FERTILIZER RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

A PROJECT REPORT

Submitted by

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ANNA UNIVERSITY::CHENNAI 600 025

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BONAFIDE CERTIFICATE

Certified that this project report on **"Fertilizers Recommendation System For Disease Prediction"** is the bonafide work of **"H.GOWTHAM (731219205002), S.MAHANTESH (731219205004), S.NINGARAJU (731219205008), S.NAVEEN (731219205007) and M.VAIGAIRAJ (731219205019)"** who carried out the project work Under my supervision.

SIGNATURE   SIGNATURE

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T.N.Palayam   T.N.Palayam

Submitted for the Viva-Voce examination held on _____

ABSTRACT

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.

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CHAPTER 1

INTRODUCTION

1.1 Project Overview

Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyze the digital images using digital image processing for diagnosis of plant diseases. Application of computer vision and image processing strategies simply assist farmers in all of the regions of agriculture. Generally, the plant diseases are caused by the abnormal physiological functionalities of plants. Therefore, the characteristic symptoms are generated based on the differentiation between normal physiological functionalities and abnormal physiological functionalities of the plants. 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.

CHAPTER 2

LITERATURE SURVEY

2.1 Existing problem

       The method was prone to various disadvantages. Even when the framework was digitalized, it has certain problems as, predicting a diverse fertilizer for a soil type, certain files regarding the leaf disease or soil type or fertilizer

2.2 References

1. Reyes Angie .K, Juan C. Caicedo,and Jorge E. Camargo, "**Fine-tuning Deep Convolutional Networks for Plant Recognition''**, InCLEF (Working Notes), 2015.

2. Hamrouni .L, Aiadi .O, Khaldi .B and Kherfi .M.L, "**Plants Species Identification using Computer Vision Techniques''**,Revue des **8**Bioressources7, no. 1, 2018.

3. Dimitrovski, Ivica, GjorgjiMadjarov, DragiKocev, and PetreLameski, "**Maestra at LifeCLEF 2014 Plant Task: Plant Identification using Visual Data**", InCLEF (Working Notes), pp. 705-714, 2014.

4. Naresh, Y. G., and H. S. Nagendraswamy, "**Classification of medicinal plants: an approach using modified LBP with symbolic representation**",Neurocomputing173, pp: 1789-1797, 2016.

5. Kaur, Lakhvir, and Vijay Laxmi, "**A Review on Plant Leaf Classification and Segmentation**",International Journal Of Engineering And Computer Science5, no. 8, 2016.

2.3 Problem Statement Definition

He had a own farming land and do Agriculture for past 30 Years , In this 30 Years he Faced a problem in Choosing Fertilizers and Controlling of Plant Disease.

- ➢ He wants to know the better recommendation for fertilizers for plants with the disease.
- ➢ He has faced huge losses for a long time.
- ➢ This problem is usually faced by most farmers.
- ➢ He needs to know the result immediately.

Who does the problem affect?	Persons who do Agriculture
What are the boundaries of the problem?	People who Grow Crops and facing Issues of Plant Disease
What is the issue?	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.
When does the issue occur?	During the development of the crops as they will be affected by various diseases.

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment.
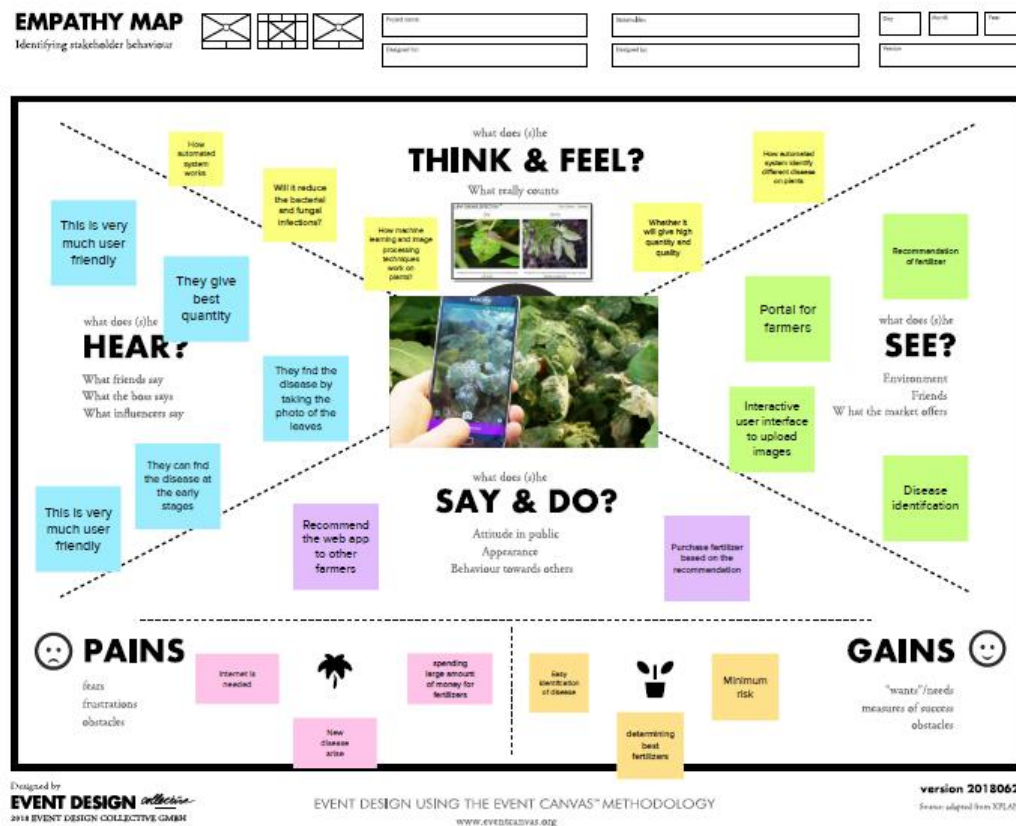
3.2 Ideation & Brainstorming

