Crop Disease Prediction Using Machine Learning

A Major Project Synopsis Submitted to

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Towards Partial Fulfillment for the Award of

Bachelor of Technology
(Computer Science and Engineering)

Under the Supervision of:
Prof. Ritika Bhatt
Dr. Rashid Sheikh
Prof. Bharti Bhattad

Submitted By:
Ansh Joshi (0827CS201036)
Bhavik Sharma (0827CS201058)
Bhavika Darpe (0827CS201059)
Devendra Singh Pawar (0827CS201067)

Department of Computer Science and Engineering
Acropolis Institute of Technology & Research, Indore
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1. Abstract

In agriculture, early detection and effective management of crop diseases are pivotal for ensuring food security and optimal yields. To address this challenge comprehensively, we propose an Integrated Crop Disease Detection and Management System (ICDDMS) that empowers farmers by allowing them to upload images of diseased plants. The system will not only accurately identify the disease and the pest responsible but also provide tailored solutions for disease control and prevention.

2. Introduction of the Project

Agriculture forms the backbone of many economies, and crop diseases pose a significant threat to crop yields and food security. Rapid and precise detection, coupled with effective management solutions, is essential to mitigate the impact of these diseases. Advances in computer vision, machine learning, and agricultural science offer an unprecedented opportunity to provide farmers with a holistic solution. Similarly, this project aims to build a machine learning model which accurately predicts the disease that a particular crop is affected with.

3. Scope

A plant disease detection system has a wide range of applications and potential scope, and its significance is growing with increasing concerns about food security, sustainable agriculture, and environmental conservation. These systems can help protect crops from diseases, reducing the need for chemical pesticides and promoting sustainable farming practices.

4. Study of Existing System

Crop disease detection systems have been developed to address the crucial challenge of identifying and managing diseases in agriculture. Here is a comprehensive survey of existing systems and methods:

1.Manual Visual Inspection and Expert Consultation: Farmers visually inspect crops for signs of disease and seek advice from agricultural experts.
Pros: Low cost, traditional knowledge, accessible.
Cons: Subjective, relies on expertise, slow response time, accuracy varies.

2. Sensor-Based Systems: Sensor devices measure various plant parameters like moisture, temperature to detect anomalies indicating disease presence.
Pros: Real-time monitoring, data driven
Cons: Costly equipment, maintenance requirement

5. Project Description

This Plant Disease Detection System will enable farmers to upload images of diseased crops for disease and pest identification and provide actionable solutions and recommendations for disease control and prevention. It will offer insights on best agricultural practices tailored to specific diseases and crops.
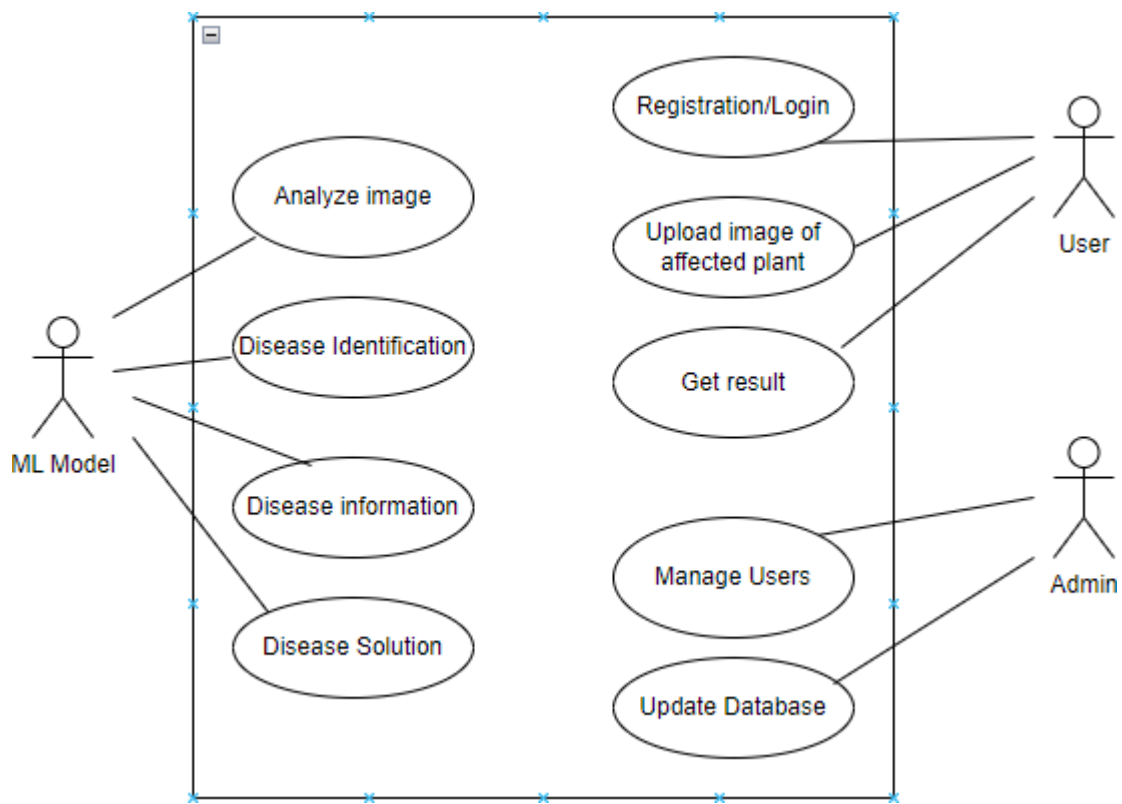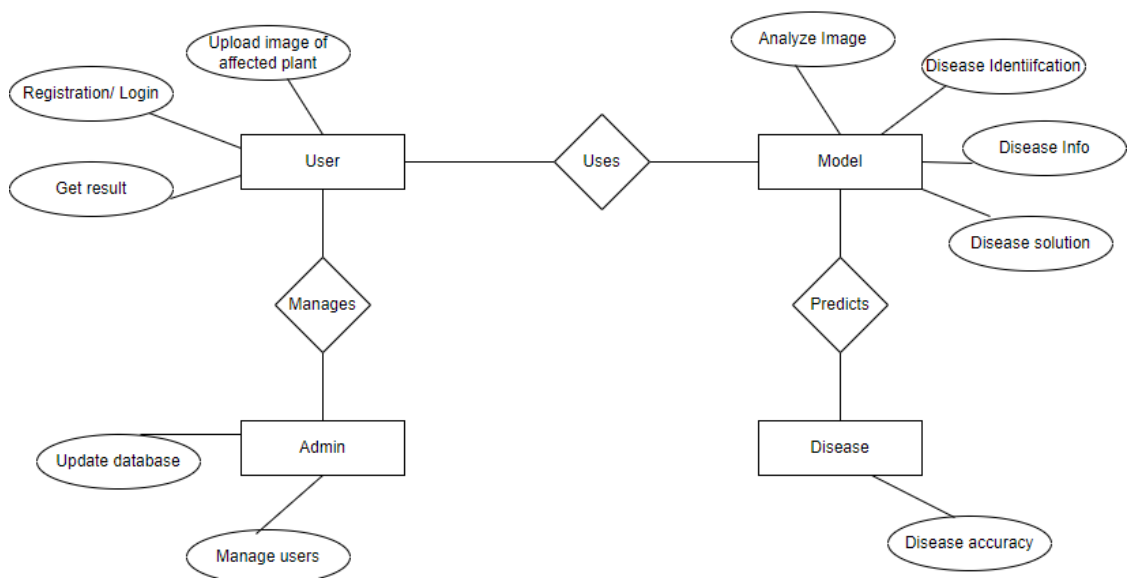
Fig.1 Use-case Diagram

