# FERTILIZERS RECOMMENDATION SYSTEM FOR DISEASE PREDICTION


## TEAM ID : PNT2022TMID23783

ULASA POOJITHA A. NAVYA
THARANI P K VEMBUDHARSINI V


## 1.INTRODUCTION

### 1.1 PROJECT OVERVIEW :

Agriculture is the most important sector in today's life. Most plants are affected by a wide variety of bacterial and fungal diseases. Diseases on plants placed a major constraint on the production and a major threat to food security. Hence, early and accurate identification of plant diseases is essential to ensure high quantity and best quality. In recent years, the number of diseases on plants and the degree of harm caused has increased due to the variation in pathogen varieties, changes in cultivation methods, and inadequate plant protection techniques.

An automated system is introduced to identify different diseases on plants by checking the symptoms shown on the leaves of the plant. Deep learning techniques are used to identify the diseases and suggest the precautions that can be taken for those diseases.

### 1.2 PURPOSE :

Plant diseases especially on leaves is one of the main reason for reduction in both quality and quantity of food crops. In Agriculture aspects, if a plant is affected by leaf disease ,then it reduces the growth at agricultural level. Finding the leaf disease is an important role of agriculture preservation.After pre-processing using a median layer, segmentation is done and leaf disease is identified. The disease based similarity measure is used for fertilizer recommendation.

## 2.LITERATURE SURVEY

## 2.1 EXISTING PROBLEM :

A proposed method for leaf disease detection and suggest fertilizers to cure leaf diseases. But the method involves less number of train and test sets which results in poor accuracy.

Pandi selvi proposed a simple prediction method for soil based fertilizer recommendation system for predicted crop diseases.This method gives less accuracy and prediction.

Shiva reddy proposed an IOT based system for leaf disease detection and fertilizer recommendation which is based on machine learning techniques that yields less than 80 percentage accuracies.

## 2.2 REFERENCES :

[1]. R Indumathi.; N Saagari.; V Thejuswini.; R Swarnareka.;"Leaf Disease Detection and Fertilizer Suggestion",IEEE International Conference on System , Computation , Automation and Networking (ICSCAN) , 29-30 March 2019, DOI:10.1109/ICSCAN.2019.8878781

[2]. P. Pandi Selvi, P.Poornima, "Soil Based Fertilizer Recommendation System for Crop Disease Prediction System",International Journal of Engineering Trends and Applications(IJETA)-Volume 8 Issue 2 , Mar-Apr 2021

[3]. H Shiva reddy, Ganesh hedge , Prof. DR chinnaya3, "IOT based Leaf Disease Detection and Fertilizer Recommendation", International Research Journal of Engineering and Technology (IJRET), Volume: 06 Issue: 11, Nov 2019,e-ISSN:2395-0056

[4]. Detection of Leaf Diseases and Classification using Digital Image Processing International Conference on Innovations in Information, Embedded and Communication Systems(ICIIECS), IEEE, 2017.

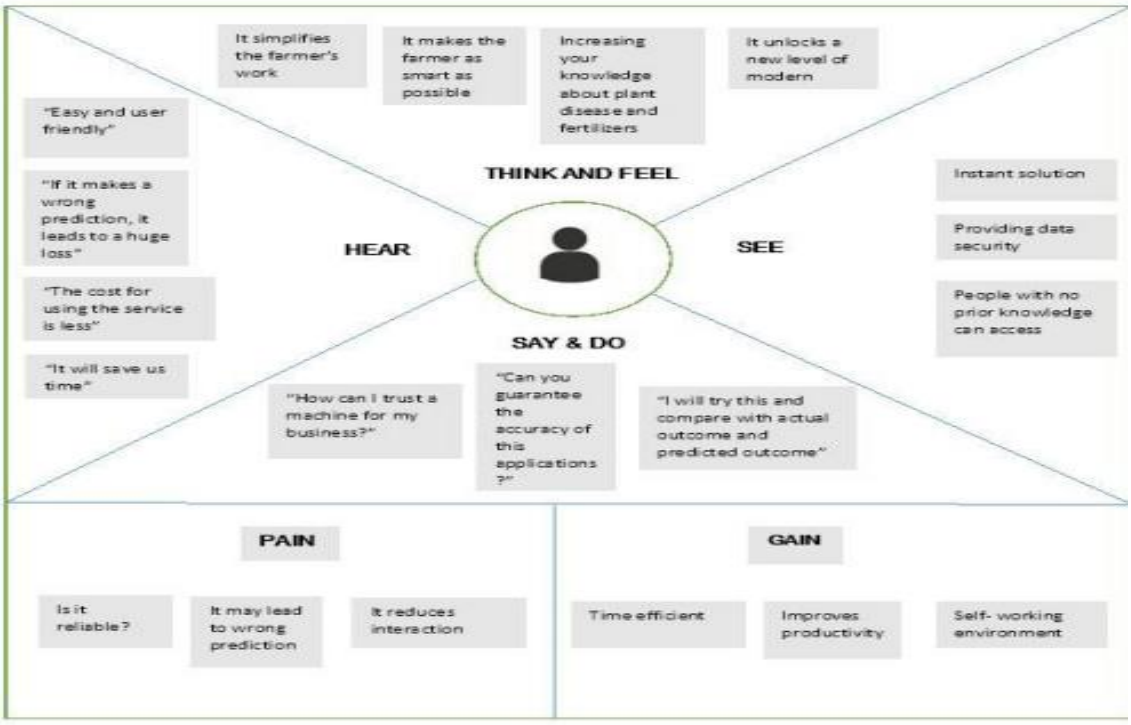
## 2.3 PROBLEM STATEMENT DEFINITION :

Mostly, the plant leaf diseases are caused by Pathogens which are positioned on the stems of the plants. These different symptoms and diseases of leaves are

