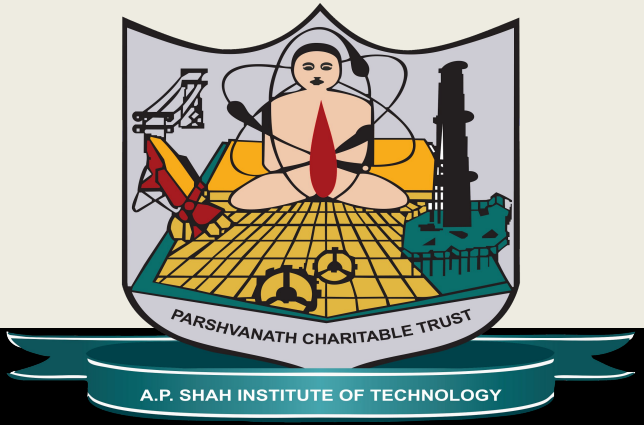

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UNIVERSITY OF MUMBAI

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A Project Report on

Agrolife: ML enabled Plant Disease Classification System

Submitted in partial fulfillment of the degree of
Bachelor of Engineering(Sem-8)
in
INFORMATION TECHNOLOGY

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1.Project Conception and Initiation

1.1 Abstract

Agrolife aims at detecting whether the plant is diseased or not and if yes, classify the disease caused. Along with this, the system will provide a gist about the disease with few easy home remedies(if applicable) and guide the user to take proper consultation.

Convolutional Neural Network (CNN), a Deep Learning technique, is used which takes input from the user in the form of image data and displays the type of disease along with some remedies. Also, some other softwares used are Tensorflow(for preprocessing of data) and Google cloud server(for deployment). This, thus, would help in preventing the loss of crops resulting in an increase in production.

1.2 Objectives

1. To detect the crop disease using Convolutional Neural Network algorithm.
2. To give right knowledge to the users about which disease the crop has based on the image classification.
3. To help predict disease and display the actions to be taken at the right time.
4. To provide information about the disease predicted to the user and help them make an informed decision before taking appropriate measures.

1.3 Literature Review

Sr. no.	Published Paper Name	Description	Year
1.	A Deep CNN Approach for Plant Disease Detection.	Applied CNN to allow early detection of plant diseases by classifying the plant images into diseased and disease-free categories.	2020
2.	Plant disease classification using deep learning.	CNN model is used to classify the plant images. Also, pre-trained models like VGG, ResNet and DenseNet are trained using the dataset.	2021
3.	Plant Disease Diagnosing Based on Deep Learning Techniques.	Presented a review on use of CNN in diagnosis and identification of plant pest and diseases.	2023

1.4 Problem Definition

- Farmers' economic growth is determined by the quality of the goods they produce, which is dependent on plant growth and yield.
- As a result, in the field of agriculture, disease identification in plant leaves is important.
- It takes a long time to manually diagnose plant leaves’ disease through naked eye.
- Thus, computational methods need to be developed to automate the process of disease detection and classification using leaf image classification.

1.5 Scope

- Can be helpful for farmers and gardeners to detect plant diseases early, allowing them to take timely and appropriate measures to prevent further spread and damage to crops.
- Can be able to apply targeted treatments, such as specific pesticides or fungicides, in a more precise manner.
- Can improve crop yield by identifying diseases that can significantly reduce productivity.
- Can be helpful reduce food waste caused by crops being unsuitable for consumption.

1.6 Technology stack

1. HTML, CSS, Bootstrap for interface
2. Python (version 3.9.2)
3. Tensorflow for preprocessing the data
4. Deep Learning using CNN model
5. Google Cloud Server for deployment