Fig.2 Entity Relationship Diagram

6. Methodology/Planning of the Project work

The project will follow these steps:

- Requirement analysis and design
- Analyzing and cleaning the dataset.
- Building a machine learning model by applying most accurate regression technique.
- Creating frontend of the web application using HTML, CSS and JavaSript
- User interface testing and debugging

7. Expected Outcome

Our proposed Integrated Crop Disease Detection and Management System (ICDDMS) will employ state-of-the-art machine learning models to classify diseases and pests from uploaded images. It will then provide farmers with actionable solutions for disease control and prevention, as well as personalized agricultural practices to maximize crop yield.

8. Resources and Limitations

- ❖ **Hardware Requirements**:
  - 16 GB RAM is recommended.
  - GPU is recommended for deep Learning

- ❖ **Software Requirements:**
- Jupyter Notebook
- VS Code

- ❖ **Limitation**:

Dependency on Technology: Relies on internet access and technology infrastructure.
Initial Costs: Development and maintenance costs may be a barrier for some farmers.
Data Privacy: Concerns about user data privacy and security.

9. Expected Outcome

The Integrated Crop Disease Detection and Management System (ICDDMS) is poised to revolutionize agriculture by offering farmers not only accurate disease and pest identification but also practical solutions for disease control and prevention. By addressing the problem of timely disease detection and providing actionable recommendations, ICDDMS can significantly enhance crop yields, reduce economic losses, and contribute to improved food security.

10. References

- Anand H. Kulkarni, Ashwin Patil R. K., Applying image processing technique to detect plant diseases, International Journal of Modern Engineering Research, vol.2, Issue.5, pp: 3661-3664, 2012.
- P. Revathi, M. Hemalatha, Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques, IEEE International Conference on Emerging Trendsin Science, Engineering and Technology, pp-169-173, Tiruchirappalli, TamilNadu, India, 2012.
- Tushar H. Jaware, Ravindra D. Badgujar and Prashant G. Patil, Crop disease detection using image segmentation, National Conference on Advances in Communication and Computing, World Journal of Science and Technology, pp:190-194, Dhule, Maharashtra, India, 2012.
- Prof.Sanjay B. Dhaygude, Mr.Nitin P. Kumbhar, Agricultural plant Leaf Disease Detection Using Image Processing, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering , S & S Publication vol. 2, Issue 1, pp: 599- 6 02, 2013.