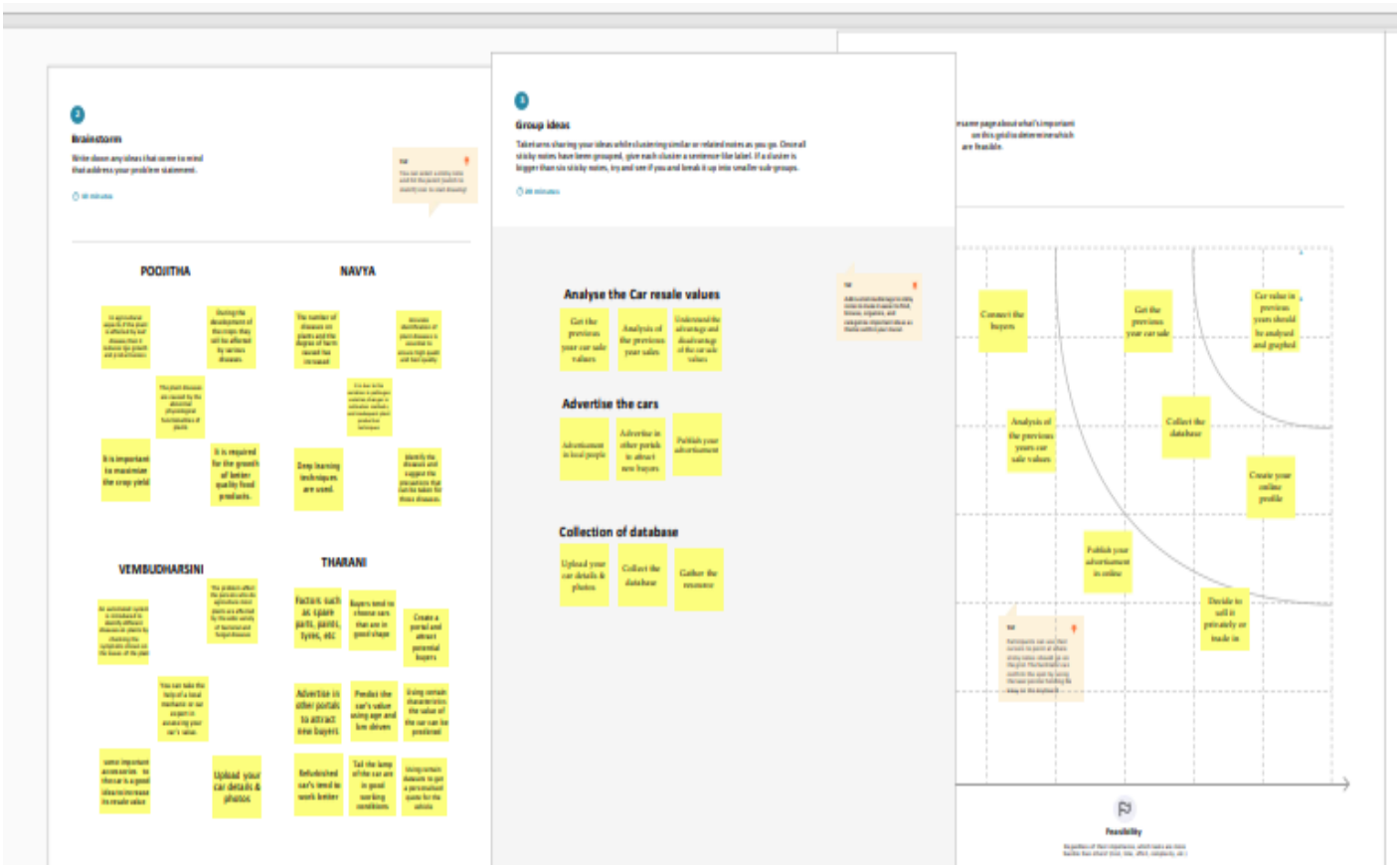
predicted by different methods in image processing. These different methods include different fundamental processes like segmentation, feature extraction and classification and so on. Mostly, the prediction and diagnosis of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

# 3.IDEATION & PROPOSED SOLUTION

## 3.1 EMPATHY MAP CANVAS :




## 3.2 IDEATION AND BRAINSTORMING :

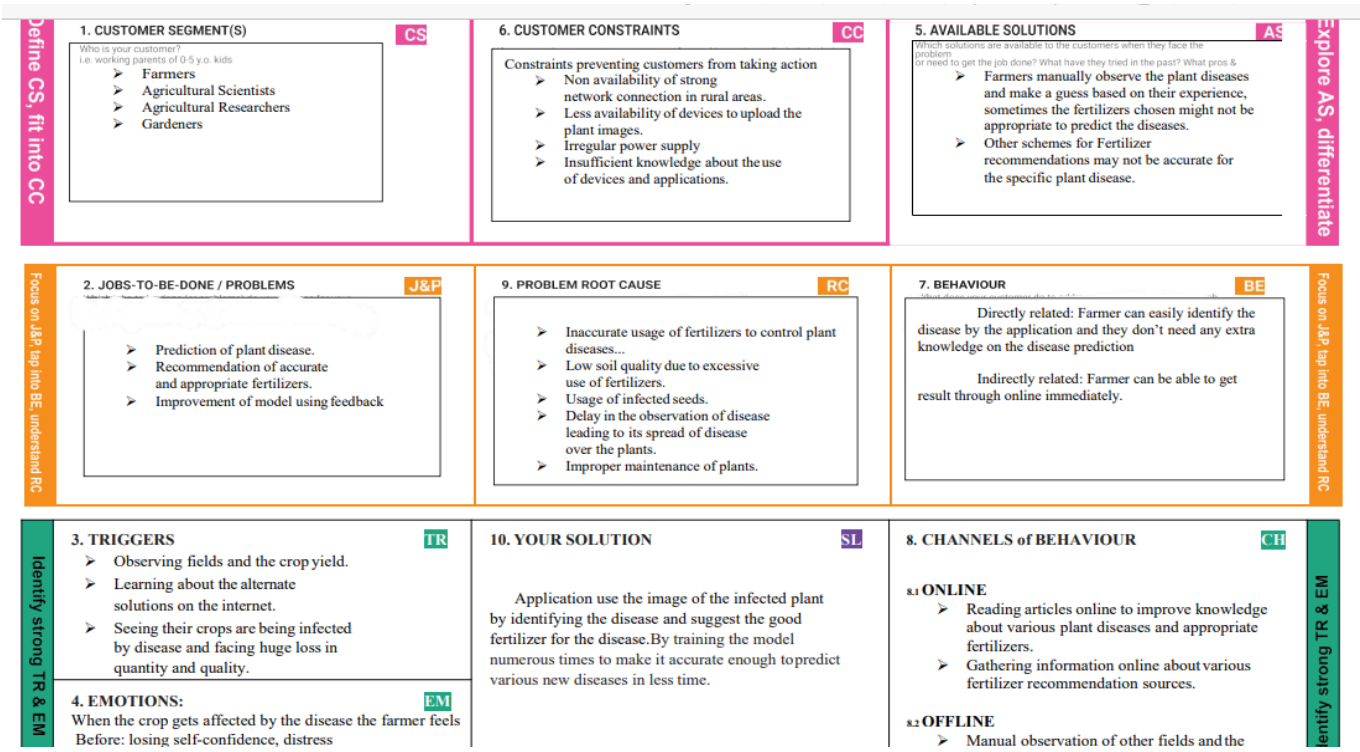



## 3.3 PROPOSED SOLUTION :

| S.no | Parameter | Description |
|---|---|---|

| | | |
|---|---|---|
| 1 | Problem Statement (Problem to be solved) | Disease in plants reduced the quantity and quality of the plants productivity. Identifying the disease in plant is hard to find. |
| 2 | Idea / Solution description | One of the solution of the problem is to identifying the disease in early stage and using the correct fertilizer. |
| 3 | Novelty / Uniqueness | This application can suggest good fertilizer for the disease in the plant by recognizing the images. |
| 4 | Social Impact / Customer Satisfaction | It helps the farmer by identifying the disease in the early stage and increase the quality and quantity of crops in efficient way. |
| 5 | Business Model (Revenue Model) | The application is recommends to farmer in subscription basis. |
| 6 | Scalability of the Solution | This application can be improved by introducing online purchases of crops, fertilizer easily |