1.7 Benefits for environment & Society

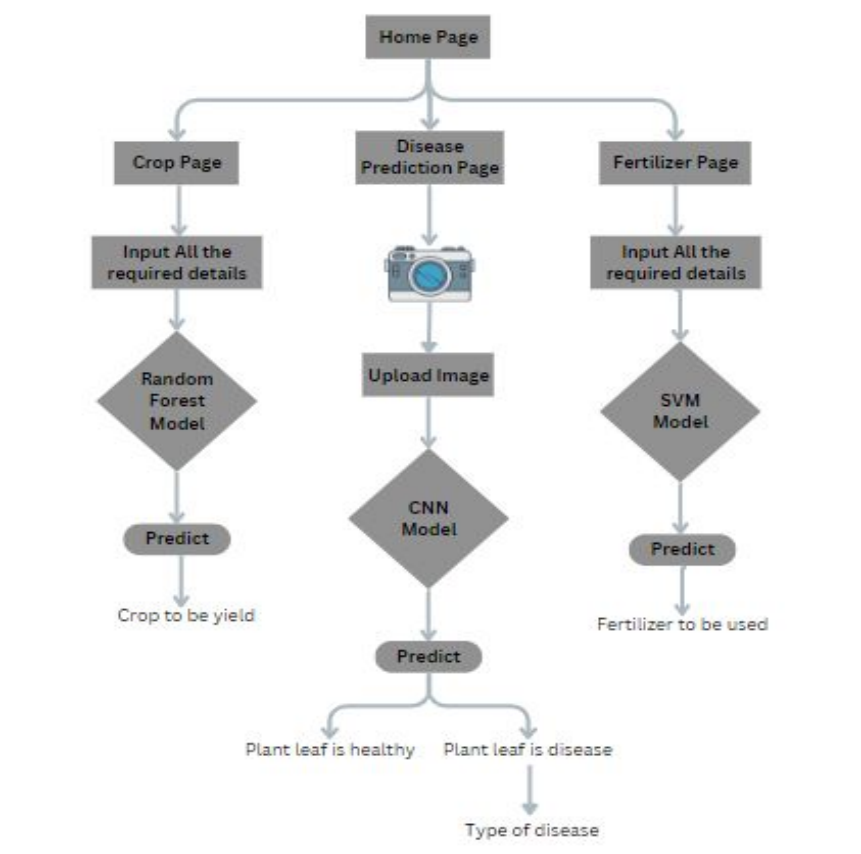
- The ML enabled plant disease classification system project allows for early detection of plant diseases through image analysis.
- The ML-enabled plant disease classification system project can reduce the use of pesticides by providing targeted treatment recommendations based on the specific disease detected in the plants.
- The ML-enabled plant disease classification system project can lead to cost savings for farmers by reducing the use of pesticides and increasing crop yields.