Brainstorming is a group problem-solving method that involves the spontaneous contribution of creative ideas and solutions. This technique requires intensive, freewheeling discussion in which every member of the group is encouraged to think aloud and suggest as many ideas as possible based on their diverse knowledge.
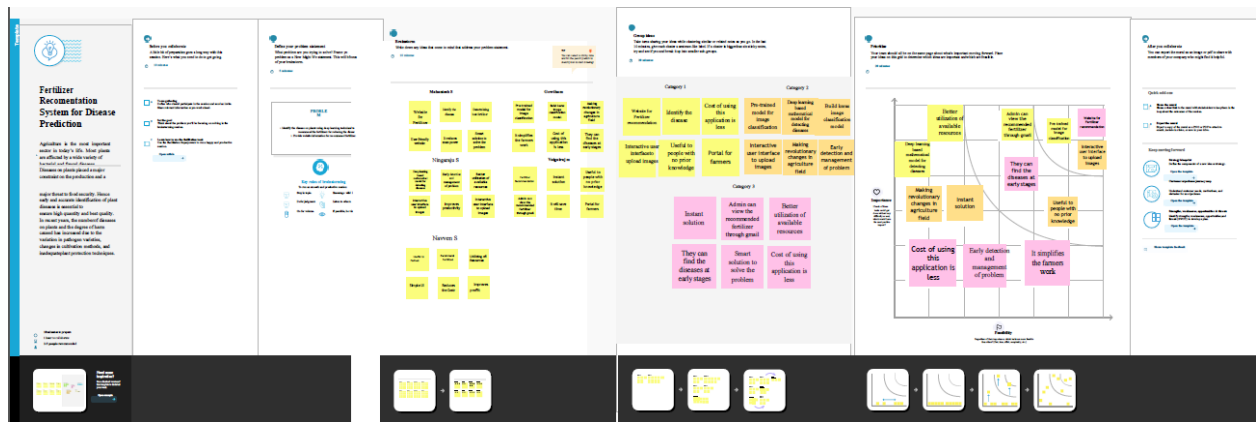
3.3 Proposed Solution

He wants to know the better recommendation for fertilizers for plants with the disease.

SI.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.
2.	Idea / Solution description	In agricultural aspects, if the plant is affected by leaf disease, then it reduces the growth productiveness. Generally, the plant diseases are

		caused by the abnormaphysiological functionalities of plants.
3.	Novelty / Uniqueness	During the development of the crops as they will be affected by various diseases
4.	Social Impact / Customer Satisfaction	The issue occurs in agriculture practicing areas, particularly in rural regions.
5.	Business Model (Revenue Model)	It is required for the growth of better quality food products. It is important to maximise the crop yield.
6.	Scalability of the Solution	Deep learning techniques are used to identify the diseases and suggest the precautions.

3.4 Problem Solution fit

Project Title: Fertilizer Recommendation System For Disease Prediction Project Design Phase-I - Solution Fit Template   Team ID: PNT2022TMID44442

Define CS, fit into CC / **Explore AS, differentiate**

1. CUSTOMER SEGMENT(S) CS
Who is your customer?
i.e. working parents of 0-5 y.o. kids

Farmer Are The First CustomerFor This Application. Farmer Can Easily Use This Application And Get Suggestion For Fertilizer To Used Correctly

6. CUSTOMER CONSTRAINTS CC
What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

Availability of good networks.
Capturing the image in required pixels to get a accurate prediction of disease in the plant

5. AVAILABLE SOLUTIONS AS
Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking.

People are judge the disease in plantsby Identifying through the change of leaf's quality

Focus on J&P, tap into BE, understand RC / **Focus on J&P, tap into BE, understand RC**

2. JOBS-TO-BE-DONE / PROBLEMS J&P
Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.

This application focuses on helping for the farmer who needs a better recommendation offertilizer on the infected plants identifying the disease is one of the biggest problem here

9. PROBLEM ROOT CAUSE RC
What is the real reason that this problem exists?
What is the back story behind the need to do this job?
i.e. customers have to do it because of the change in regulations.

