



Fertilizers Recommendation System for Disease Prediction

IBM

PROJECT REPORT

Submitted by

TEAM ID : PNT2022TMID46485

LAVANYA M(820619104024)

PRIYADHARSHINI S(820619104042)

SUBALAKSHIMI K(820619104059)

SWATHI J(820619104062)

*In partial fulfillment for the award of the
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BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE AND ENGINEERING

**ARASU ENGINEERING COLLEGE,
KUMBAKONAM**

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1.INTRODUCTION

Overview In this project, two datasets elements fruit dataset and vegetable dataset are collected. To gathered datasets are trained and tested with deep learning neural network named Convolutional Neural Networks (CNN). First, the fruit dataset is trained and then tested with CNN. Second, the vegetable dataset is trained and tested. The software used for training and testing of datasets is Python. All the Python codes are first written in Jupyter notebook supplied along with Anaconda Python and then the codes are tested in IBM cloud. Finally, a web- based framework is designed with help Flask a Python library. There are 2 html files are created in templates folder along with their associated files in HTML folder. The Python program 'App.py' used to interface with these two web pages is written in Spyder-Anaconda python and tested.

Purpose,This project is used to test the fruits and vegetables samples and identify the different diseases. Also, this project recommends fertilizers for predicted diseases.

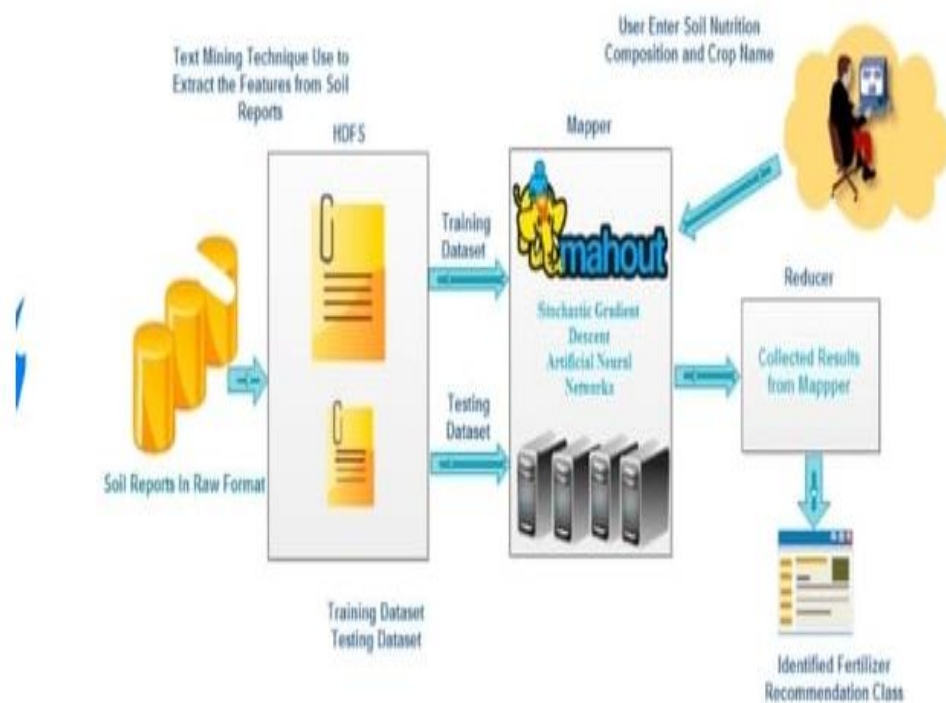
2.LITERATURE SURVEY

Existing problem should proposed a 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. It proposed a simple prediction method for soil-based fertilizer recommendation system for predicted crop diseases. This method gives less accuracy and prediction. IoT based system for leaf disease detection and fertilizer recommendation which is based on Machine Learning techniques yields less 85 percentage accuracies. NN (Neural Network) Based Fertilizers Recommendation System For Disorder Classification. This methodology requires experts who can recognize varieties in leaf shading. Ordinarily a similar malady is characterized by a few specialists as a

different sickness. This arrangement is exorbitant, in light of the fact that it requires nonstop expert management

Agriculture is the most important sector in today's life. Most of the plants are affected by a wide variety of bacterial and fungal diseases. In agricultural aspects, if the plant is affected by leaf disease then it reduces the growth and productiveness. Generally, the plant diseases are caused by the abnormal physiological functionalities of plants

3.IDEATION & PROPOSED SOLUTION



Fertilizer Recommendation System.

Empathy map



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 🕒 10 minutes to prepare
- 🕒 1 hour to collaborate
- 👥 2-8 people recommended

[Share template feedback](#)



Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes



Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.



Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.



Learn how to use the facilitation tools

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) →

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

Fertilizer
Recommendation
System For Disease
Prediction
This may helpful to
avoid and control the
disease while using
the fertilizer



Key rules of brainstorming

To run an smooth and productive session



Stay in topic.



Encourage wild ideas.



Defer judgment.



Listen to others.



Go for volume.



If possible, be visual.



Need some inspiration?

See a finished version of this template to kickstart your work.

[Open example](#) →

Brainstorm & idea prioritization

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

TIP

You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!

KEERTHIVASAN K

Machine Learning based Recommendation System	CRAB Prediction Model: Obstacle Detection System	A Hybrid Approach to Sequence Classification: Study
Managerial Skills of Governmental Policies: Critical Issues in India	Real Time Data Classification using Edge Computing and Deep Learning	The impact of social media on the mental health of adolescents

KARTHI M

An AI Based System Design for Disaster Risk Monitoring and Prediction	Automated system for the detection and classification of the forest fire using deep learning	Self-supervised learning for the detection of the forest fire using deep learning
A System Model for Monitoring and Detection of the Forest Fire using Deep Learning	Deep learning for the detection and classification of the forest fire using deep learning	An AI Based System Design for Disaster Risk Monitoring and Prediction

MANICKA VASAKAR G

Deep learning for the detection and classification of the forest fire using deep learning	Automated system for the detection and classification of the forest fire using deep learning	Self-supervised learning for the detection of the forest fire using deep learning
Deep learning for the detection and classification of the forest fire using deep learning	Automated system for the detection and classification of the forest fire using deep learning	Self-supervised learning for the detection of the forest fire using deep learning