2. Project Design

2.1 Proposed System

- This project aims to investigate and identify whether a plant is diseased, and if so, provide the user with a summary of the disease, including potential home remedies, and guidance on seeking appropriate professional advice.
- Ultimately, this system can aid in preventing crop loss and enhancing production growth.
- In addition to identifying plant diseases and providing remedies, the proposed system also incorporates a fertilizer and crop recommendation system.

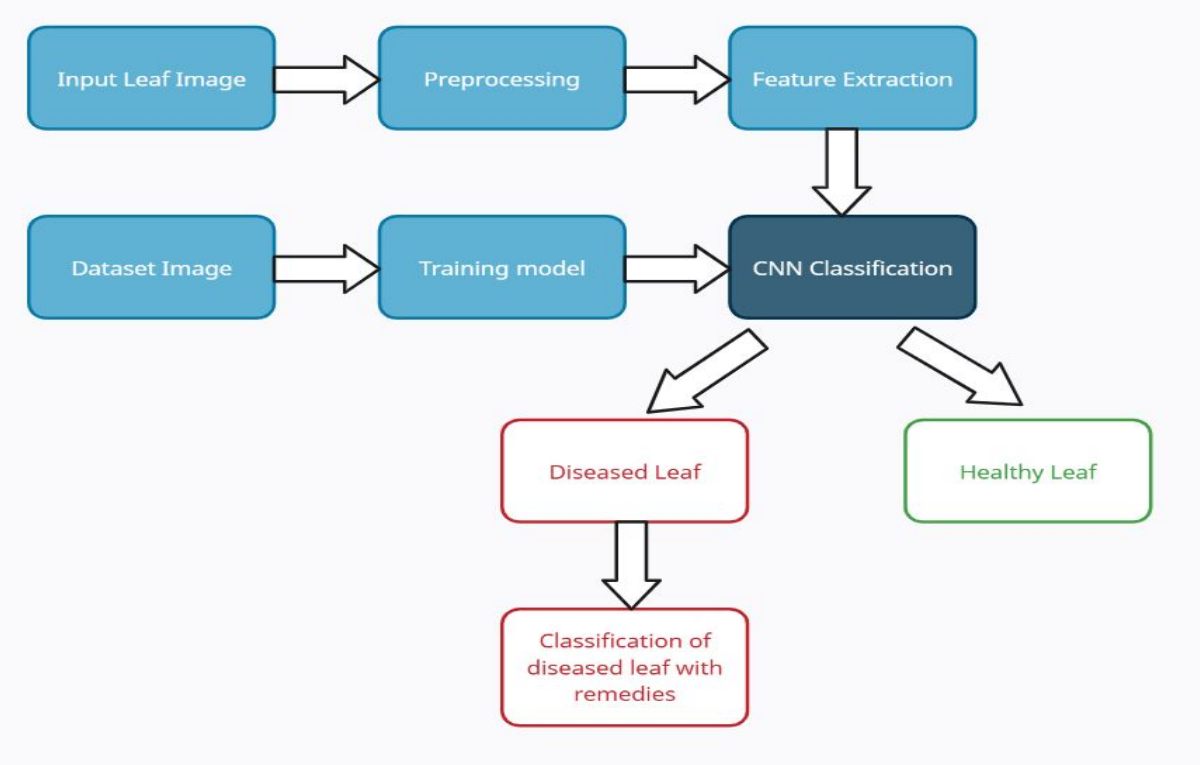
2.2 Design(Flow Of Modules)