Various disease on the plantscan lead to reducing the quality and quantity of the crops productivity. Theinsects on the plants can spread the disease.

7. BEHAVIOUR BE
What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e.

Directly:
Farmers can easily identify the disease by the application and they don't need any extra knowledge of disease prediction

Indirectly:
Farmer able to get result through online immediately

Identify strong TR & EM / **Identify strong TR & EM**

3. TRIGGERS TR
What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a good solar panel solution in the news etc.

Seeing their crops are being infected disease and facing huge loss in quantity and quality

4. EMOTIONS: BEFORE / AFTER EM
How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident > in control> and share your emotional recommendation strategy & design

Before: losing self confidence, distress
After: Gaining self confidence, relif

10. YOUR SOLUTION SL
If you are working on a new business/product idea, write down your current solution (leave this blank if you don't have one yet, and fill in after you complete the canvas).
If you are working on an existing business/product, then it might feel easy to fill in the canvas and create a solution with a solution that fits within customer limitations, such as a problem and customer behaviour.

Using the fertilizer is one the solution the disease in the plants, our application use the image of the infected plant by identifying the disease and suggest the good fertilizer for the disease

8. CHANNELS of BEHAVIOUR CH
ONLINE
What kind of actions do customers take online? Extract online channels from #7

Basic knowledge on the plantand fertilizer

OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use it in your communication strategy.

People try to identify the diseaseby the quality of the leaf's

CHAPTER 4

SYSTEM REQUIREMENTS

4.1 SOFTWARE REQUIREMENTS

Language   : Python

Operating System   : Windows 10 or higher

4.2 HARDWARE REQUIREMENTS

RAM   : 8 GB or Above

Processor   : Intel i3 or Higher

Hard Disk   :256 GB

CHAPTER 5

REQUIREMENT ANALYSIS

5.1 Functional requirement:

A Functional Requirement (FR) is a description of the service that the software must offer. It describes a software system or its component**.**

Following are the functional requirements of the proposed solution .

Fr.no	Functional requirement	Sub requirement(story/subtask)
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 requirements

Non-Functional Requirements are the constraints or the requirements imposed on the system. They specify the quality attribute of the software. Non-Functional Requirements deal with issues like scalability, maintainability, performance, portability, security, reliability, and many more. Non-Functional Requirements address vital issues of quality for software systems.

Following are the non-functional requirement of the proposed solution

NFr.no	Non-functional 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

CHAPTER 6

PROJECT DESIGN

The process of outlining all of a project's stages and creating a project plan. It includes a strategy of ideas, resources and processes to achieve project goals and keep within a budget and deadline. Along the way you might solve one or more problems, try to achieve a goal, and/or create something specific.

6.1 Data Flow Diagrams

A data flow diagram (DFD) is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement. They are often elements of a formal methodology such as Structured Systems Analysis and Design Method (SSADM). It includes data inputs and outputs, data stores, and the various sub processes the data moves.

Data Flow Diagram:

Start → Input image → Image acquisition → Image preprocessing → Image segmentation → SVM (Support vector machine) → Database

Disease detection → No → No disease

Disease detection → Yes → Image classification → Result

No disease → Result → End
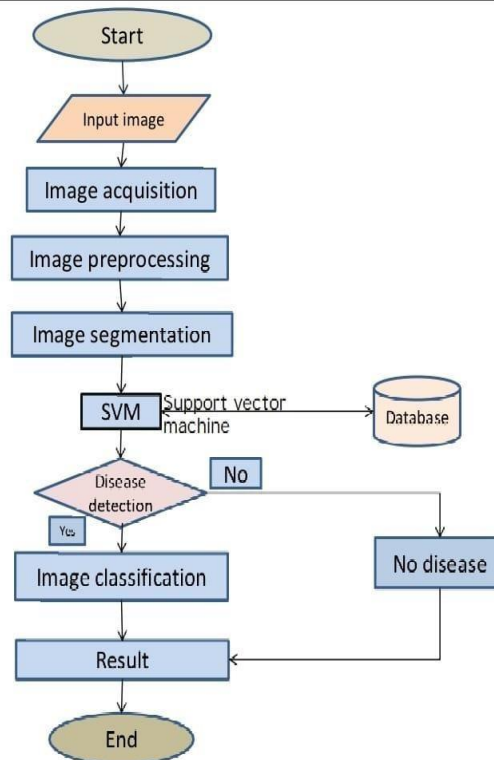
6.2 Solution & Technical Architecture