## 3.4 PROBLEM SOLUTION FIT :




# 4.REQUIREMENT ANALYSIS

## 4.1 FUNCTIONAL REQUIREMENTS:

| Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|---|---|
| User Registration | Registration through Form ,Gmail , LinkedIN |
| User Confirmation | Confirmation via Email ,Confirmation via OTP |
| Capturing image | Capture the image of the leaf |
| Image processing | Upload the image for the prediction of the disease in the leaf. |
| Leaf identification | Identify the leaf and predict the disease in leaf. |
| Image description | Suggesting the best fertilizer for the disease . |

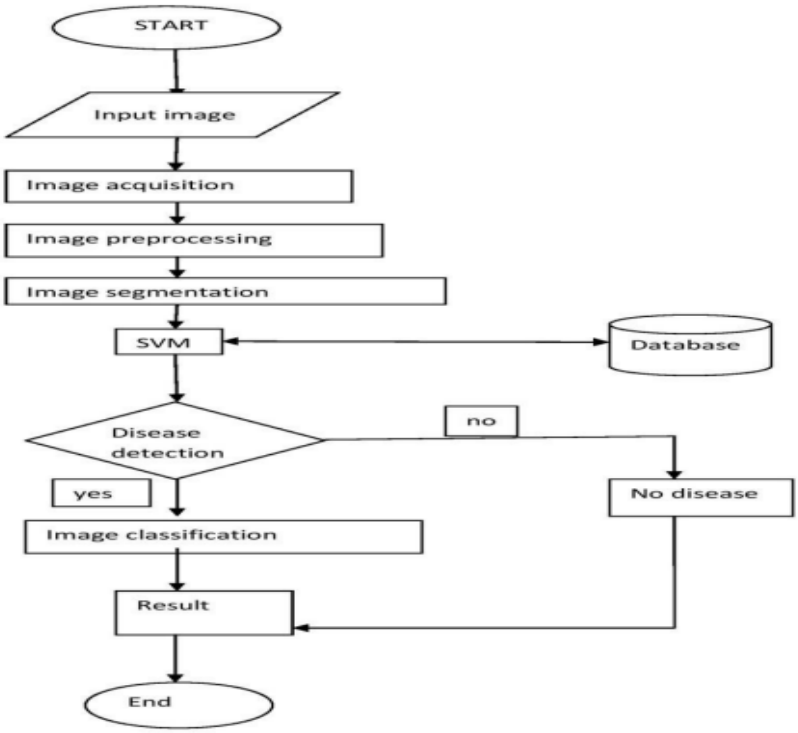
## 4.2 NON FUNCTIONAL REQUIREMENTS:

| Non-Functional Requirement | Description |
|---|---|
| Usability | Datasets of all the leaf is used to detecting the disease that present in the leaf. |
| Security | The information belongs to the user and leaf are secured highly. |

| | |
|---|---|
| Reliability | The leaf quality is important for the predicting the disease in leaf. |
| Performance | The performance is based on the quality of the leaf used for disease prediction. |
| Availability | It is available for all user to predict the disease in the plant |
| Scalability | Increasing the prediction of the disease in the leaf |

