FERTILIZERS RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

PROJECT REPORT

Submitted by

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In

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K.RAMAKRISHNAN COLLEGE OF ENGINEERING

1. INTRODUCTION

1.1 Overview In this project, two datasets name fruit dataset, and the vegetable dataset are collected. The collected 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. It has 6 classes and all the classes are trained and tested. Second, the vegetable dataset is trained and tested. The software used for training and testing datasets in Python. All the Python codes are first written in Jupyter notebook supplied along with Anaconda Python and then the codes are tested in the IBM cloud. Finally, a web-based framework is designed with the help of Flask a Python library. There are 2 HTML files are created in the templates folder along with their associated files in the static folder. The Python program 'app.py' used to interface with these two webpages is written in Spyder-Anaconda python and tested.

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

2. LITERATURE SURVEY

2.1 Existing problem Indumathi 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. Pandi Selvi proposed a simple prediction method for a 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 and yields less than 80 percent accuracy.

2.2 Proposed solution In this project work, a deep learning-based neural network is used to train the collected datasets and test the same. The deep learning-based neural network is CNN which gives more than 90% classification accuracies. By increasing the number of dense layers and by modifying hyperparameters such as the number of epochs, and batch size, the accuracy rate can be increased from 95% to 98%.

3. THEORETICAL ANALYSIS

3.1 Block diagram

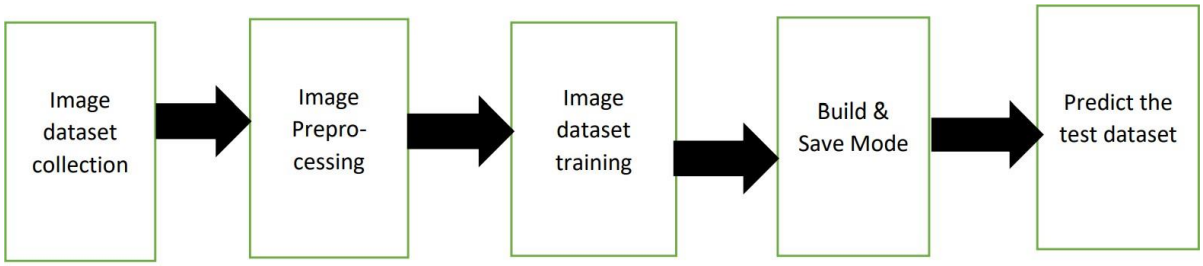


Figure.3.1. Block Diagram of the project

The block diagram of the entire project is shown in Fig.3.1. First step is the image dataset collection followed by image preprocessing. The third step is the training of image datasets by initializing different hyperparameters. Then build the model and save the model file in .h5 format. The final stage is the testing of existing or new datasets using the trained model.

3.2 Hardware/Software designing

The software used for training and testing the dataset is Python. The Jupyter notebook (Notebook of IBM cloud also) is used for python programming. The neural network used for training and testing the model is Convolutional Neural Network (CNN).

The CNN has following layers:

- Convolutional layer (32x32 kernal (3x3))
- Max-pool layer (kernel(2x2))
- Flatten layer
- Dense layer (different layers with different size)
- Drop out layer (optional)
- Final output dense layer(size 6x1 for fruit dataset and 9x1 for Vegetable dataset)

In the preprocessing step, images are normalized to 1 and then resized to 128x128. The images are arranged in different batch sizes. Then train set and test set are formed from the collected datasets. In order to do the above steps in Python, the following Python libraries must be imported before starting the process:

- NumPy
- TensorFlow
- Keras
- Matplotlib (optional for data visualization)