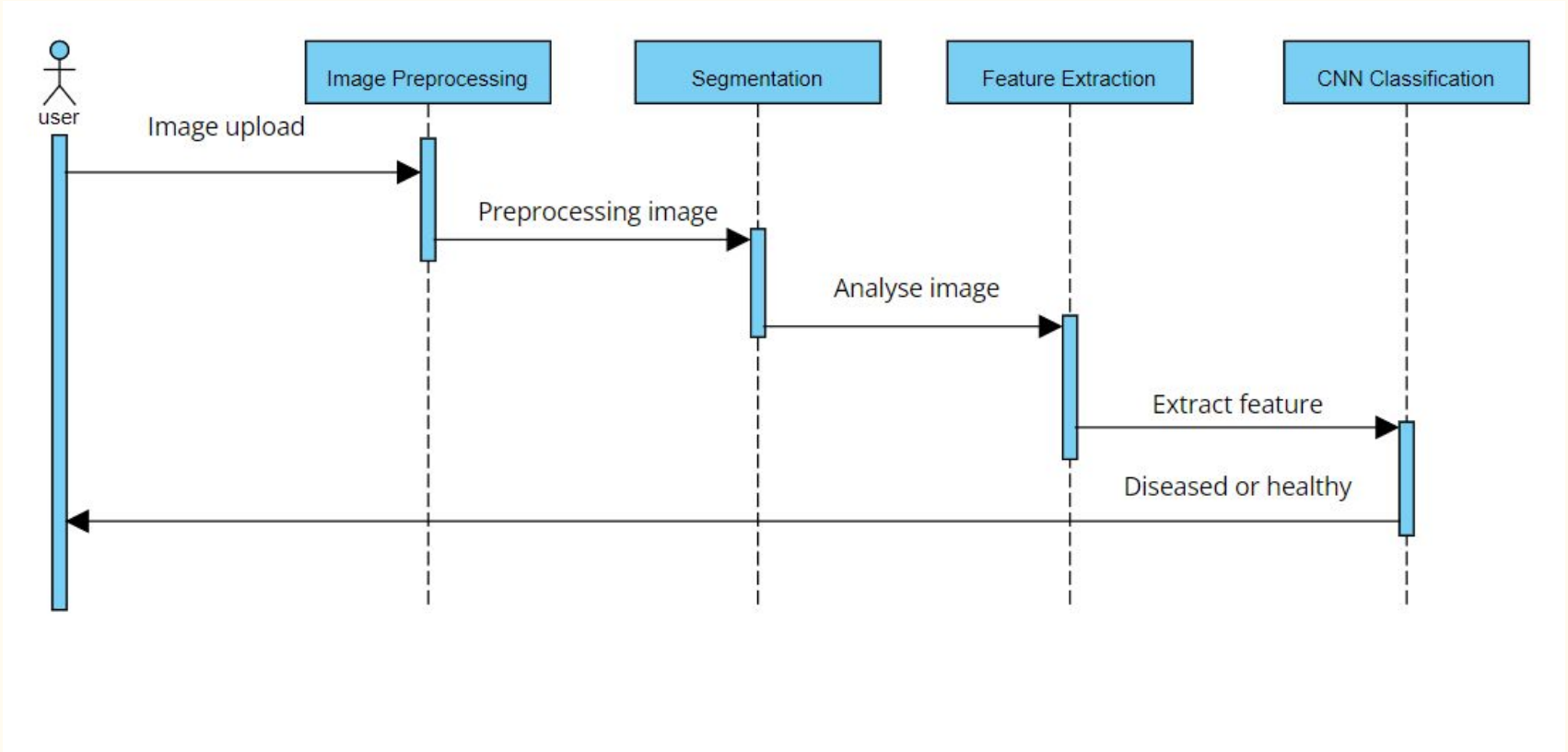
2.3 Description Of Use Case

The use cases for a plant leaf disease classification system using deep learning techniques involves several components. The user starts by providing an input image of a plant leaf, which undergoes preprocessing to remove any distortions. Relevant features of the preprocessed image are then extracted using deep learning techniques like CNNs. The system then utilizes a pre-trained model to identify the disease present in the input image. This use case diagram provides a clear outline of the process involved in plant leaf disease classification using deep learning techniques.