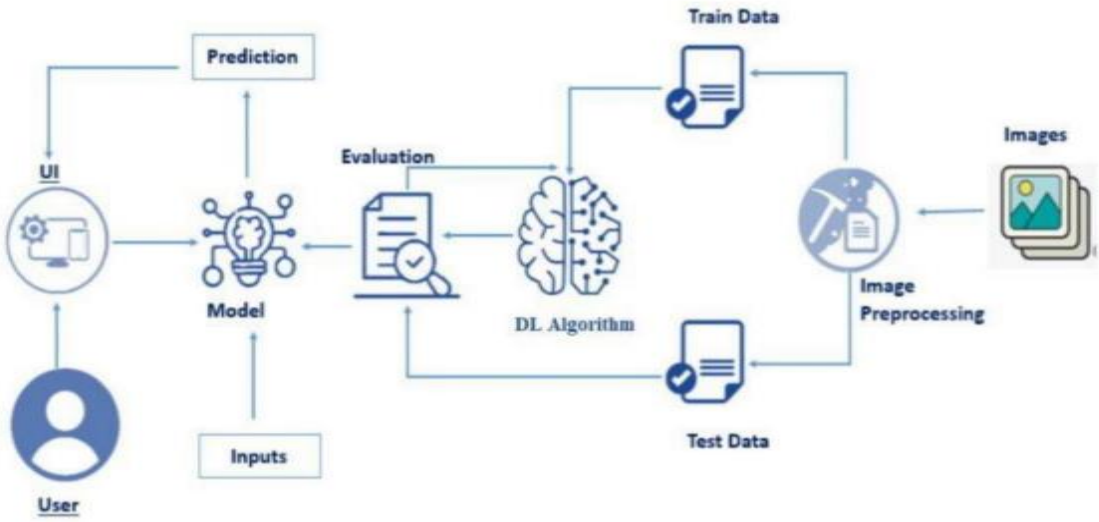
# 5.PROJECT DESIGN

## 5.1 DATA FLOW DIAGRAMS :

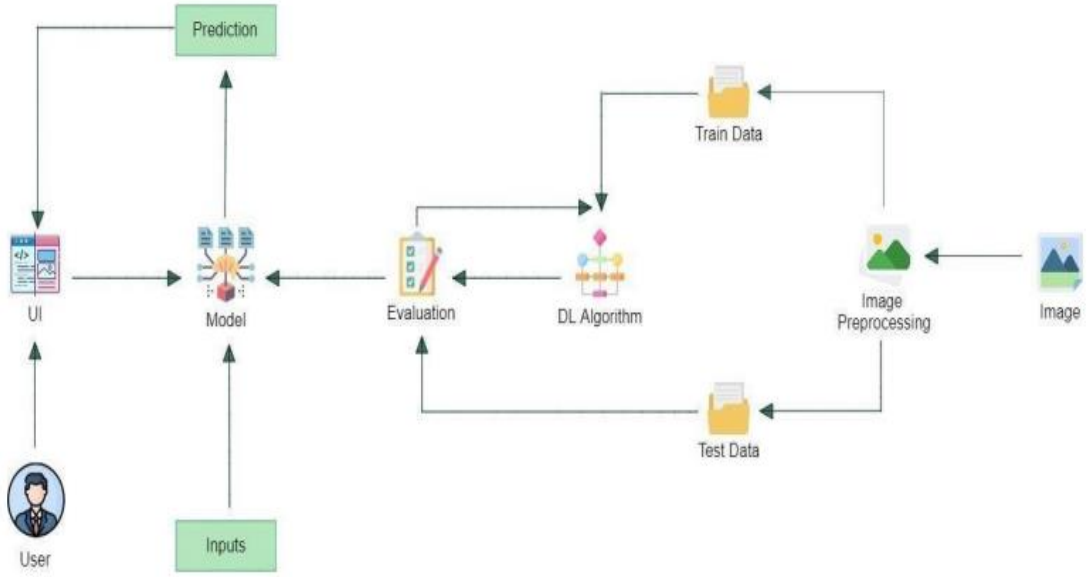



## 5.2 SOLUTION & TECHNICAL ARCHITECTURE :

Solution Architecture




Technical Architecture




## 5.3 USER STORIES :

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|---|---|---|---|---|---|---|
| Sprint-1 | Modelling Phase | USN-1 | As a customer I can understand the farmers problem..Because country side farmers face many problems such as finding the actual disease is quite difficult. | 3 | Medium | POOJITHA |
| Sprint-1 | | USN-2 | Data Collection-Collect the sample images of Disease affected leaves of different kind of varieties and unpredicted disease affected leaves. | 2 | Medium | NAVYA |
| Sprint-1 | | USN-3 | Image Preprocessing -Preprocess the collected Disease affected images such as rotating to grayscale,calling. | 3 | Low | VEMBU |
| Sprint-1 | | USN-4 | Train and test the collected dataset and to measure the accuracy of the dataset. | 4 | Medium | THARANI |
| Sprint-2 | | USN-5 | Model building-Create a CNN model for the image segmentation. | 5 | High | NAVYA |
| Sprint-2 | | USN-6 | Cnn model evaluation -Evaluvating the cnn model to check the accuracy and precision. | 3 | High | POOJITHA |
| Sprint-2 | Development Phase | USN-7 | SVM algorithm -Use of SVM is classifies the images and give 95% accuracy. | 5 | High | NAVYA |
| Sprint-2 | | USN-8 | Database creation for each dataset classes. | 3 | Medium | THARANI |

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|---|---|---|---|---|---|---|
| Sprint-2 | | USN-9 | User database creation for the user details. | 2 | Low | POOJITHA |
| Sprint-2 | | USN-10 | Description Page - It contains the details of predicting criteria and user guides. | 3 | Medium | NAVYA |
| Sprint-3 | | USN-11 | .Login Page - Login the user with phone number and email id. | 2 | Low | VEMBU |
| Sprint-3 | | USN-12 | IAM - Access via OTP or SSH key protection | 3 | Medium | THARANI |
| Sprint-3 | | USN-13 | Dashboard and Input page creation - Contains user profiles and predicting accuracy. Input page we can able to feed the input images. | 2 | Low | VEMBU |
| Sprint-3 | | USN-14 | Prediction page - Show the prediction based on the user input | 2 | Low | THARANI |
| Sprint-4 | Development Phase | USN-15 | Model Load – API creation using flask | 4 | Medium | POOJITHA |
| Sprint-4 | | USN-16 | Connecting User interface and backend API calls | 5 | High | VEMBU |
| Sprint-4 | Testing Phase | USN-17 | Deploy the application using IBM cloud | 5 | High | POOJITHA |
| Sprint-4 | | USN-18 | Test the application function to be working with high accuracy and low latency with reliable. | 5 | High | NAVYA |
| Sprint-4 | | USN-19 | Testing the application as a user all user interfaces will be working properly with check the prediction accuracy. | 5 | High | VEMBU |

# 6. PROJECT PLANNING AND SCHEDULING

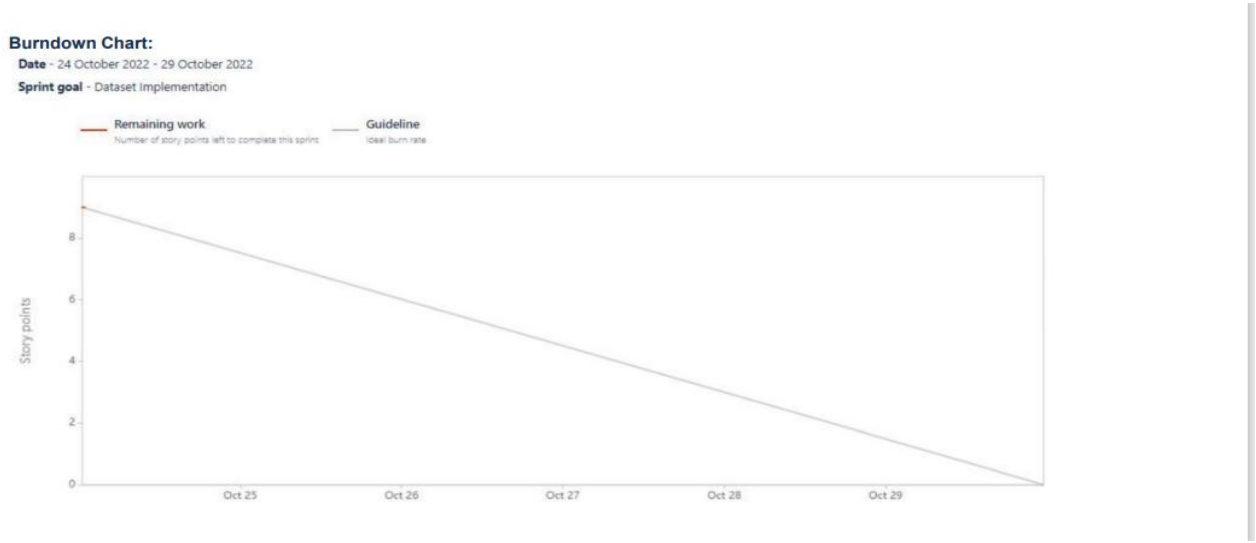
## 6.1 SPRINT PLANNING :

Phrase 1 : Requirement analysis and information collection
Phrase 2: Project planning and developing modules
Phrase 3:Implementing highly accurate algorithms
Phrase 4: Deploying the model on cloud and Testing the model

## 6.2 SPRINT DELIVERY SCHEDULE :

| Sprint | Story points | Duration | Start date | End date |
|---|---|---|---|---|
| Sprint 1 | 12 | 6 days | 24 Oct 2022 | 29 Oct 2022 |
| Sprint 2 | 21 | 4 days | 30 Nov 2022 | 02 Nov 2022 |
| Sprint 3 | 09 | 5 days | 03 Nov 2022 | 07 Nov 2022 |
| Sprint 4 | 24 | 5 days | 08 Nov 2022 | 12 Nov 2022 |

## 6.3 REPORTS FROM JIRA:




Velocity:

Sprint 1 average velocity: Average Velocity = 12 / 6 =2
Sprint 2 average velocity: Average Velocity = 21 / 4 = 5.2
Sprint 3 average velocity: Average Velocity = 09 / 5 = 1.8
Sprint 4 average velocity: Average Velocity = 24 / 5 = 4.8

# 7.CODING & SOLUTIONING

## 7.1 Feature 1 :

Images in the dataset are preprocessed to ensure efficiency and reliability.