Solution architecture is a practice to provide ground for software development projects by tailoring IT solutions to specific business needs and defining their functional requirements and stages of implementation. It is comprised of many sub processes that draw guidance from various enterprise architecture viewpoints.
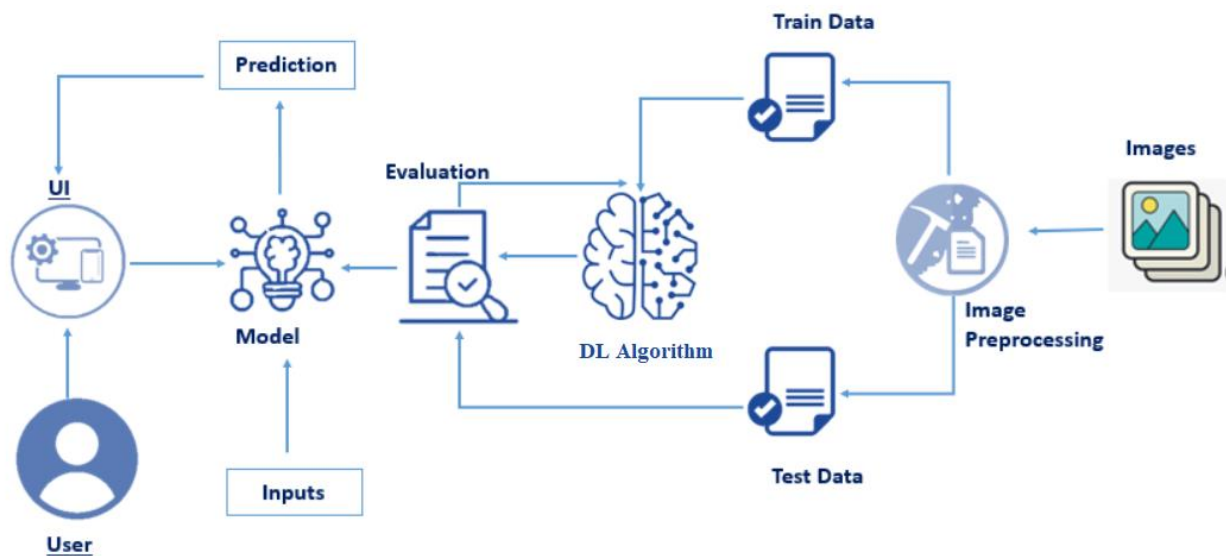
6.3 User Stories

A user story is an informal, general explanation of a software feature written from the perspective of the end user or customer. The purpose of a user story is to articulate how a piece of work will deliver a particular value back to the customer.

CHAPTER 7

PROJECT PLANNING & SCHEDULING

Fundamentally, 'Project planning' is all about choosing and designing effective policies and methodologies to attain project objectives. While 'Project scheduling' is a procedure of assigning tasks to get them completed by allocating appropriate resources within an estimated budget and time-frame.

7.1 Sprint Planning & Estimation

Milestone

Modern Technology are increasing and optimizing the Performance of the Artificial Intelligences (AI) model. Based crop yield disease prediction system, is helpful for farmers to prevent the crop from the various disease. Which can identify the disease with in a process of capturing the Image at the plant and Machine Learning Algorithm will give affected Disease Name. In this Project Milestone will be given the Best Solution for the farmer using The complete friendly and simple user interface web application to fetching the solution by own. In addition process. We are planned to add availed module that is fertilizer recommendation for the Specific Disease. It can give both artificial fertilizer and Natural fertilizer in suggestions manner.

Activity list

In project management planning is an important task to scheduling the phrase of the project to by the team members. In this activity can shows the various activity are allocated an done by team members. In project we can spilt into the four phrase are

Phase 1: Information collection and Requirement Analysis.

Phase 2: Project Planning and Developing Modules.

Phase 3: Implementing the high accuracy deep learning algorithm to perform.

Phase 4: Deploying the Model on Cloud and Testing the Model and UI performance.
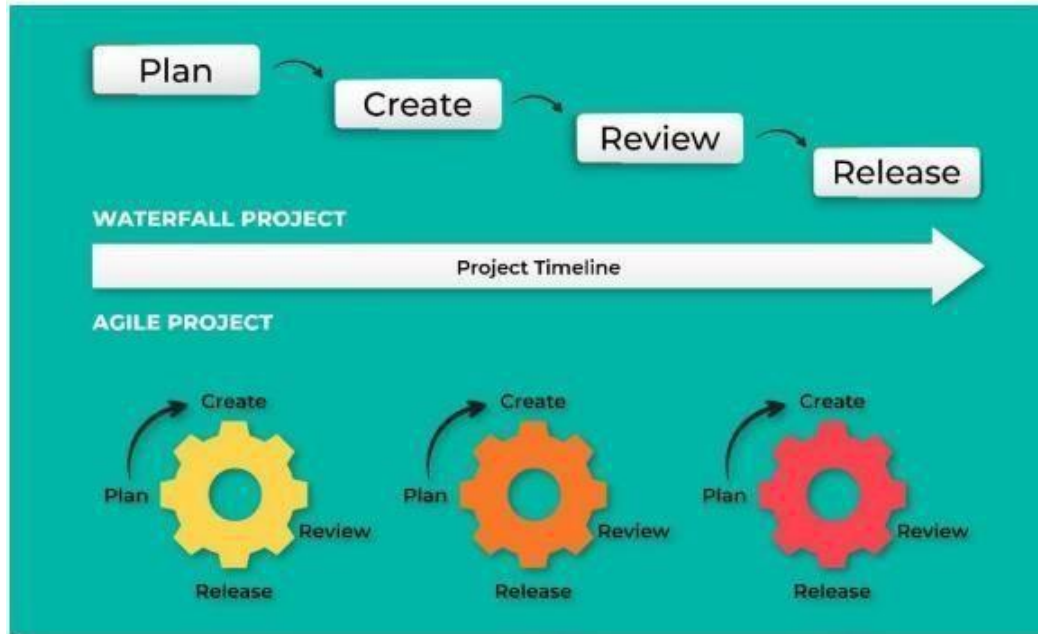
7.2 Sprint Delivery Schedule