SABARI K

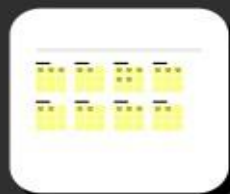
Deep learning for the detection and classification of the forest fire using deep learning	Automated system for the detection and classification of the forest fire using deep learning	Self-supervised learning for the detection of the forest fire using deep learning
Deep learning for the detection and classification of the forest fire using deep learning	Automated system for the detection and classification of the forest fire using deep learning	Self-supervised learning for the detection of the forest fire using deep learning

Person 5

Person 6

Person 7

Person 8



the same page about what's important moving
n this grid to determine which ideas are important and

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

Edge
computing
may also
used for the
project

Fertilizer
Recommendation
System For
Disease Prediction
using IOT Internet
Of Things

Deep learning
technology used
for the fertilizer
recommendation
predicting
system

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H** key on the keyboard.

While using in
Machine Learning
we can use the
topic Fertilizer
Recommendation
System For
Disease Prediction

Fertilizer
Recommendation
System For
Disease Prediction
using Artificial
Intelligence



Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)



3

Group ideas
 Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

20 minutes

TIP
 Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

→

After you collaborate
 You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons

A
Share the mural
 Share a **view link** to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B
Export the mural
 Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint
 Define the components of a new idea or strategy.
[Open the template →](#)

Customer experience journey map
 Understand customer needs, motivations, and obstacles for an experience.
[Open the template →](#)

Strengths, weaknesses, opportunities & threats
 Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.
[Open the template →](#)

[Share template feedback](#)

→

→

Proposed Solution

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	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.
2	Idea / Solution description	Develop an website for an farmers
3	Novelty / Uniqueness	The major agricultural products in India are rice, wheat, pulses, and spices. As our population is increasing rapidly the demand for agriculture products also increasing alarmingly. A huge amount of data are incremented from various field

- Social Impact / Customer Satisfaction - The project helps us to know about what type of disease were attacked in our plants how to recover using fertilizers are the main concept.
- Business Model (Revenue Model) - Increasing demand for agricultural production owing to the growing population. Widening information management systems as well as new advanced technologies adoption for improving crop productivity.
- Scalability of the Solution - These tools are improving information about soils and vegetation that forms the basis for investments in management actions, provides early warning of pest and disease outbreaks, and facilitates the selection of sustainable cropland management practices.

Problem Solution fit

Agriculture is one field which has a high impact on life and economic status of human beings. Improper management leads to loss in agricultural products. Farmers lack the knowledge of disease and hence they produce less production. Farmers are unable to explain disease properly on call need to analysis the image of affected area of disease. Though, images and videos of crops provide better view and agro scientists can provide a better solution to resolve the issues related to healthy crop yet it not been informed to farmers. It is required to note that if the productivity of the crop is not healthy, it has high risk of providing good and healthy nutrition. Due to the improvement and development in technology where devices are smart enough to recognize and detect plant diseases. Recognizing illness can prompt faster treatment in order to lessen the negative impacts on harvest. This paper therefore focus upon plant disease detection using image processing approach. This work utilizes an open dataset of pictures of unhealthy and

solid plants, where convolution system and semi supervised techniques are used to characterize crop species and detect the sickness. Farmers can interact with portal build interact with user interface to upload images of diseases leaf the image will be processing and train data to the algorithm. These types of algorithm may evaluate the processing of image and predict to the user interface.

4. REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENT

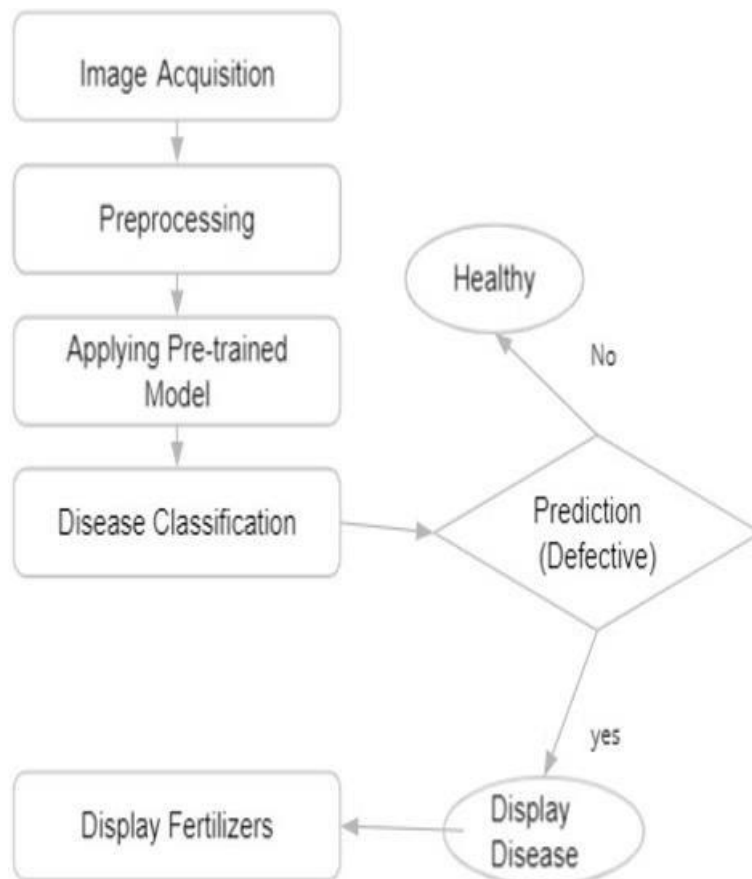
FR-1	User registration	Registration through form Registration through Gmail
FR-2	User confirmation	Confirmation via OTP Confirmation via Email
FR-3	Capturing image	Capture the image of the leaf And check the parameter of the captured image .
FR-4	Image processing	Upload the image for the prediction of the disease in the leaf.
FR-5	Leaf identification	Identify the leaf and predict the disease in leaf.
FR-6	Image description	Suggesting the best fertilizer for the disease.