2.4 Activity diagram

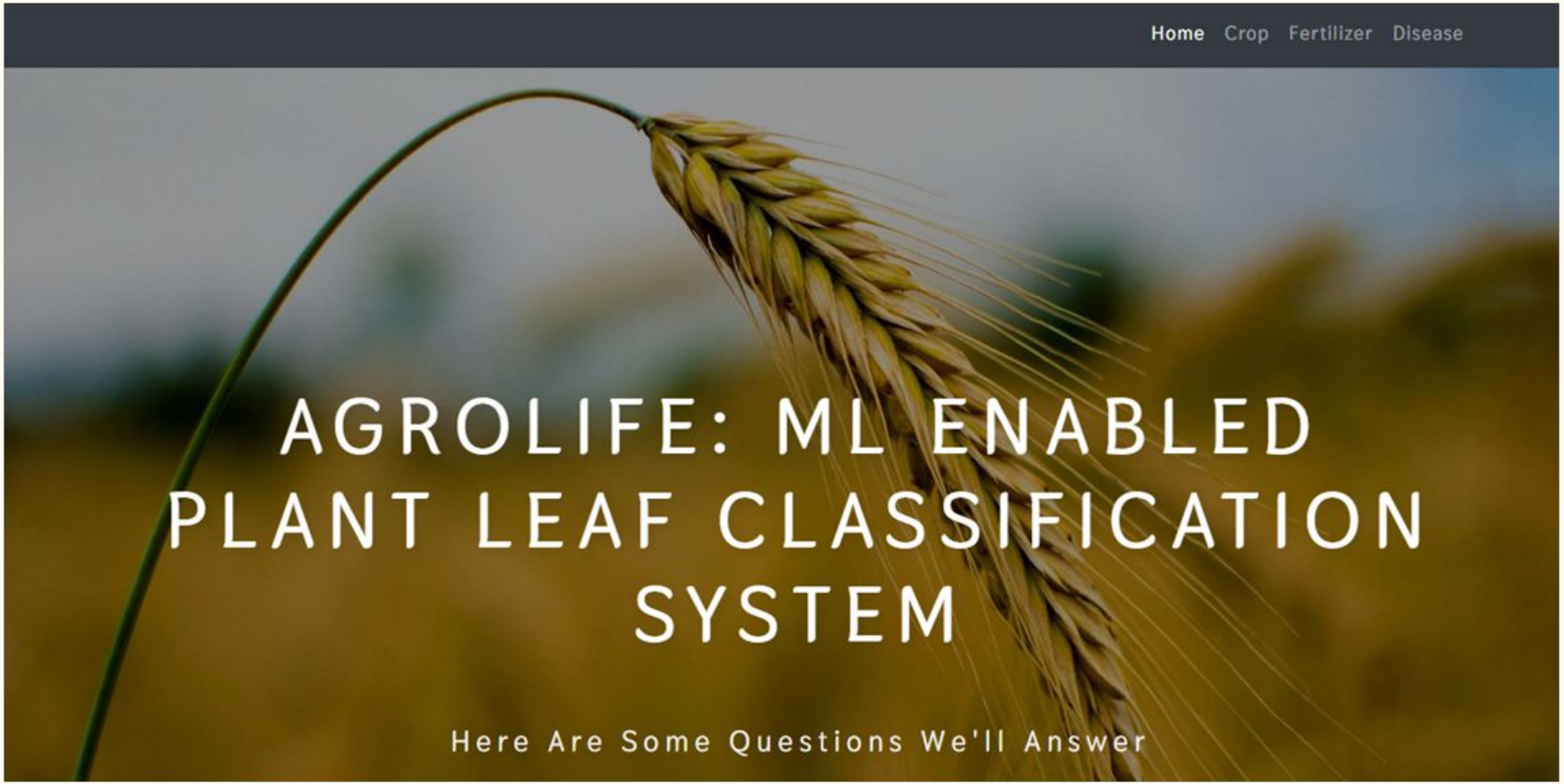


2.5 Class Diagram



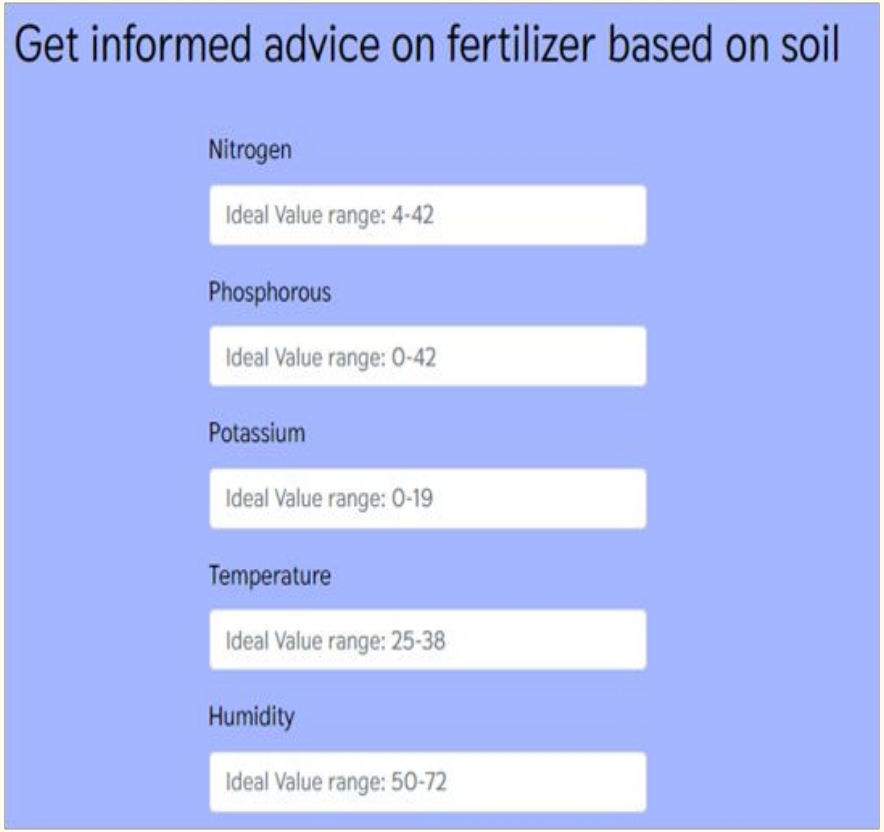
3. Implementation

A] Home Page