The delivery plan of project deliverables is a strategic element for every Project Manager. The goal of every project is, in fact, to produce a result that serves a specific purpose. With the word, purpose we can mean the most disparate goals: a software program, a chair, a building, a translation, etc.…

In Project Spirit Delivery Planning is one of the processes of Completing the project and Show Casing the Time Line of the Project Planning. This Delivery plan help to understanding the process and Work Flow of the Project working by the Team Mates.

Every Single Modules are assigned to the team mates to show case their work and contribution of developing the Project

Delivery Plan

Spirit Model Planning

Spirit One

- The team should conduct a proof of concept.
- The team should start by outlining the milestones.
- The team should monitor the process efficiency.

Spirit Two

- The team make any final adjustments to the process.
- The team should make the prototype for their project
- The team should start by analysis the project Specification

Spirit Three

- The team mates should understand the project Flow
- The team should monitor the process of work
- The team should follow the project Management System

Spirit Four

- The team will show the Demo process to team mentor
- The team mates will updating the project modules in cloud
- The team make to deploy the final Model for the Testing Process.

CHAPTER 8

CODING & SOLUTIONING

8.1 Home

<!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;

```css
            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;
```

```css
}
.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;
```

```css
    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;
```

```css
  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 {
```

```css
  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%;
```

```css
  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;
```

```css
  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="{{ url_for('prediction')}}">Predict</a>

  </div>

</div>

<div style="background-color:#ffffff;">
```

```html
<div style="width:60%;float:left;">

<div style="font-size:50px;font-family:Montserrat;padding-left:20px;text-align:center;padding-top:10%;">

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

<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><br><br>

</div>

</div>

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

<img src="{{url_for('static',filename='images/12456.png')}}" style="max-height:100%;max-width:100%;">

</div>

</div>

<div class="home">

<br>

</div>

<script>

var slideIndex = 0;

showSlides();

function showSlides() {
```

```javascript
  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>
```

8.2 Prediction

```html
<!DOCTYPE html>

<html >

<head>

  <meta charset="UTF-8">

  <meta name="viewport" content="width=device-width, initial-scale=1">
```

```html
<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=Josefin Sans' rel='stylesheet'>

<link href='https://fonts.googleapis.com/css?family=Montserrat' rel='stylesheet'>

<link href="{{ url_for('static', filename='css/final.css') }}" rel="stylesheet">

<style>

.header {

                top:0;

                margin:0px;

                left: 0px;

                right: 0px;

                position: fixed;

                background-color: #28272c;

                color: white;
```

```css
        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;
```

```css
}
.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;
  </style>
  </head>
  <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>

                        <img src="{{url_for('static',filename='images/789.jpg')}}"
style="height:450px;width:550px"class="img-rounded" alt="Gesture">

                </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;">
```

```html
									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>

						</div>

						<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>
```

```html
<footer>

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

</footer>

</html>
```

CHAPTER 9

TESTING

Project Testing Phase means a group of activities designated for investigating and examining progress of a given project to provide stakeholders with information about actual levels of performance and quality of the project.

9.1 User Acceptance Testing

Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [Product Name] project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity2	Severity3	Severity4	Subtotal
By Design	10	4	2	3	19
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 the passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Out source Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

CHAPTER 10

RESULTS

10.1 Performance Metrics

Recommend the fertilizer for affected leaves based on severity level. Fertilizers may be organic or inorganic. Admin can store the fertilizers based on disease categorization with severity levels. The measurements of fertilizers suggested based on disease severity. To compare the performance of the proposed SVM method with the existing CNN (Convolutional Neural Network) method. Metrics such as True Positive, False Positive, True Negative, False Negative are used. The proposed method is implemented using .NET. The code existing CNN method was written in Python was downloaded from the web [https://github.com/cs-chan/Deep-Plant].

Methods	*TP*	*FP*	*TN*	*FN*
Existing[CNN]	*6*	*3*	*2*	*4*
Proposed[SVM]	*8*	*4*	*1*	*2*

CHAPTER 11

ADVANTAGES

- ➢ Our proposed system is that it was user friendly and highly efficient.
- ➢ The proposed system maintain privacy and also predicts accuracy.
- ➢ The prediction and diagnosing of leaf diseases are depending on the segmenta- tion such as segmenting the healthy tissues from diseased tissues of leaves.
- ➢ The system detects the diseases on citrus leaves with 90% accuracy.
- ➢ The system helps to compute the disease severity.
- ➢ It allows us to predict which crops would be appropriate for a given climate. Using the weather and disease related data sets, the crop quality can also be improved. Pre- diction algorithms help us to classify the data based on the disease, and data extracted from the classifier is used to predict soil and crop.
- ➢ For crop recommendation and fertilizer recommendation, we can provide the availability of the same on the popular shopping websites, and possibly allow users to buy the crops and fertilizers directly from our application.