NON FUNCTIONAL REQUIREMENT

NFR.NO	Nonfunction requirement	Description
NFR-1	Usability	Datasets of all the leaf is used to detecting the disease that present in the leaf.
NFR-2	Security	The information belongs to the user and leaf are secured highly.
NFR-3	Reliability	The leaf quality is important for the predicting the disease in leaf.
NFR-4	Performance	The performance is based on the quality of the leaf used for disease prediction
NFR-5	Availability	It is available for all user to predict the disease in the Plant
NFR-6	Scalability	Increasing the prediction of the disease in the leaf

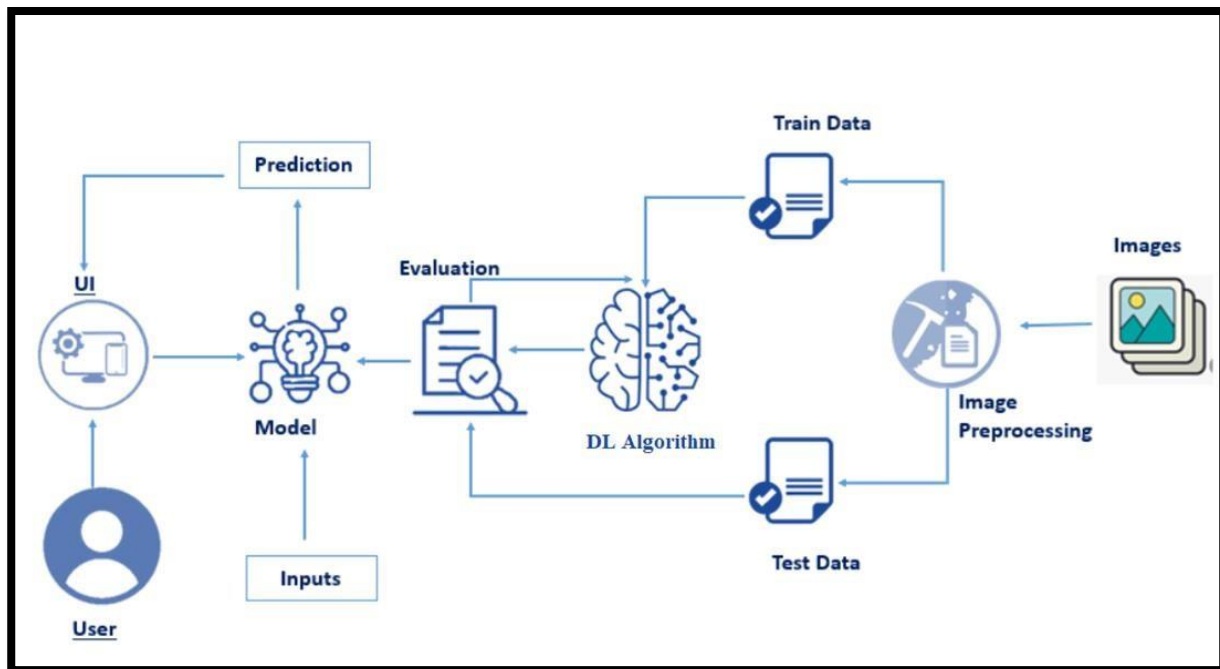
5. PROJECT DESIGN

Data Flow Diagrams



Solution & Technical Architecture

From this technical architecture and solution the user can take the picture of an image and the image will be processing the data the train data and test data are should be using in AI algorithm .The evaluated image could be predict the disease and gives an solution for the attacked leaf.



User Stories

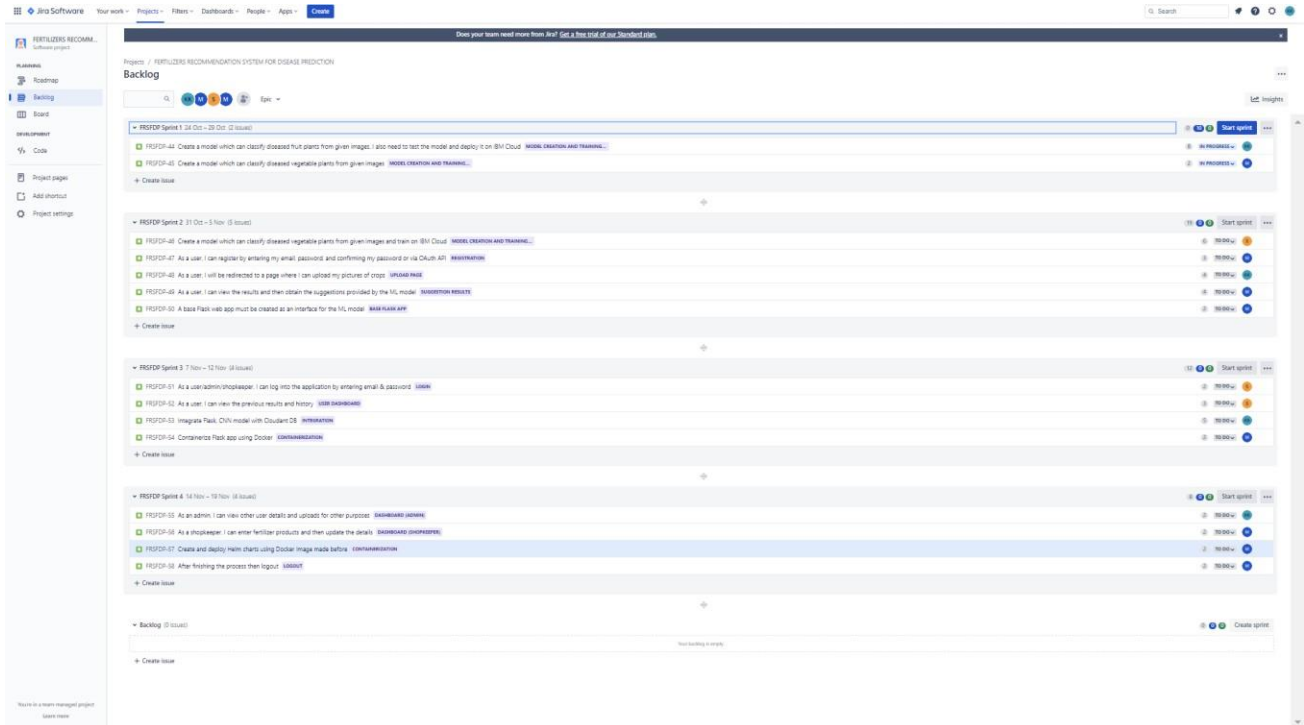
The user can register in the account and may use mail id and password to login the page and make useful for farmers. The image can be processed and data should be held by it. If you predict the images can be taken as a photo and predict button should be made. Then the prediction will appear. If the leaf is healthy it shows healthy. If the leaf is not healthy it shows the prediction for fertilizer.

6. PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points (Total)	Priority	Team Members
Sprint-1	Model Creation and Training (Fruits)	FRSFDP-44	Create a model which can classify diseased fruitplants from given images. I also need to test the model and deploy it on IBM Cloud	8	High	Lavanya
	Model Creation and Training (Vegetables)	FRSFDP-45	Create a model which can classify diseased vegetable plants from given images	2	Medium	Priyadharshini

Sprint-2	Model Creation and Training (Vegetables)	FRSFDP-46	Create a model which can classify diseased vegetable plants from given images and train on IBM Cloud	6	High	Subalakshmi
	Registration	FRSFDP-47	As a user, I can register by entering my email, password, and confirming my password or via OAuth API	3	High	Swathi
	Upload page	FRSFDP-48	As a user, I will be redirected to a page where I can upload my pictures of crops	4	High	Lavanya
	Suggestion results	FRSFDP-49	As a user, I can view the results and then obtain the suggestions provided by the ML model	4	High	Priya dharshini
	Base Flask App	FRSFDP-50	A base Flask web app must be created as an interface for the ML model	2	High	Lavanya
Sprint-3	Login	FRSFDP-51	As a user/admin/shopkeeper, I can log into the application by entering email & password	2	High	Subalakshmi
	User Dashboard	FRSFDP-52	As a user, I can view the previous results and history	3	Medium	priyadharshini
	Integration	FRSFDP-53	Integrate Flask, CNN model with Cloudant DB	5	Medium	Swathi
	Containerization	FRSFDP-54	Containerize Flask app using Docker	2	Low	Swathi
Sprint-4	Dashboard (Admin)	FRSFDP-55	As an admin, I can view other user details and uploads for other purposes	2	Medium	lavanya
	Dashboard (Shopkeeper)	FRSFDP-56	As a shopkeeper, I can enter fertilizer products and then update the details	2	Low	Priya dharshini
	Containerization	FRSFDP-57	Create and deploy Helm charts using Docker Image made before	2	Low	Lavanya
	Logout	FRSFDP-58	After finishing the process then logout	2	Low	Subalakshmi

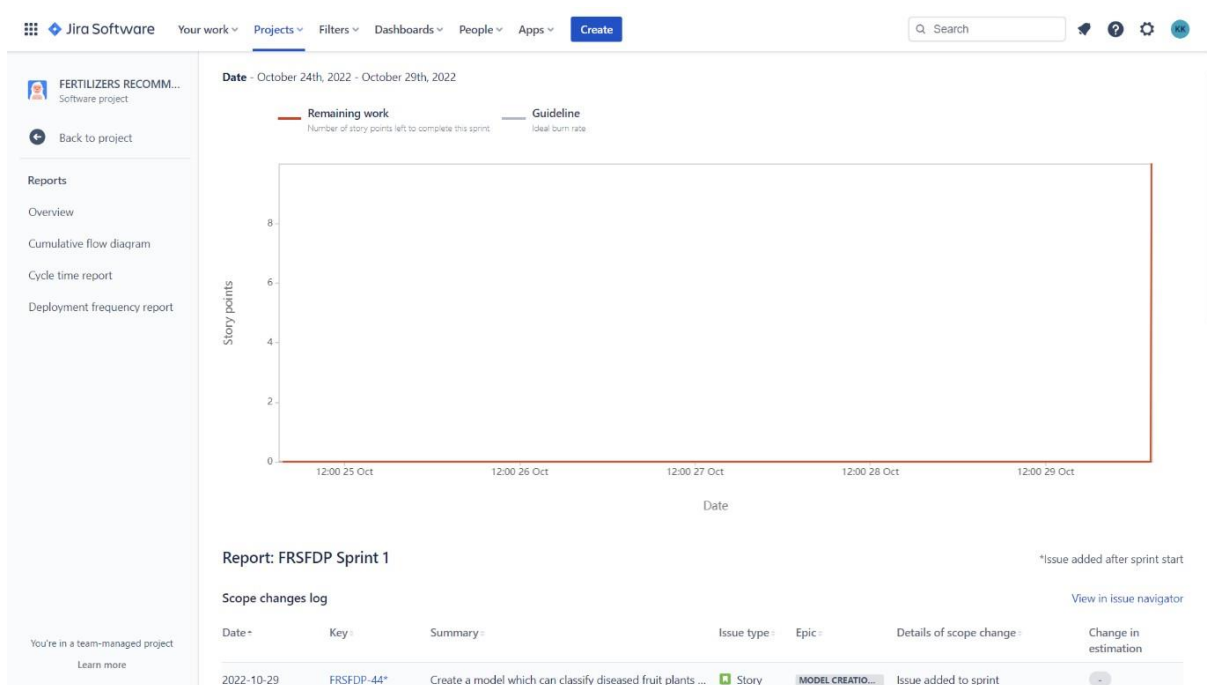


Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	10	6 Days	24 Oct 2022	29 Oct 2022	10	30 Oct 2022
Sprint-2	15	6 Days	31 Oct 2022	05 Nov 2022	15	06 Nov 2022
Sprint-3	15	6 Days	07 Nov 2022	12 Nov 2022	15	13 Nov 2022
Sprint-4	12	6 Days	14 Nov 2022	19 Nov 2022	10	20 Nov 2022

BURNDOWN CHART

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However burn down charts can be applied to any project containing measurable progress over time.