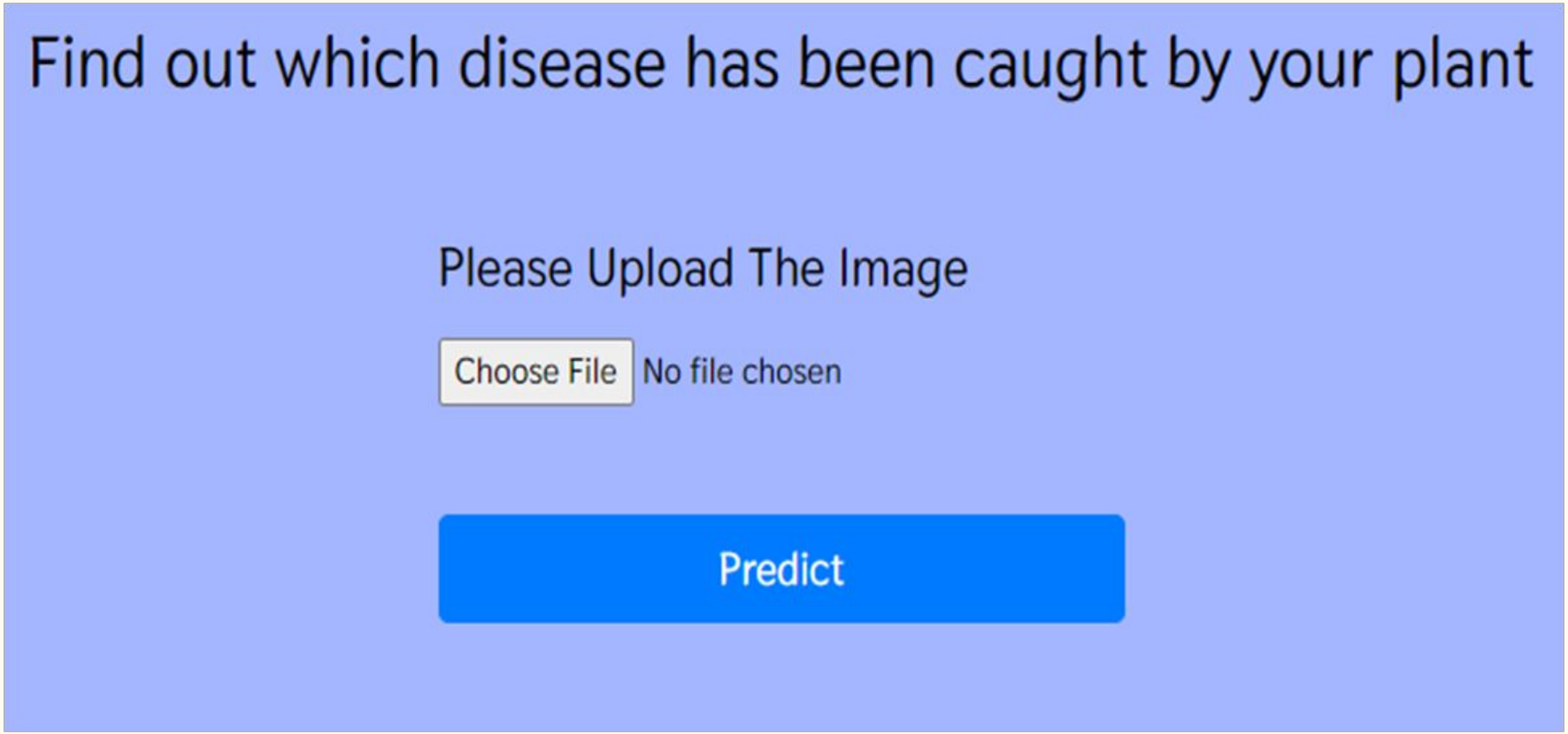

Home
Crop
Fertilizer
Disease
AGROLIFE: ML ENABLED PLANT LEAF CLASSIFICATION SYSTEM
Here Are Some Questions We'll Answer