DISADVANTAGES

- ➢ To provide fine-grained segmentations of the diseased portion of the dataset. this is not possible due to lack of such data. However, in our application, we can integrate a segmentation annotation tool where the users might be able to help us with the lack. Also, we can use some unsupervised algorithms to pin-point the diseased areas in the image. We intend to add these features and fix these gaps in our upcoming work.
- ➢ 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 plant organs such as stems and fruits.

CHAPTER 12

CONCLUSION

The proposed method uses SVM to classify tree leaves, identify the disease and suggest the fertilizer. The proposed method is compared with the existing CNN based leaf disease prediction. The proposed SVM technique gives a better result when compared to existing CNN. For the same set of images, F-Measure for CNN is 0.7and 0.8 for SVM, the accuracy of identification of leaf disease of CNN is 0.6 and SVM is 0.8.

CHAPTER 13

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 vari ous plantorgans such as stems and fruits. Using the fertilizers to improve the plant growth and high yield.

CHAPTER 14

APPENDIX

14.1 Source Code

```python
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')
```

```python
#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)
```
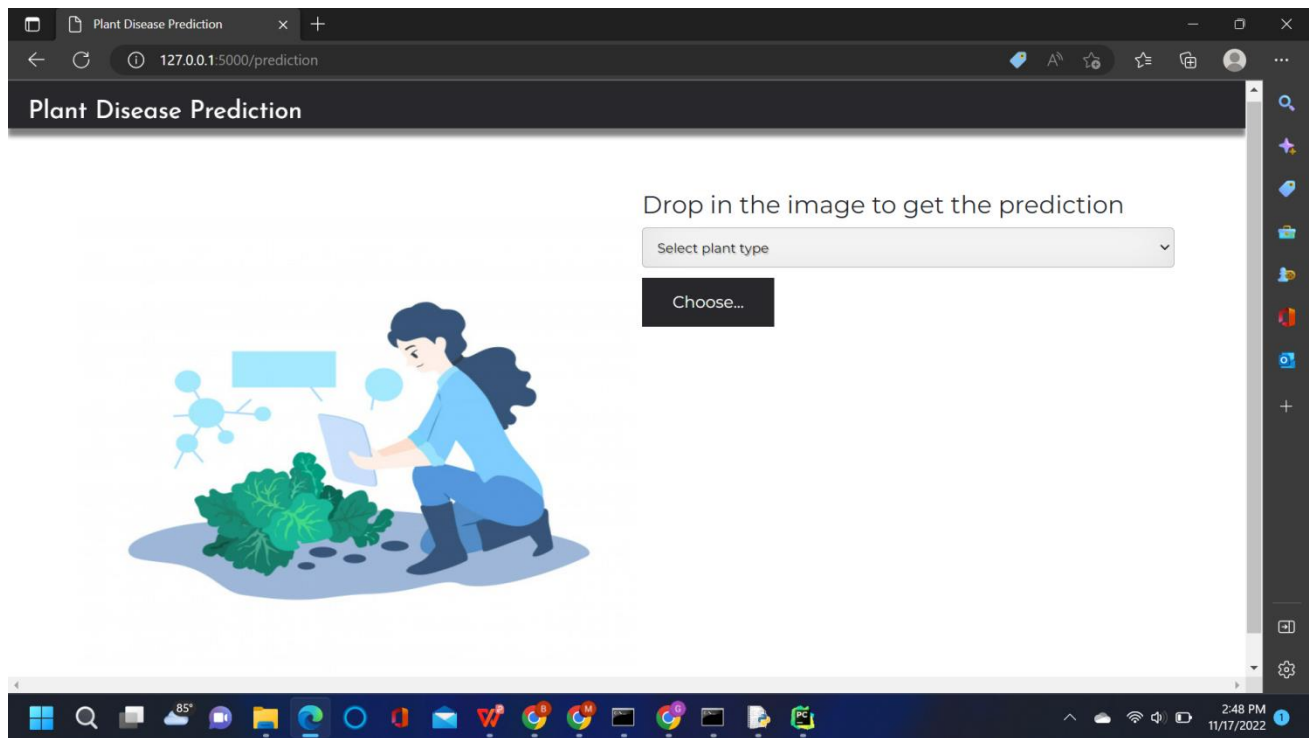
```python
        df=pd.read_excel('precautions - veg.xlsx')

        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)
```