Reports from JIRA

ACTIVITY LIST

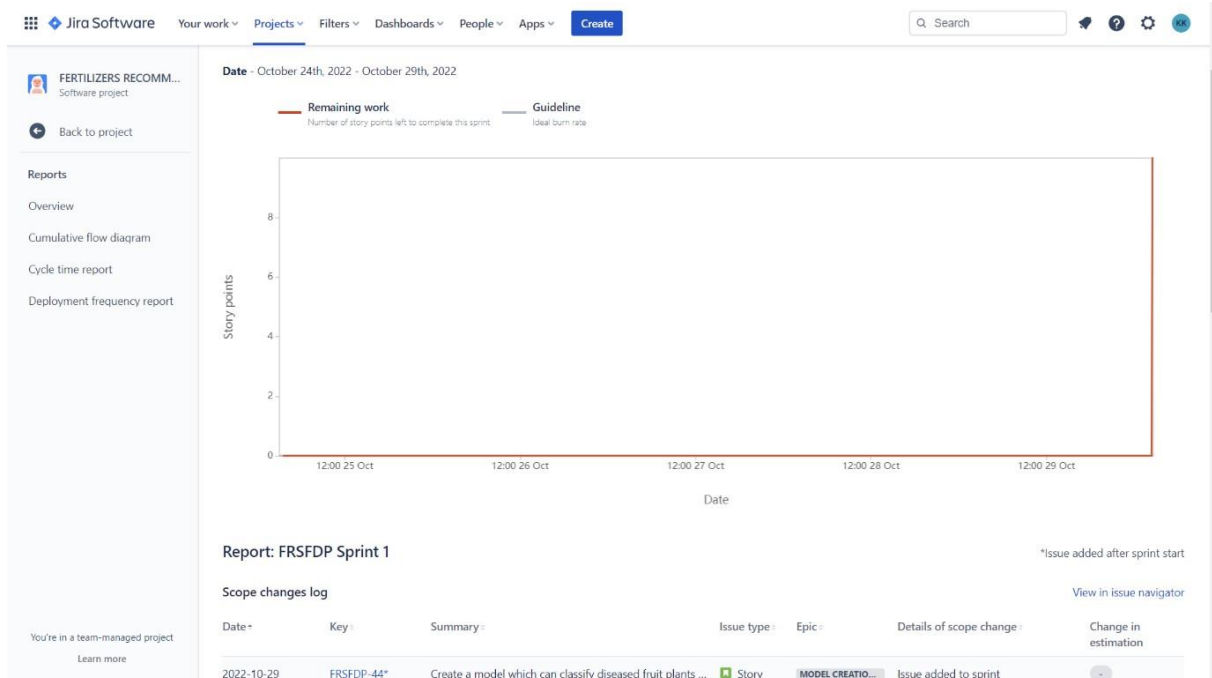
Backlog

Projects / Fertilizers Recommendation System For Disease Prediction project

FRSFDP Sprint 1 16 Nov - 30 Nov (7 issues)

Issue Key	Summary	Type	Status	Assignee
FRSFDP-1	Collecting dataset for pre-processing	DATA COLLECTION	IN PROGRESS	S
FRSFDP-2	Data pre-processing Used to transform the data into useful format.	DATA COLLECTION	TO DO	JS
FRSFDP-3	Model building for fruit and vegetable disease prediction	MODEL BUILDING	IN PROGRESS	S
FRSFDP-4	Splitting the data into training and testing from the entire dataset.	MODEL BUILDING	IN PROGRESS	SK
FRSFDP-5	Training the model and testing the performance of the model model	TRAINING AND TESTING	TO DO	S
FRSFDP-6	Implementing the web page for collecting the data from user	IMPLEMENTATION OF WEB PAGE	TO DO	S
FRSFDP-13	Deploying the model using IBM Cloud and IBM Watson Studio	IMPLEMENTATION OF WEB PAGE	IN PROGRESS	SK

BURNDOWNCHART



SPRINT BURNDOWNCHART

Welcome to Project! Delights | IBM | FRSFDP board - Agile board | (8) WhatsApp | Sprint Delivery Plan_PNT2022

pnt2022mid46485.atlassian.net/jira/software/projects/FRSFDP/boards/2

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Projects / Fertilizers Recommendation System For Disease Prediction project

FRSFDP Sprint 1

9 days remaining | Complete sprint

GROUP BY: None | Insights

TO DO 3 ISSUES

Data pre-processing Used to transform the data into useful format.

DATA COLLECTION

FRSFDP-2

Training the model and testing the performance of the model

TRAINING AND TESTING

FRSFDP-5

IN PROGRESS 4 ISSUES

Collecting dataset for pre-processing

DATA COLLECTION

FRSFDP-1

Model building for fruit and vegetable disease prediction

MODEL BUILDING

FRSFDP-3

Splitting the data into training

DONE

fertilizers_recom....png

Type here to search

22:18 16-11-2022

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

Feature 1 (Home page)

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<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'>
</head>
<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:cursive;
    font-size: 2vw;
    width: 100%;
    height:8%;
    text-align: center;
}
.topnav {
    overflow: hidden;
    background-color: #333;
}
.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: rgb(196, 13, 13);
    color: black;
}

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

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

body {
    background-color: aliceblue;
    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: 100px 0 10px 0;
    /* margin-top: 80px; */
}
```

```
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:1;text-align:left;color:white; padding-
top:1%;margin-top: -5px;">Plant Disease Prediction</div>
<div class="topnav-right"style="padding-top:0.5%; margin-top:-5px;">
```

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

```
<div style="background-color:#ffffff;">
<div style="width:60%;float:left; margin-top: -50px;">
<div style="font-size:50px;font-family:cursive;padding-left:20px;margin-top: -20px;;
text-align:center;padding-top:10%;">
<b>Detect if your plant<br> is infected!!</b></div><br>
<div style="font-size:25px; font-family:cursive; padding-left:70px;padding-right:30px;text-
align:justify;"> Now a day's agriculture is very important for life and helps
to save the healthy environment around as. Doing agriculture is the
most hard in current scenario because lot of natural disaster are
happening day-to-day our life. Maximun of the plants are affected by
```

many disease due to pollution in water, gas, soil. Identifying the disease is one of the huge hurdles in agriculture. Most of the plants are affected by leaf disease and its hard to find to correct fertilizer to cure.

Identifying the disease in early stage is very important and easy to cure that.

</div>

</div>

<div style="width:40%;float:right; margin-top: 90px;">

</div>

</div>

<div class="home">

</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>

Feature 2(Predict page)

<!DOCTYPE html>

<html lang="en">

<head>

<title>predict</title>

</head>