## Code :

```
from keras.preprocessing.image import ImageDataGenerator
train_datagen = ImageDataGenerator (rescale = 1./255, shear_range= 0.2,zoom_range= 0.2, horizontal_flip = True)
test_datagen =ImageDataGenerator (rescale = 1)

x_train = train_datagen.flow_from_directory(r'C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Disease\fruit-dataset\fruit-dataset\train',target_size = (128,128), batch_size = 32, class_mode = 'categorical')
x_test = test_datagen.flow_from_directory(r'C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Disease\fruit-dataset\fruit-dataset\test',target_size = (128,128), batch_size = 32, class_mode = 'categorical')

Found 5384 images belonging to 6 classes.
Found 1686 images belonging to 6 classes.

x_train = train_datagen.flow_from_directory(r'C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Disease\Veg-dataset\Veg-dataset\train_set',target_size = (128,128), batch_size = 32, class_mode = 'categorical')
x_test = test_datagen.flow_from_directory(r'C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_ System_For_Disease_ Prediction\Dataset Plant Disease\Veg-dataset\Veg-dataset\test_set',target_size = (128,128), batch_size = 32, class_mode = 'categorical')

Found 11386 images belonging to 9 classes.
Found 3416 images belonging to 9 classes.
```

## 7.2 FEATURE 2 :

Histogram analysis is performed to identify all dimensions in image processing.

## Code :

```
import matplotlib.pyplot as plt
import numpy as np
```

```
from skimage.io import imread
I = imread('/content/23ea1618-d554-47fb-bc03-a1b978f14fbf___RS_HL 6008.JPG')
J = imread('/content/25de086c-ea7e-42b0-83fd-bc7d1e584d0a___RS_HL 5852.JPG')
plt.figure()
plt.subplot(121), plt.imshow(I)
plt.subplot(122), plt.imshow(J)
plt.show()
plt.figure(figsize=(10, 10))
plt.imshow(np.abs(I[:, :, 0].astype(float) - J[:, :, 0].astype(float)), cmap='gray')
plt.show()
d = imread('/content/23ea1618-d554-47fb-bc03-a1b978f14fbf___RS_HL 6008.JPG')
mask = imread('/content/25de086c-ea7e-42b0-83fd-bc7d1e584d0a___RS_HL 5852.JPG')
print(np.amin(d), np.amax(d))
print(np.amin(mask), np.amax(mask))
plt.figure(), plt.imshow(mask), plt.show()
mask = mask[:, :, 0]

maskInv = np.zeros_like(mask)
maskInv[mask == 0] = 255
maskInv[mask == 255] = 0
plt.figure(), plt.imshow(maskInv, cmap='gray'), plt.show()
```

# 8. TESTING

## 8.1 TEST CASES :

### Code :

```
 test_dir=r"C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_
System_For_Disease_ Prediction\Dataset Plant Disease\fruit-dataset\fruit-dataset\test"

 import tensorflow as tf
 from tensorflow import keras
 from tensorflow.keras.preprocessing.image import ImageDataGenerator
model =
tf.keras.models.load_model(r"C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_
System_For_Disease_ Prediction\Dataset Plant Disease\fruit.h5")
test_datagen_1=ImageDataGenerator(rescale=1)
test_generator_1=test_datagen_1.flow_from_directory(
    test_dir,
    target_size=(128,128),
    batch_size=20,
    class_mode='categorical'
)
  import numpy as np
from tensorflow.keras.models import load_model
```

```
from tensorflow.keras.preprocessing import imagei
img=image.load_img(r"C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_
System_For_Disease_ Prediction\Dataset Plant Disease\fruit-dataset\fruit-
dataset\train\Corn_(maize)___healthy\11c1e3ce-73d1-4338-8939-473087e9dcbb___R.S_HL
0604.JPG")
mg=image.load_img(r"C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_
System_For_Disease_ Prediction\Dataset Plant Disease\fruit-dataset\fruit-
dataset\train\Corn_(maize)___healthy\11c1e3ce-73d1-4338-8939-473087e9dcbb___R.S_HL
0604.JPG")
img
img=image.load_img(r"C:\Users\POOJITHA\Downloads\Fertilizers_Recommendation_
System_For_Disease_ Prediction\Dataset Plant Disease\fruit-dataset\fruit-
dataset\train\Corn_(maize)___healthy\11c1e3ce-73d1-4338-8939-473087e9dcbb___R.S_HL
0604.JPG",target_size=(128,128))
x=image.img_to_array(img)
x=np.expand_dims(x,axis=0)
y=np.argmax(model.predict(x),axis=1)
index=['Apple___Black_rot', 'Apple___healthy', 'Corn_(maize)___healthy',
'Corn_(maize)___Northern_Leaf_Blight', 'Peach___Bacterial_spot', 'Peach___healthy']
index[y[0]]
model.evaluate(test_generator_1,steps=50)
```

TEST CASES :

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Date | 05-Nov-22 | | | | | | | | |
| | | | | Team ID | PNT2022TMID25783 | | | | | | | | |
| | | | | Project Name | Facilitating Recommendation Sys | | | | | | | | |
| | | | | Maximum Marks | 4 marks | | | | | | | | |
| | Test case ID | Feature Type | Comp | Test Scenario | Pre-Requisite | Steps To Execute | Test Data | Expected Result | Actual | St | Comments | TC for | BU G | Executed By |
| 6 | LoginPage_TC_001 | Functional | Home Page | Verify user is able to see the Login/Signup popup when user clicked on My account button | Email/LinkedIN | 1.Enter URL and click go<br>2.Click on My Account drop-down button<br>3.Verify login/Signup popup displayed or not | https://zhapenzer.com/ | Login/Signup popup should display | Working as expected | Pass | | | | NAVYA |
| 7 | LoginPage_TC_002 | UI | Home Page | Verify the UI elements in Login/Signup popup | Html Page for Registration | 1.Enter URL and click go<br>2.Click on My Account drop-down button<br>3.Verify login/Signup popup with below UI elements:<br>a.email text box<br>b.password text box<br>c.Login button<br>d.New customer? Create account link<br>e.Lost password? Recovery password link | https://zhapenzer.com/ | Application should show below UI elements:<br>a.email text box<br>b.password text box<br>c.Login button with orange colour<br>d.New customer? Create account link<br>e.Lost password? Recovery password link | Working as expected | Fail | Steps are not clear to follow | | BUG-1234 | Pavithra |
| 8 | LoginPage_TC_003 | Functional | Home page | Verify user is able to log into application with Valid credentials | Authentication Security | 1.Enter URL(https://zhapenzer.com/) and click go<br>2.Click on My Account drop-down button<br>3.Enter Valid username/email in Email text box<br>4.Enter valid password in password text box<br>5.Click on login button | Username: chalam@gmail.com<br>password: Tertinq123 | User should navigate to user account homepage | Working as expected | Pass | | | | Pavithra |
| 9 | LoginPage_TC_004 | Functional | Login page | Verify user is able to log into application with InValid credentials | Authentication Security | 1.Enter URL(https://zhapenzer.com/) and click go<br>2.Click on My Account drop-down button<br>3.Enter InValid username/email in Email text box<br>4.Enter valid password in password text box<br>5.Click on login button | Username: chalam@gmail<br>password: Tertinq123 | Application should show 'Incorrect email or password' validation message. | Working as expected | Pass | | | | Tharani |
| 10 | LoginPage_TC_004 | Functional | Login page | Verify user is able to log into application with InValid credentials | Authentication Security | 1.Enter URL(https://zhapenzer.com/) and click go<br>2.Click on My Account drop-down button<br>3.Enter Valid username/email in Email text box<br>4.Enter Invalid password in password text box<br>5.Click on login button | Username: chalam@gmail.com<br>password: Tertinq123678678678678876 | Application should show 'Incorrect email or password' validation message. | Working as expected | Pass | | | | Vembudharrini |