B] Crop Recommendation Page

C] Fertilizer Recommendation Page



D] Disease Prediction page

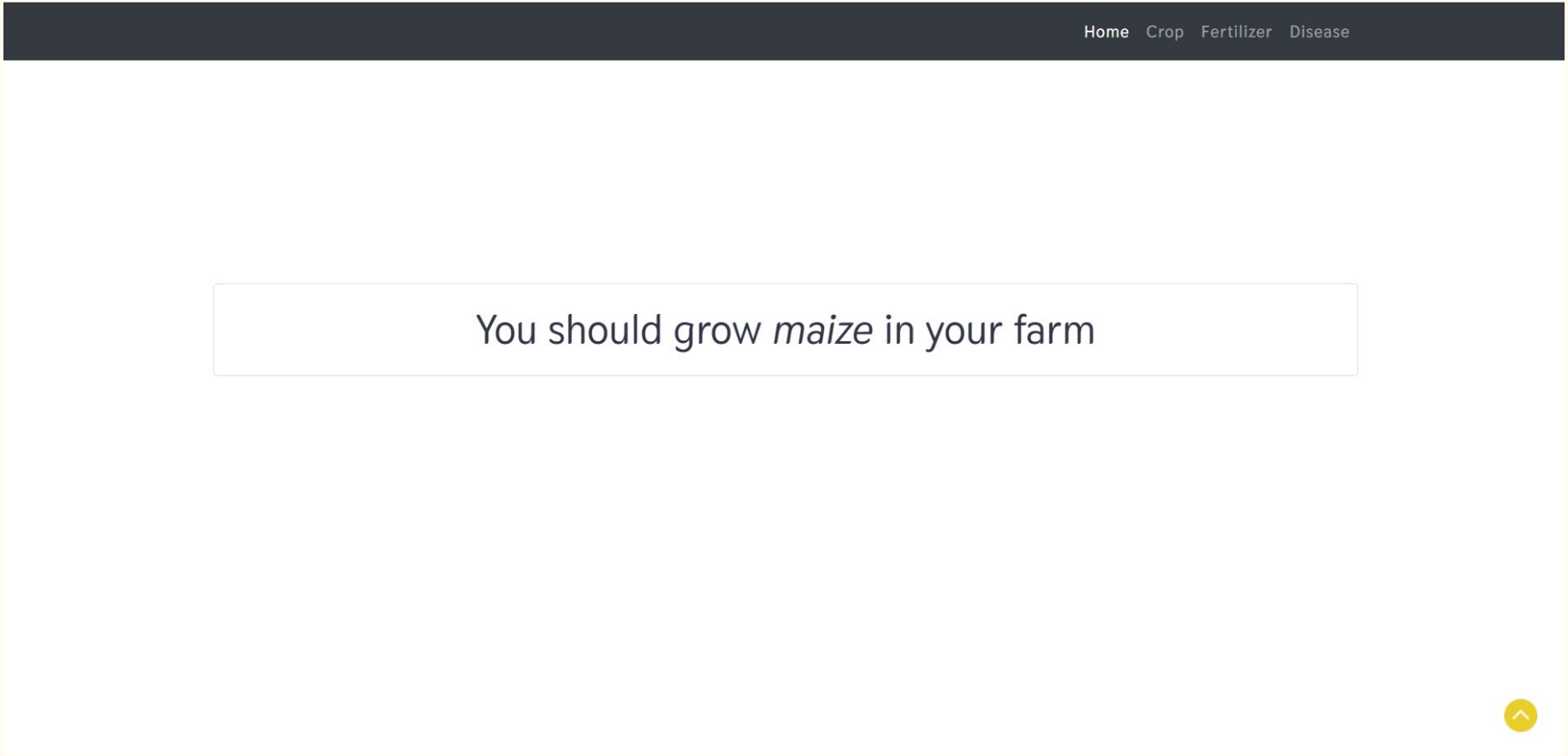


4. Testing

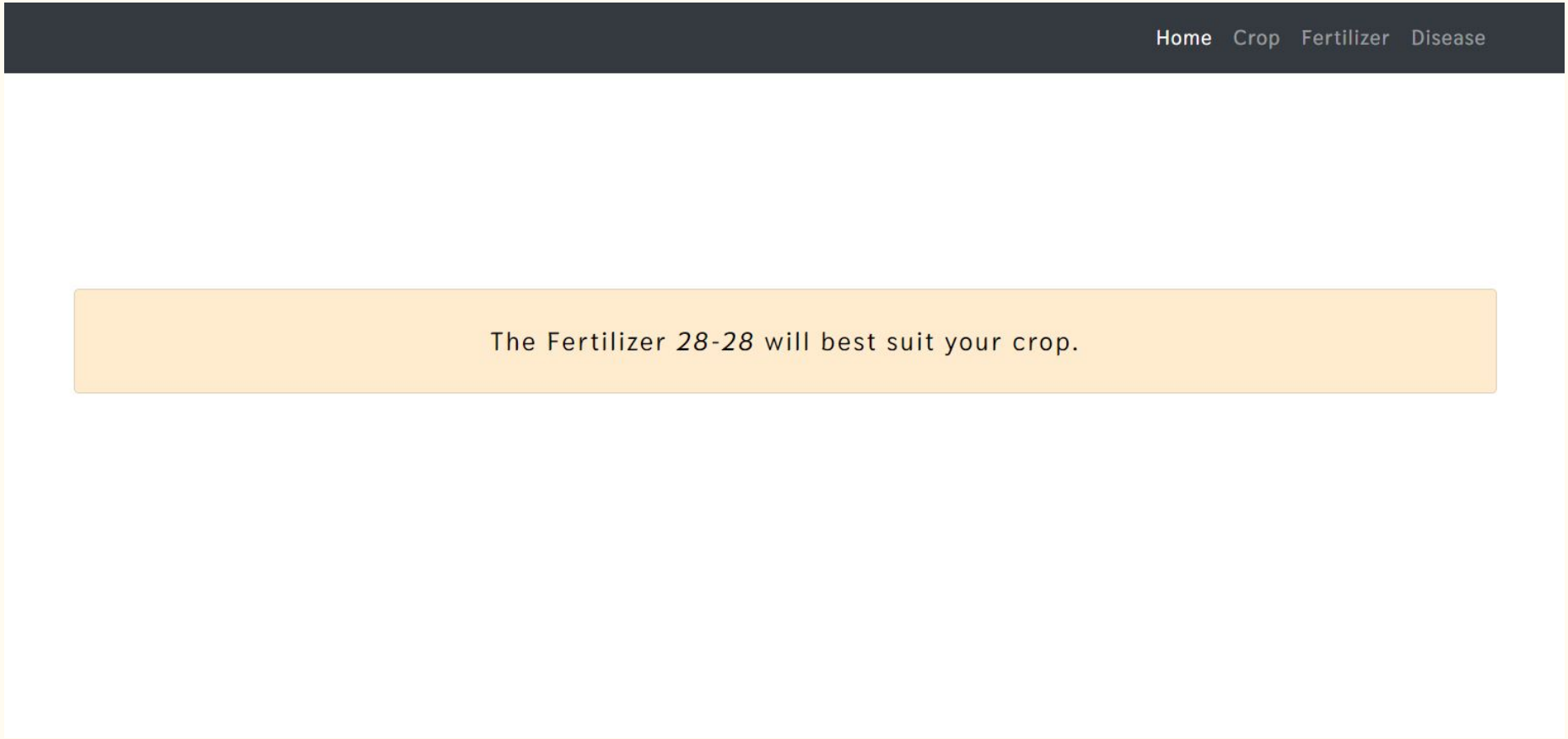
Test Case	Test Description	Expected Outcome	Actual Outcome	Pass/Fail
TC-01	Upload image	User uploads an image of a plant leaf	Image is successfully uploaded	Pass
TC-02	Preprocessing	Preprocessing module processes the image	Preprocessed image is displayed	Pass
TC-03	Classification	CNN model classifies the preprocessed image	Correct disease classification is displayed	Pass
TC-04	Disease information	System provides information about the disease	Accurate disease information is displayed	Pass
TC-05	Remedy information	System provides remedies for the disease	Appropriate remedies are displayed	Pass
TC-06	Crop recommendation	System recommends a crop based on location and soil properties	Recommended crop is suitable for the location and soil type	Pass
TC-07	Fertilizer recommendation	System recommends a fertilizer based on the recommended crop	Recommended fertilizer is suitable for the recommended crop	Pass
TC-08	Usability	System is user-friendly	User can easily navigate through the system	Pass

5. Result

A] Result for Crop Recommendation



D] Result for Fertilizer Recommendation



C] Result for Disease Prediction

Crop: Tomato

Disease: Early Blight

Cause of disease:

1. Early blight can be caused by two different closely related fungi, Alternaria tomatophila and Alternaria solani.
2. Alternaria tomatophila is more virulent on tomato than A. solani, so in regions where A. tomatophila is found, it is the primary cause of early blight on tomato. However, if A.tomatophila is absent, A.solani will cause early blight on tomato.

How to prevent/cure the disease

1. Use pathogen-free seed, or collect seed only from disease-free plants..
2. Rotate out of tomatoes and related crops for at least two years.
3. Control susceptible weeds such as black nightshade and hairy nightshade, and volunteer tomato plants throughout the rotation.
4. Fertilize properly to maintain vigorous plant growth. Particularly, do not over-fertilize with

6. Conclusion and Future Scope

In a modern environment with less knowledge of agriculture, it is important to have knowledge and an understanding of the factors that affect the cultivation before selecting any crop. In our website we have proposed an innovative approach for smart agriculture using Deep Learning and Machine Learning technology. Thus this system will be used to reduce the difficulties faced by the farmers and will increase the quantity and quality of work done by them. Thus the farmers can plant the right crop increasing his yield and also increasing the overall productivity of the nation. Our future work is aimed at an improved data set with a large number of attributes and also implements yield prediction.

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Paper Publication

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Thank You