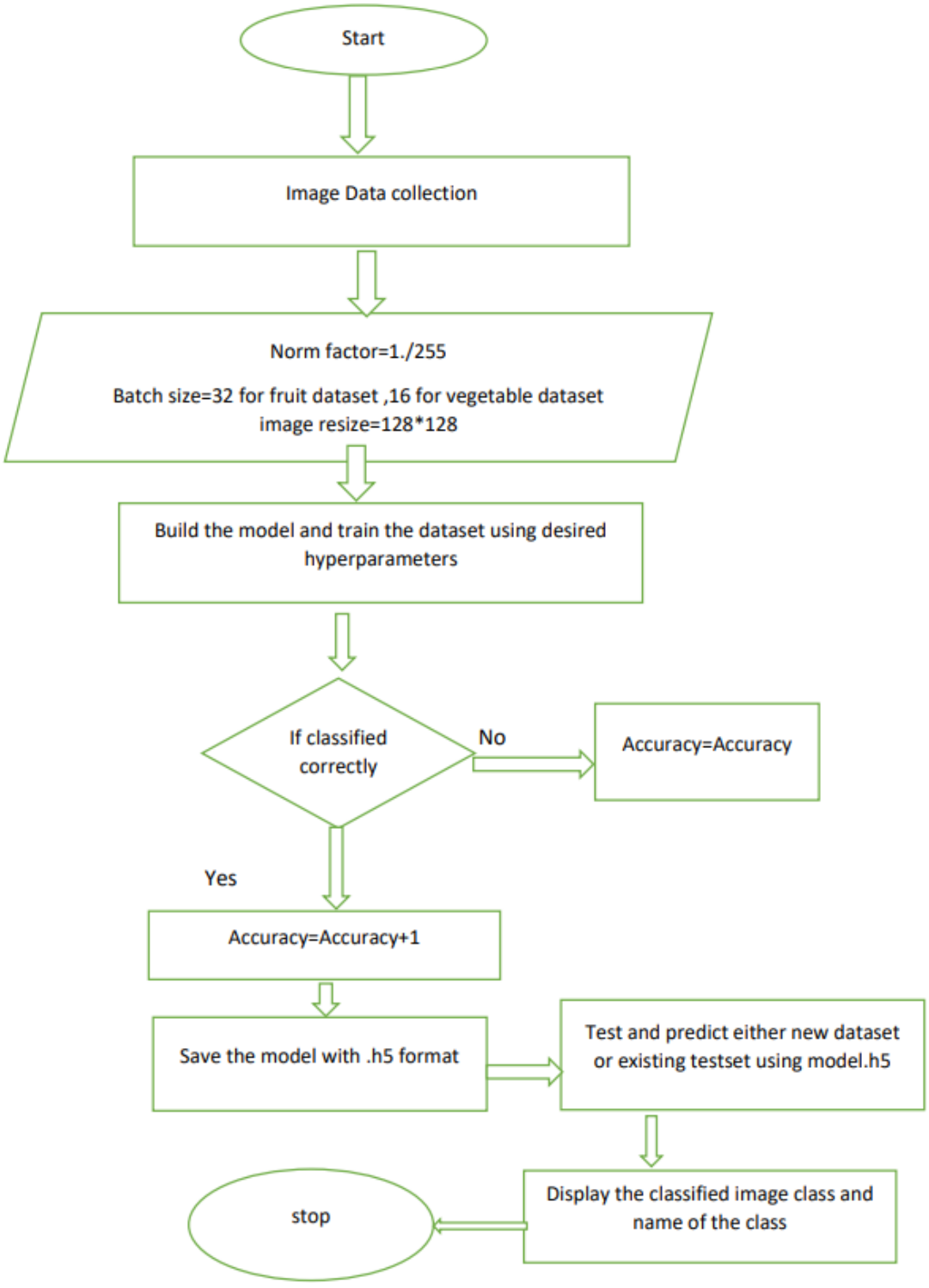
The following activation functions used in the CNN training:

- RELU at the end of convolution layer and Max Pool layer
- SoftMax at the end of output dense layer
- For testing the dataset argmax is used, its an optional