## 8.2 USER ACCEPTANCE TESTING :

### Defect Analysis :

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|---|---|---|---|---|---|
| By Design | 10 | 4 | 2 | 3 | 20 |
| Duplicate | 1 | 0 | 3 | 0 | 4 |
| External | 2 | 3 | 0 | 1 | 6 |
| Fixed | 11 | 2 | 4 | 20 | 37 |
| Not Reproduced | 0 | 0 | 1 | 0 | 1 |
| Skipped | 0 | 0 | 1 | 1 | 2 |
| Won't Fix | 0 | 5 | 2 | 1 | 8 |
| Totals | 24 | 14 | 13 | 26 | 77 |

### Test Case Analysis :

This report shows the number of test cases that have passed, failed, and untested

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| Print Engine | 7 | 0 | 0 | 7 |
| Client Application | 51 | 0 | 1 | 50 |
| Security | 2 | 0 | 0 | 2 |
| Outsource Shipping | 3 | 0 | 0 | 3 |
| Exception Reporting | 9 | 0 | 0 | 9 |
| Final Report Output | 4 | 0 | 0 | 4 |
| Version Control | 2 | 0 | 0 | 2 |

# 9.RESULTS

## 9.1 PERFORMANCE METRICS :

## Model Summary :

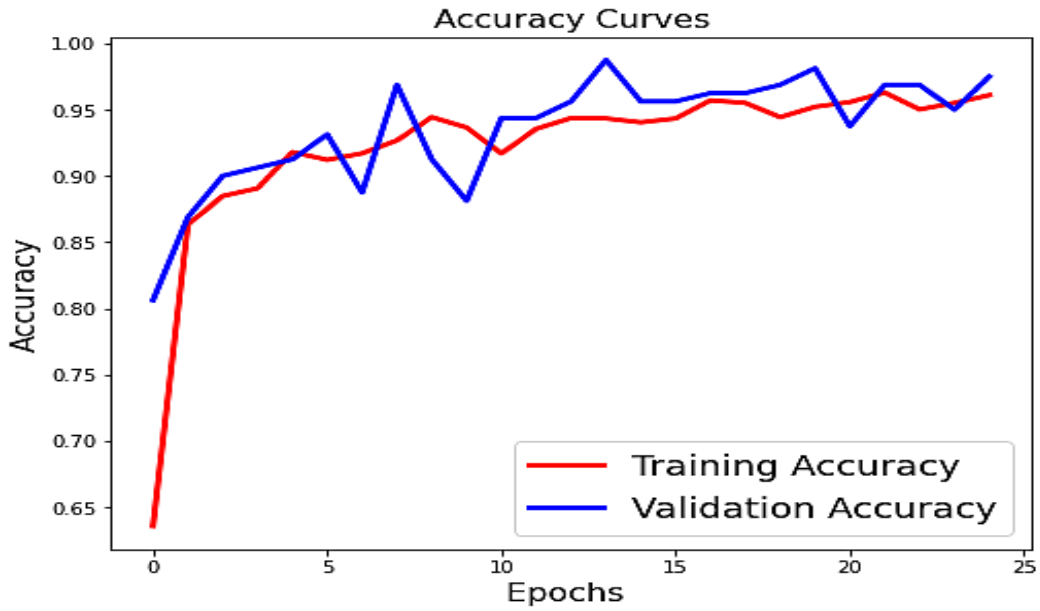
```
[54] test_score = model.evaluate_generator(testing_generator, batch_size)

     print("[INFO] accuracy: {:.2f}%".format(test_score[1] * 100))
     print("[INFO] Loss: ",test_score[0])

     /usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: UserWarning: `Model.eval
       """Entry point for launching an IPython kernel.
     [INFO] accuracy: 99.71%
     [INFO] Loss:  0.015788547694683075
```