```

<style>
.image{
display: flex;
padding: 60px 70px 60px 70px;

}
.card{
padding: 70px 80px 70px 80px;
margin-top: -80px; color:rebeccapurple;
}
.menu{ padding: 10px 10px 10px 10px;

background-color:black;
color:aqua;
font-size: 25px;
font-family: cursive;

}
body{
background-color: antiquewhite;
}

</style>
<body>
<div class="menu">
<p align="center">Plant disease Prediction</p></div>
<div class="image">



<div class="card">
<form>
<h1>Drop in the image to get the Prediction </h1><br><br>
<labe><select name="data collection" id="plant">

```

```

<option value="fruit" id="fruit">Fruit</option>
<option value="vegetable" id="veg">vegetable</option>
<option value="crop" id="crop">crop</option>
</select>
</label><br><br>
<input id="default-btn" type="file" name="choose an file" onchange="document.getElementById('output')
onchange="document.getElementById('output').
<img src="" id="output" height="200px" width="200">

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

```

Feature 2 (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
import os

from flask import Flask, request, render_template, redirect, url_for
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)

```

8. TESTING

Test Cases

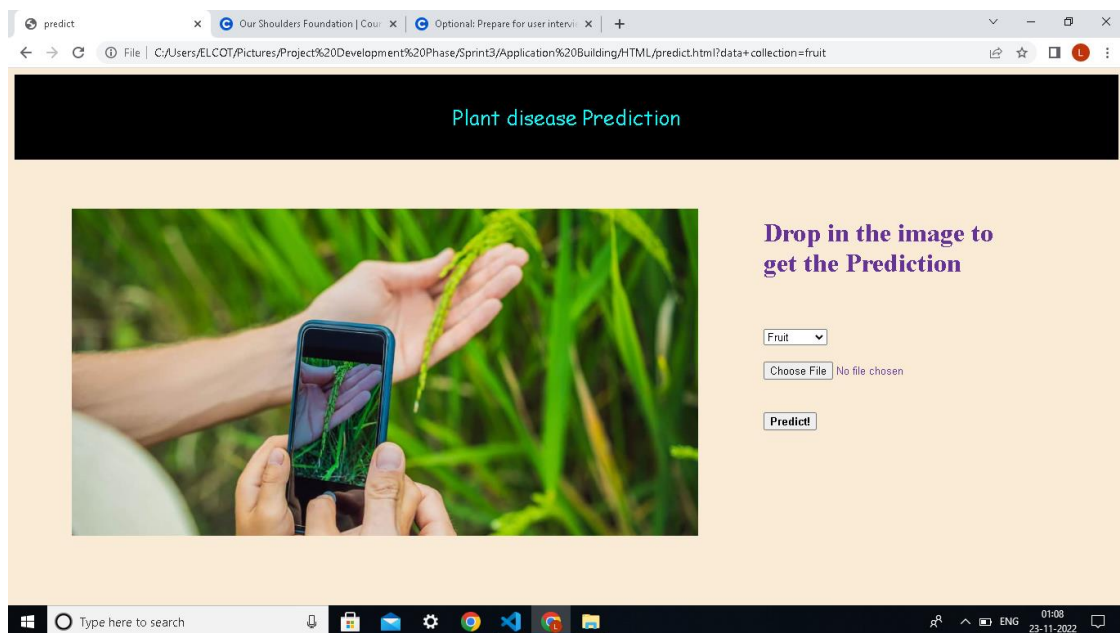
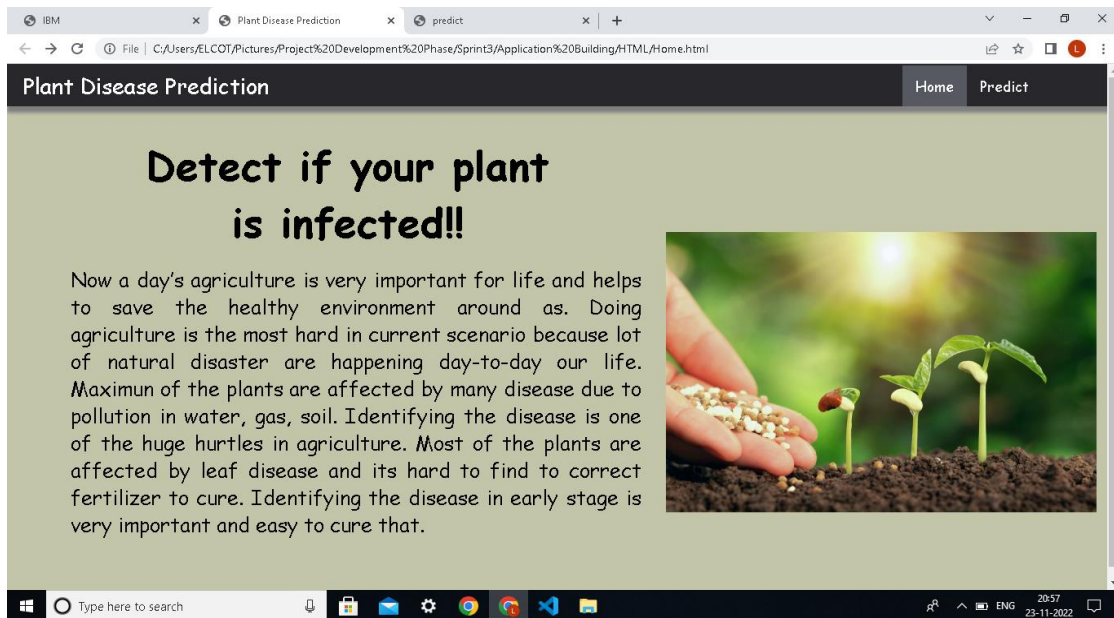
SECTION	TOTAL CASES	NOT TESTED	FAIL	PASS
Leaf spots	17	0	0	17
Mosaic Leaf Pattern	51	0	0	51
Misshapen Leaves	20	0	0	20
Yellow Leaves	7	0	0	7
Fruit Rots	9	0	0	9
Fruit Spots	4	0	0	4
Blights	2	0	0	2