14.2 Screenshots
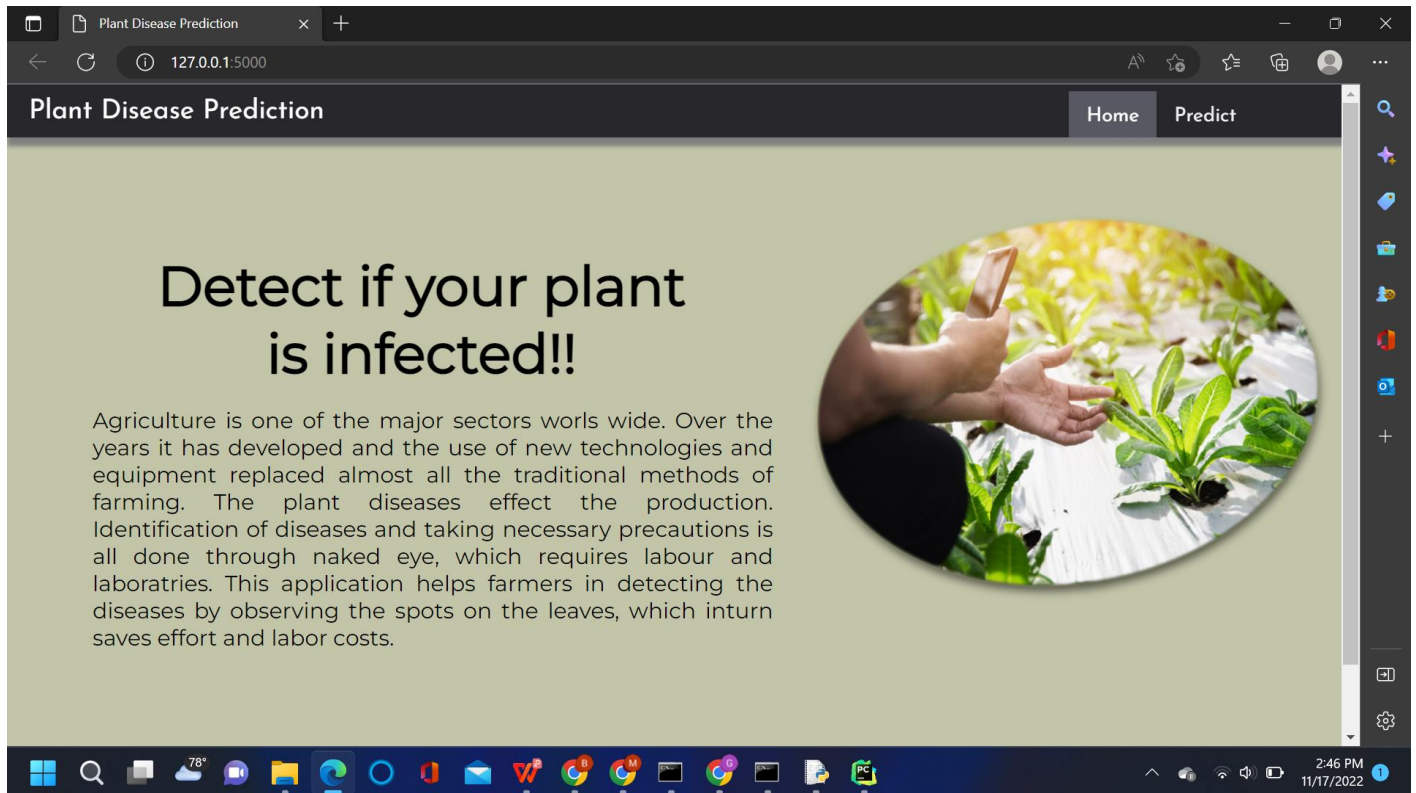
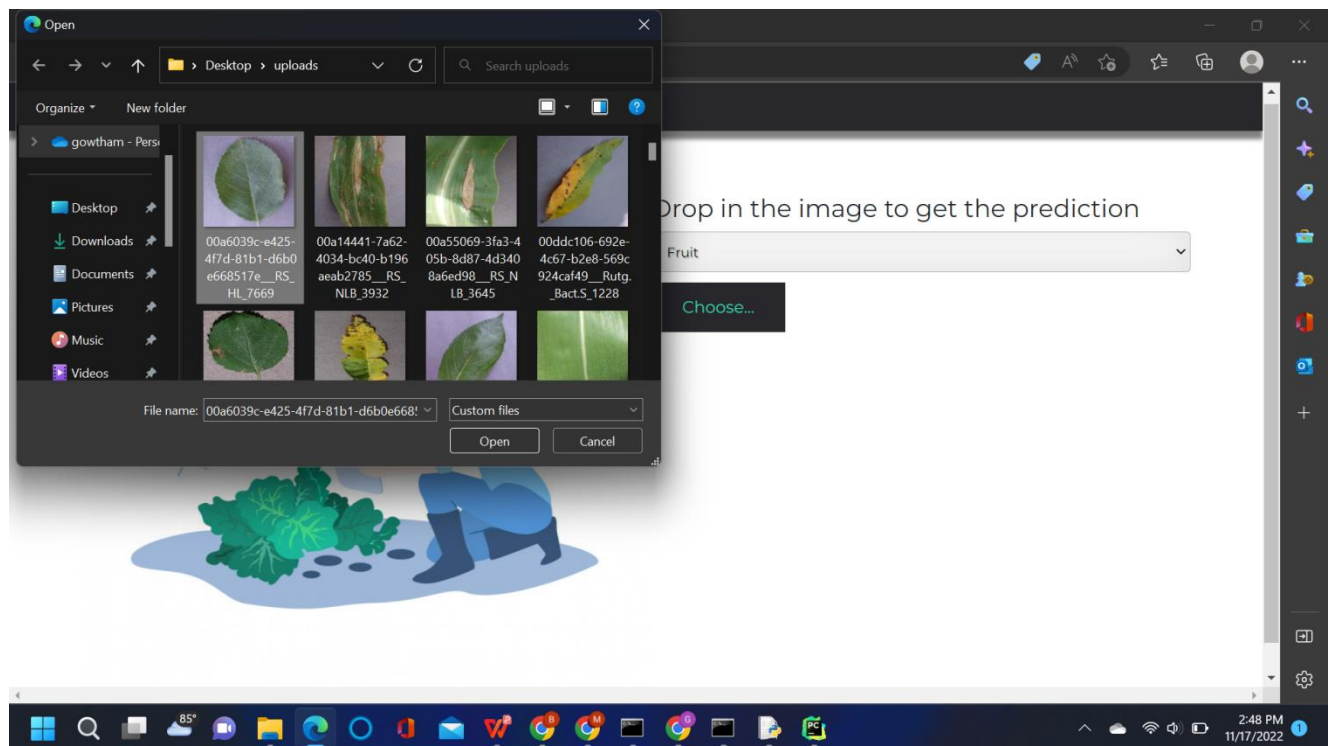