## Values :

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:47: UserWarning: `Model.predict_generator` is deprecated
Confusion Matrix
Normalized confusion matrix
Classification Report
```

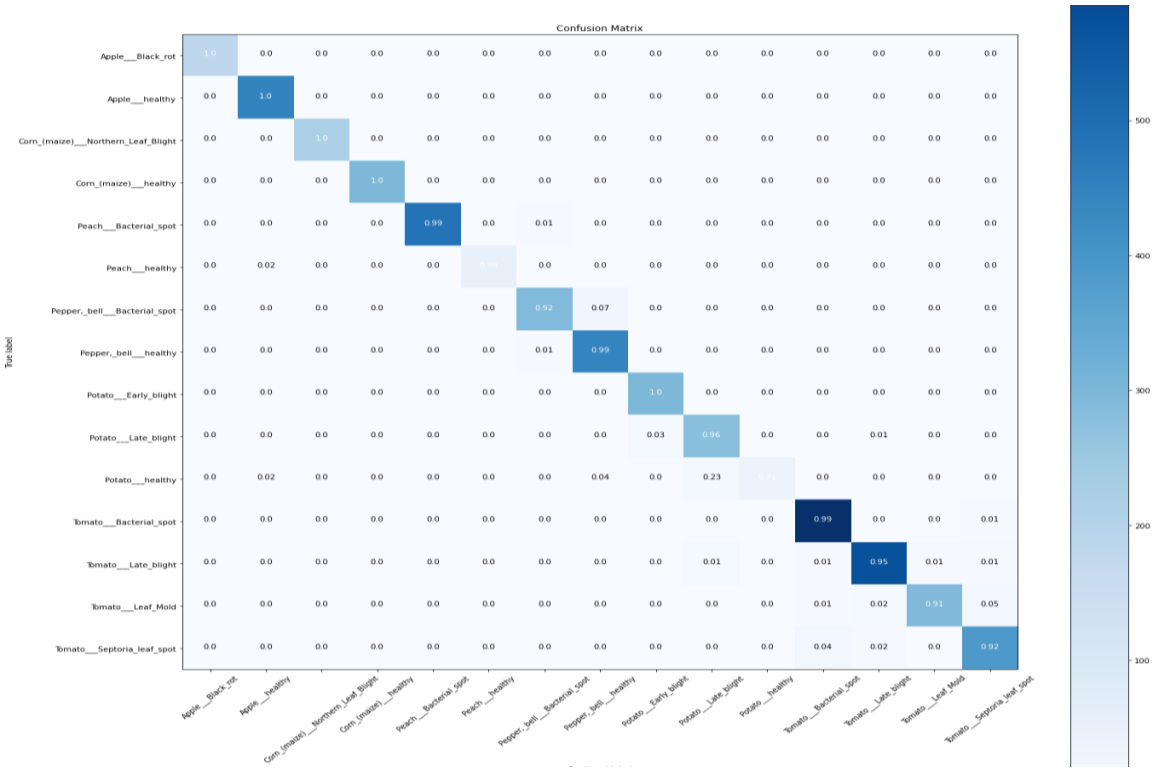
| | precision | recall | f1-score | support |
|---|---|---|---|---|
| Apple___Black_rot | 0.98 | 1.00 | 0.99 | 181 |
| Apple___healthy | 0.99 | 1.00 | 1.00 | 445 |
| Corn_(maize)___Northern_Leaf_Blight | 1.00 | 1.00 | 1.00 | 217 |
| Corn_(maize)___healthy | 1.00 | 1.00 | 1.00 | 301 |
| Peach___Bacterial_spot | 0.99 | 0.99 | 0.99 | 493 |
| Peach___healthy | 1.00 | 0.98 | 0.99 | 49 |
| Pepper,_bell___Bacterial_spot | 0.97 | 0.92 | 0.94 | 317 |
| Pepper,_bell___healthy | 0.94 | 0.99 | 0.97 | 448 |
| Potato___Early_blight | 0.96 | 1.00 | 0.98 | 300 |
| Potato___Late_blight | 0.92 | 0.96 | 0.94 | 290 |
| Potato___healthy | 0.97 | 0.71 | 0.82 | 52 |
| Tomato___Bacterial_spot | 0.96 | 0.99 | 0.97 | 667 |
| Tomato___Late_blight | 0.96 | 0.95 | 0.96 | 599 |
| Tomato___Leaf_Mold | 0.96 | 0.91 | 0.94 | 322 |
| Tomato___Septoria_leaf_spot | 0.94 | 0.92 | 0.93 | 421 |
| accuracy | | | 0.97 | 5102 |
| macro avg | 0.97 | 0.95 | 0.96 | 5102 |
| weighted avg | 0.97 | 0.97 | 0.97 | 5102 |

Accuracy :




Training accuracy : 0.95
Validation accuracy : 0.98

Model Confusion Matrix :




# 10.ADVANTAGES & DISADVANTAGES

## ADVANTAGES :

- The Proposed model here produces very high accuracy of classification.
- Very large datasets can also be trained and tested.
- Images of very high can be resized within the proposed itself.

## DISADVANTAGES :

- For training and testing , computational time is a little high.
- The neural network architecture used in this project work is complex.

# 11.CONCLUSION

The model proposed here involves image classification of fruit datasets and vegetable datasets. The following points are observed during model testing and training:

●The accuracy of Classification increased by increasing the number of epochs.

●For different batch sizes, different classification accuracies are obtained.

●The accuracies are increased by increasing more convolution layers.

●The accuracy of classification also increased by varying dense layers.

●Different accuracies are obtained by varying the size of kernel used in the convolution layer output.

●Accuracies are different while varying the size of the train and test dataset.

## 12.FUTURE SCOPE

This further research is implementing the proposed algorithm with the existing public datasets.Also, various segmentation algorithms can be implemented to improve accuracy. The proposed algorithm can be modified further to identify the disease that affects the various other plant organs such as stems and fruits.

## 13.APPENDIX

### SOURCE CODE :

### Python Code

### app.py

```
import requests
from tensorflow.keras.preprocessing import image
from tensorflow.keras.models import load_model
import numpy as np
import pandas as pd
import tensorflow as tf
from flask import Flask, request, render_template, redirect, url_for
import os
from werkzeug.utils import secure_filename
from tensorflow.python.keras.backend import set_session
app = Flask(__name__)
```

```
#load both the vegetable and fruit models
model = load_model("vegetable.h5")
model1=load_model("fruit.h5")

#home page
@app.route('/')
def home():
    return render_template('home.html')

#prediction page
@app.route('/prediction')
def prediction():
    return render_template('predict.html')

@app.route('/predict',methods=['POST'])
def predict():
    if request.method == 'POST':
        # Get the file from post request
        f = request.files['image']

        # Save the file to ./uploads
        basepath = os.path.dirname(__file__)
        file_path = os.path.join(
            basepath, 'uploads', secure_filename(f.filename))
        f.save(file_path)
        img = image.load_img(file_path, target_size=(128, 128))

        x = image.img_to_array(img)
        x = np.expand_dims(x, axis=0)

        plant=request.form['plant']
        print(plant)
```

```
        if(plant=="vegetable"):
            preds = model.predict(x)
            preds=np.argmax(preds)
            print(preds)
            df=pd.read_excel('precautions - veg.xlsx')
            print(df.iloc[preds]['caution'])
        else:
            preds = model1.predict(x)
            preds=np.argmax(preds)
            df=pd.read_excel('precautions - fruits.xlsx')
            print(df.iloc[preds]['caution'])
        return df.iloc[preds]['caution']
if __name__ == "__main__":
    app.run(debug=False)
```

HTML CODE :

home.html

```
<!DOCTYPE html>
<html >

<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <title>       Plant Disease Prediction</title>
  <link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet'
type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet'
type='text/css'>
<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet'
type='text/css'>
```

```
<link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300'
rel='stylesheet' type='text/css'>
<link rel="stylesheet" href="{{ url_for('static', filename='css/style.css') }}">
<link href='https://fonts.googleapis.com/css?family=Merriweather'
rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Josefin Sans' rel='stylesheet'>
<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>
<style>
.header {
                        top:0;
                        margin:0px;
                        left: 0px;
                        right: 0px;
                        position: fixed;
                        background-color: #28272c;
                        color: white;
                        box-shadow: 0px 8px 4px grey;
                        overflow: hidden;
                        padding-left:20px;
                        font-family: 'Josefin Sans';
                        font-size: 2vw;
                        width: 100%;
                        height:8%;
                        text-align: center;
                }
                .topnav {
  overflow: hidden;
  background-color: skyblue;
}

.topnav-right a {
  float: left;
  color: #f2f2f2;
```

```
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
  font-size: 18px;
}

.topnav-right a:hover {
  background-color: #ddd;
  color: black;
}

.topnav-right a.active {
  background-color: #565961;
  color: white;
}

.topnav-right {
  float: right;
  padding-right:100px;
}

body {

  background-color:#ffffff;
  background-repeat: no-repeat;
  background-size:cover;
  background-position: 0px 0px;
  }
  .button {
  background-color: #28272c;
  border: none;
  color: white;
  padding: 15px 32px;
```