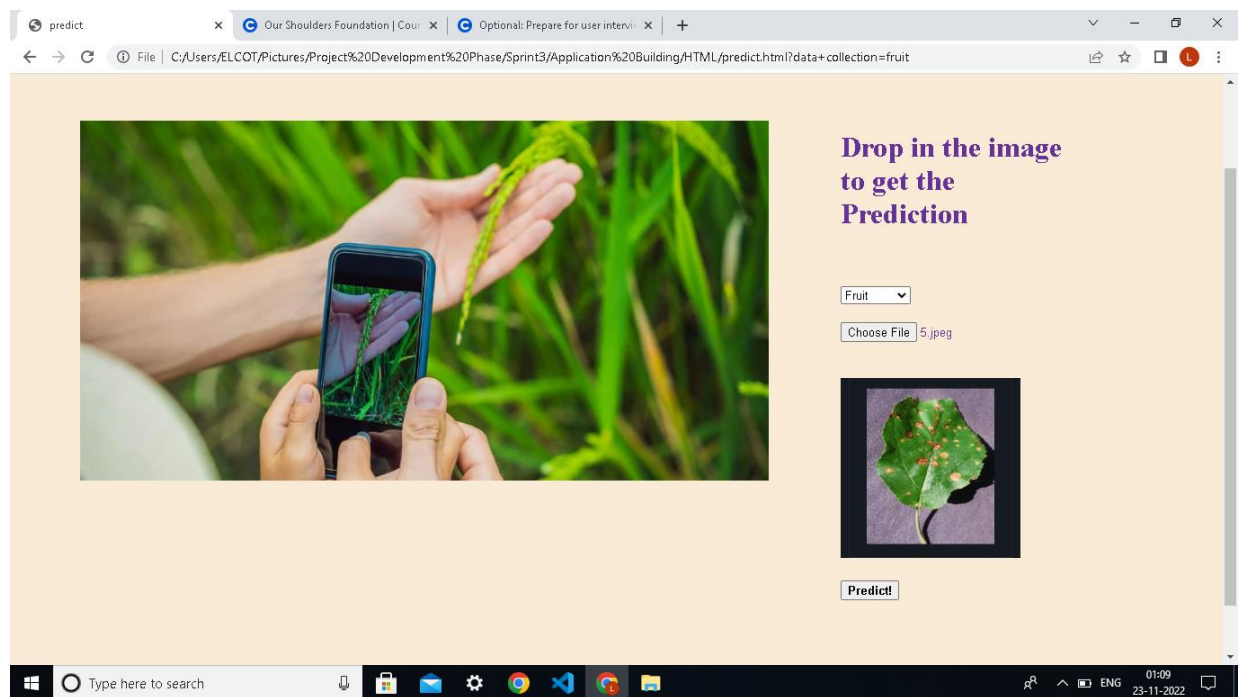
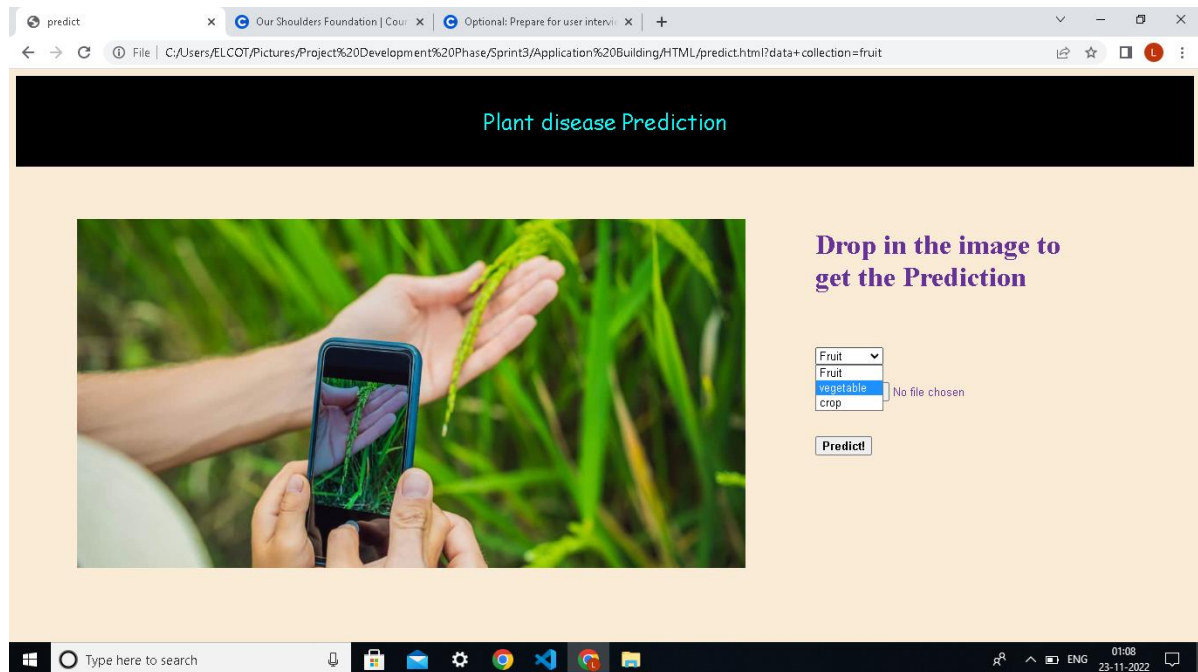
User Acceptance Testing

RESOLUTION	SEVERITY 1	SEVERITY 2	SEVERITY 3	SEVERITY 4	SUBTOTAL
Leaf spots	10	4	2	3	19
Mosaic Leaf Pattern	9	6	3	6	24
Misshapen Leaves	2	7	0	1	10
Yellow Leaves	11	4	3	20	38
Fruit Rots	3	2	1	0	6
Fruit Spots	5	3	1	1	10
Blights	4	5	2	1	12
Totals	44	31	13	32	119

9. RESULTS

Performance Metrics





(15) WhatsApp

IBM


IBM-Project-20695-16597609

predict

predict

File | C:/Users/ELCOT/Pictures/Project%20Development%20Phase/Sprint3/Application%20Building/HTML/predict.html

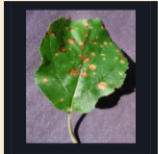
Plant disease Prediction



Drop in the image to get the Prediction

Fruit


Choose File | 5.jpeg



Predict

Black rot is caused by the fungus *Diplodia seriata* (syn. *Ectryosphaeria obtusa*). The fungus can infect dead tissue as well as living trunks, branches, leaves and fruits. The black rot fungi survive Minnesota winters in branch cankers and mummified fruit (shriveled and dried fruit) attached to the tree.