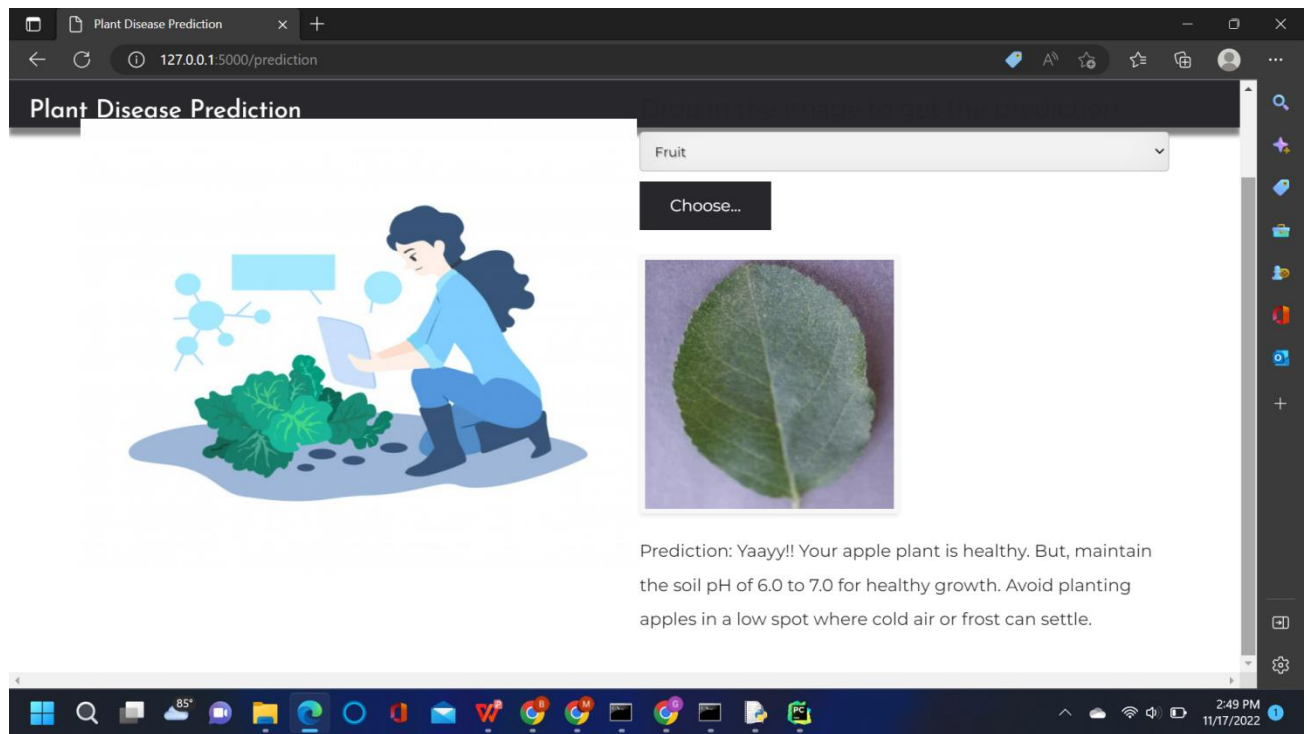**Home Page**

Predict page

Image selection

Prediction Page