorizer

b. Model Training:

- Trained Logistic Regression on vectorized symptom data
- Split: 80% training, 20% testing using train_test_split

c. Prediction Phase:

- User inputs symptom as text
- Model predicts associated plant disease

d. Image Generation:

- A prompt is constructed using the predicted disease
- Prompt is passed to the Stable Diffusion model to generate a realistic image

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4. Hardware/Software Required

- **Languages:** Python
- **Libraries:** Pandas, Scikit-learn, CountVectorizer, Hugging Face Diffusers
- **Models:** Logistic Regression, Stable Diffusion
- **Environment:** Google Colab / Jupyter Notebook

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5. Experimental Results

Sample Input:
Symptoms: *"gray mold"*

Prediction Output:
Disease: *"Botrytis Fruit Rot"*

Generated Image:
An image titled botrytis_fruit_rot.png was generated using Stable Diffusion, reflecting visual symptoms of the predicted disease.

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6. Conclusions

The Smart Plant Disease Detection System successfully predicts diseases using symptom text and provides visual feedback through image generation. The integration of machine learning and generative AI in agriculture enhances disease identification and promotes early treatment.

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7. Future Scope

- Integration of plant leaf image input using CNN
- Development of a mobile or web application
- Dataset expansion to support more crops and regional symptoms

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8. GitHub Link of Your Complete Project

https://github.com/kanishka45/plant-disease-detector