Type here to search



06:51
24-11-2022

10.ADVANTAGES & DISADVANTAGES

List of 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.

List of disadvantages

- For training and testing, the proposed model requires very high computational time.
- The neural network architecture used in this project work has high complexity.

10. 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 datasets.

11. FUTURE SCOPE

The proposed model in this project work can be extended to image recognition. The entire model can be converted to application software using python to exe software. The real time image classification, image recognition and video processing are possible with help Open CV python library. This project work can be extended for security applications such as figure print recognition, iris recognition and face recognition.

APPENDIX

```
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 >
```

```
<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: #333;
```

```
}
```

```
.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;}
```

```
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 {
```

```
/* 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 {

    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) {
```

</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%;">

Home

Predict

</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%;">

Detect if your plant
 is infected!!</div>

<div style="font-size:20px;font-family:Montserrat;padding-left:70px;padding-right:30px;text-align:justify;">Agriculture is one of the major sectors worls wide. Over the years it has developed and the use of new technologies and equipment replaced almost all the traditional methods of farming. 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>

</div>

</div>

<div style="width:40%;float:right;">

</div>

</div>

<div class="home">

</div>


```
VarslideIndex = 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", "");  
    }  
    slides[slideIndex-1].style.display = "block";  
    dots[slideIndex-1].className += " active";  
    setTimeout(showSlides, 2000); // Change image every 2 seconds  
}
```

```
</script>
```

```
</body>
```

```
</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://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css"  
rel="stylesheet">
```

```
<script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>
```

```
<script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>
```

```
<script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>
```

```
<link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300'  
rel='stylesheet' type='text/css'>
```

```
<link href='https://fonts.googleapis.com/css?family=Merriweather' 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: #333;
    }

    .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;
    }

    .login{
margin-top:-70px;
    }
    body {

        background-color:#ffffff;
        background-repeat: no-repeat;
        background-size:cover;
        background-position: 0px 0px;
    }
    .login{
        margin-top:100px;
    }

    .container {
        margin-top:40px;
        padding: 16px;
    }
    select {
        width: 100%;
        margin-bottom: 10px;
        background: rgba(255,255,255,255);
        border: none;
        outline: none;
        padding: 10px;
        font-size: 13px;
        color: #000000;
        text-shadow: 1px 1px 1px rgba(0,0,0,0.3);
        border: 1px solid rgba(0,0,0,0.3);
        border-radius: 4px;
        box-shadow: inset 0 -5px 45px rgba(100,100,100,0.2), 0 1px 1px
rgba(255,255,255,0.2);
        -webkit-transition: box-shadow .5s ease;
        -moz-transition: box-shadow .5s ease;
        -o-transition: box-shadow .5s ease;
        -ms-transition: box-shadow .5s ease;
        transition: box-shadow .5s ease;
    }

```

```
<body style="font-family:Montserrat;overflow:scroll;">
```

```
<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%;">
```

```
</div>
```

```
</div>
```

```
<div class="container">
```

```
<div id="content" style="margin-top:2em">
```

```
<div class="container">
```

```
<div class="row">
```

```
<div class="col-sm-6 bd" >
```

```
<br>
```

```

```

```
</div>
```

```
<div class="col-sm-6">
```

```
<div>
```

```
<h4>Drop in the image to get the prediction </h4>
```

```
<form action = "" id="upload-file" method="post" enctype="multipart/form-data">
```

```
<select name="plant">
```

```
<option value="select" selected>Select plant  
type</option>
```

```
<option value="fruit">Fruit</option>
```

```
<option value="vegetable">Vegetable</option>
```

```
</select><br>
```

```
<label for="imageUpload" class="upload-label" style="background: #28272c;">
```

```
Choose...
```

```
</label>
```

```
<input type="file" name="image" id="imageUpload" accept=".png, .jpg, .jpeg">
```

```
</form>
```

```
<div class="image-section" style="display:none;">
```

```
<div class="img-preview">
```

```
<div id="imagePreview">
```

```

        <div>
            <button type="button" class="btn btn-info btn-lg "
id="btn-predict" style="background: #28272c;">Predict!</button>
        </div>
    </div>

    <div class="loader" style="display:none;"></div>

    <h3>
        <span id="result" style="font-size:17px; "> </span>
    </h3>

</div>
</div>

</div>
</div>
</div>
</div>
</body>

<footer>
    <script src="{ { url_for('static', filename='js/main.js') } }"
type="text/javascript"></script>
</footer>
</html>

.img-preview {
    width: 256px;
    height: 256px;
    position: relative;
    border: 5px solid #F8F8F8;
    box-shadow: 0px 2px 4px 0px rgba(0, 0, 0, 0.1);
    margin-top: 1em;
    margin-bottom: 1em;
}

.img-preview>div {
    width: 100%;
    height: 100%;
    background-size: 256px 256px;
    background-repeat: no-repeat;
    background-position: center;
}

```

```
        display: none;
    }

.upload-label{
    display: inline-block;
    padding: 12px 30px;
    background: #28272c;
    color: #fff;
    font-size: 1em;
    transition: all .4s;
    cursor: pointer;
}

.upload-label:hover{
    background: #C2C5A8;
    color: #39D2B4;
}

.loader {
    border: 8px solid #f3f3f3; /* Light grey */
    border-top: 8px solid #28272c; /* Blue */
    border-radius: 50%;
    width: 50px;
    height: 50px;
    animation: spin 1s linear infinite;
}

@keyframes spin {
    0% { transform: rotate(0deg); }
    100% { transform: rotate(360deg); }
}
```

GitHub & Project:

<https://github.com/lavaself>