```
  text-align: center;
  text-decoration: none;
  display: inline-block;
  font-size: 16px;
  border-radius: 12px;
}
.button:hover {
  box-shadow: 0 12px 16px 0 rgba(0,0,0,0.24), 0 17px 50px 0 rgba(0,0,0,0.19);
}
form {border: 3px solid #f1f1f1; margin-left:400px;margin-right:400px;}

input[type=text], input[type=password] {
  width: 100%;
  padding: 12px 20px;
  display: inline-block;
  margin-bottom:18px;
  border: 1px solid #ccc;
  box-sizing: border-box;
}

button {
  background-color: #28272c;
  color: white;
  padding: 14px 20px;
  margin-bottom:8px;
  border: none;
  cursor: pointer;
  width: 15%;
  border-radius:4px;
}

button:hover {
  opacity: 0.8;
```

```
}

.cancelbtn {
  width: auto;
  padding: 10px 18px;
  background-color: #f44336;
}

.imgcontainer {
  text-align: center;
  margin: 24px 0 12px 0;
}

img.avatar {
  width: 30%;
  border-radius: 50%;
}

.container {
  padding: 16px;
}

span.psw {
  float: right;
  padding-top: 16px;
}

/* Change styles for span and cancel button on extra small screens */
@media screen and (max-width: 300px) {
  span.psw {
     display: block;
     float: none;
  }
```

```
  .cancelbtn {
     width: 100%;
  }
}

.home{
        margin:80px;

  width: 84%;
  height: 500px;
  padding-top:10px;
  padding-left: 30px;

}
.login{
        margin:80px;
        box-sizing: content-box;
  width: 84%;
  height: 420px;
  padding: 30px;
  border: 10px solid blue;
}
.left,.right{
 box-sizing: content-box;
 height: 400px;
 margin:20px;
 border: 10px solid blue;
}

.mySlides {display: none;}
img {vertical-align: middle;}

/* Slideshow container */
```

```
.slideshow-container {
  max-width: 1000px;
  position: relative;
  margin: auto;
}

/* Caption text */
.text {
  color: #f2f2f2;
  font-size: 15px;
  padding: 8px 12px;
  position: absolute;
  bottom: 8px;
  width: 100%;
  text-align: center;
}
/* The dots/bullets/indicators */
.dot {
  height: 15px;
  width: 15px;
  margin: 0 2px;
  background-color: #bbb;
  border-radius: 50%;
  display: inline-block;
  transition: background-color 0.6s ease;
}

.active {
  background-color: #717171;
}

/* Fading animation */
.fade {
```

```
  -webkit-animation-name: fade;
  -webkit-animation-duration: 1.5s;
  animation-name: fade;
  animation-duration: 1.5s;
}

@-webkit-keyframes fade {
  from {opacity: .4}
  to {opacity: 1}
}

@keyframes fade {
  from {opacity: .4}
  to {opacity: 1}
}

/* On smaller screens, decrease text size */
@media only screen and (max-width: 300px) {
  .text {font-size: 11px}
}
</style>
</head>

<body style="font-family:'Times New Roman', Times, serif;background-
color:#C2C5A8;">

<div class="header">
 <div style="width:50%;float:left;font-size:2vw;text-align:left;color:white;
padding-top:1%">Plant Disease Prediction</div>
  <div class="topnav-right"style="padding-top:0.5%;">

    <a class="active" href="{{ url_for('home')}}">Home</a>
```

```
    <a href="C:\Users\POOJITHA\OneDrive\Documents\Predict.html"
class="button">Predict</button></a>
  </div>
</div>

<div style="background-color:#ffffff;">
<div style="width:60%;float:left;">
<div style="font-size:50px;font-family:Montserrat;padding-left:20px;text-
align:center;padding-top:10%;">
<b>Know Your Plant!</b></div><br>
<div style="font-size:20px;font-family:Montserrat;padding-left:70px;padding-
right:30px;text-align:justify;">Agriculture was the essential development in the
rise of human
  civilization, whereby farming of acclimatize species produced food oversupply
that enabled people to reside in cities.
  Plants were independently sophisticated in at least 11 regions of the world.
Industrial agriculture based on large-scale monocropping in the twentieth century
came to influence agricultural output, though
  about 2 billion people still depended on maintaining agriculture.The plant
diseases effect the production. Identification of diseases and taking necessary
precautions is all done through naked eye, which requires labour and laboratries.
This application helps farmers in detecting the diseases by observing the spots on
the leaves, which inturn saves effort and labor costs.</div><br><br>
</div>
</div>
<div style="width:40%;float:right;"><br><br>
<img src="C:\Users\POOJITHA\Downloads\leaves.jpeg"style="max-
height:200%;max-width:200%;">

</div>
</div>

<div class="home">
```

```
<br>

</div>

<script>
var slideIndex = 0;
showSlides();

function showSlides() {
  var i;
  var slides = document.getElementsByClassName("mySlides");
  var dots = document.getElementsByClassName("dot");
  for (i = 0; i < slides.length; i++) {
    slides[i].style.display = "none";
  }
  slideIndex++;
  if (slideIndex > slides.length) {slideIndex = 1}
  for (i = 0; i < dots.length; i++) {
    dots[i].className = dots[i].className.replace(" active", "")
  }
}
</script>
</body>
</html>
```

predict.html :

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>predict</title>
</head>
```

```
<style>
   .container{
      display: flex;
      padding: 60px 70px 60px 70px;
   }
   .card{
      padding: 70px 80px 70px 80px;
   }
   .menu{
      padding: 10px 10px 10px 10px;
      background-color: black;
      color: white;
      font-size: 15pt;
   }
</style>
<body>
   <div class="menu">
      <ul ><li>Plant disease Prediction</li></ul></div>
   <div class="container">
      <img src="C:\Users\POOJITHA\Downloads\Fields.jpeg">
      <div class="card">
      <form>
         <h1>Drop in the image to get the Prediction </h1><br><br>
         <label><select name="Fruit" id="plant">
            <option value="fruit" id="fruit">Fruit</option>
            <option value="vagitable" id="vig">vegitable</option>
            </select>
         </label><br><br><br>
         <input  id="default-btn" type="file" name=""
onchange="document.getElementById('output').src=window.URL.createObjectUR
L(this.files[0])"><br><br><br>
         <img src="" id="output">
```

```
        <br><button id="button" onclick ="display()" >Predict!</button></br>
    </form>
</body>
</html>
```

DATE SET LINK :

https://drive.google.com/file/d/1fxs7ptI6zh7NTbCOZARKZ7AmYKjnprrY/view?usp=sharing

FLASK FILES :

https://drive.google.com/drive/folders/1C0Qu-O8T-zZPO7scXTdUDzs8-vzNC-ge

GitHub LINK :

https://github.com/IBM-EPBL/IBM-Project-34603-1660239698

DEMO VIDEO LINK :

https://drive.google.com/drive/u/0/folders/1M7q068LcdA6CoEsRpljTBmPQleO8kK0U