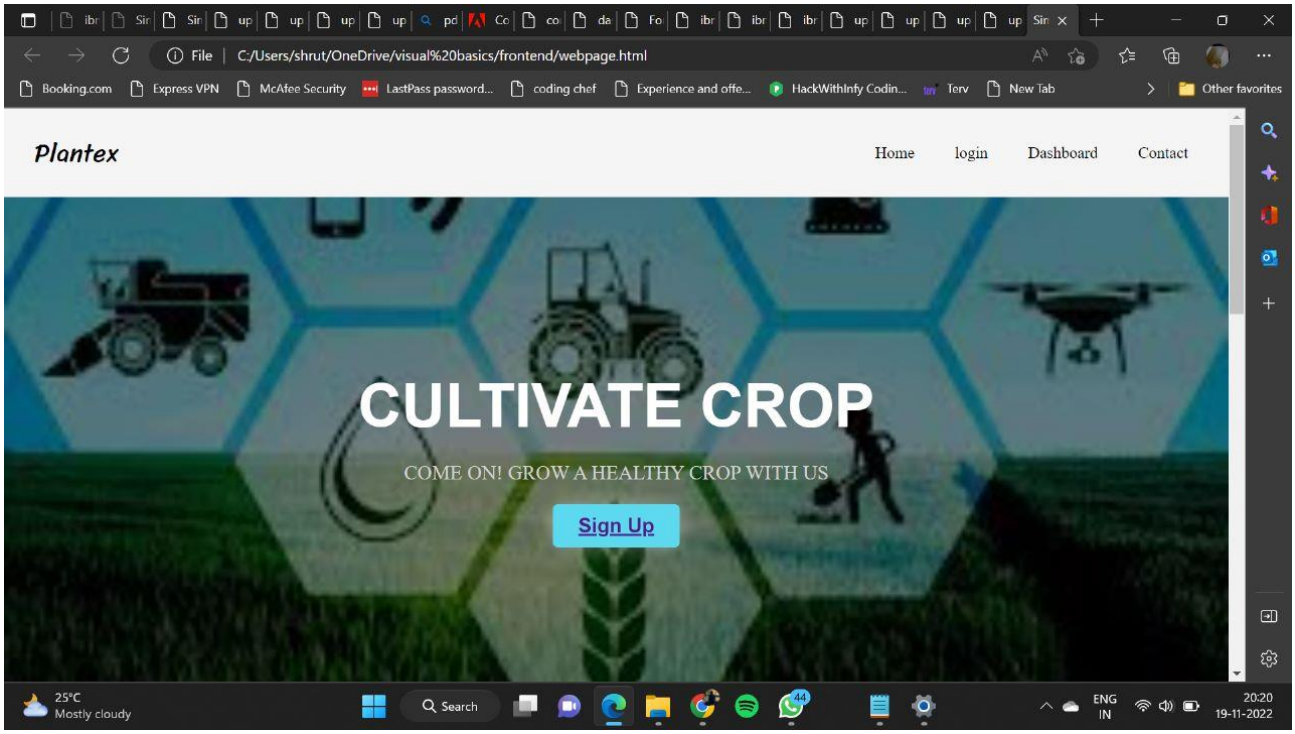
4. EXPERIMENTAL INVESTIGATIONS

The analysis made while working on the solution The batch sizes are varied and tested. For different batch sizes, the CNN gives different accuracies. The batch size determines the number of iterations per epoch. Another important hyperparameter is the number of epochs. This determines accuracy and it has a high influence on accuracy compared to other hyperparameters. The accuracy can be varied from 80% to 90% in the vegetable dataset and 95% to 98% in the case of the fruit dataset by increasing the number of epochs. The size of the test dataset and train dataset also has a very high influence on accuracies. The accuracy can be increased by using more images in the training dataset. The computational time for model building is increased when the size of the training dataset increases and also the number of epochs increases. The batch size of the training dataset and test dataset also play a vital role in computational time. The Neural Network complexity is increased when more number of convolutional layers increases. If the number of layers increases, better accuracy results will obtain. At the same increasing the number of layers in CNN leads to more training time and also requires more time to build a model. The model .h5 size depends on the size of the train datasets. But the memory requirement depends on the size of the training dataset and CNN architecture complexity.

FLOWCHARTS:


Start
Image Data collection
Norm factor=1./255
Batch size=32 for fruit dataset ,16 for vegetable dataset
image resize=128*128
Build the model and train the dataset using desired hyperparameters
If classified correctly
No
Accuracy=Accuracy
Yes
Accuracy=Accuracy+1
Save the model with .h5 format
Test and predict either new dataset or existing testset using model.h5
Display the classified image class and name of the class
stop

RESULTS: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Booking.com
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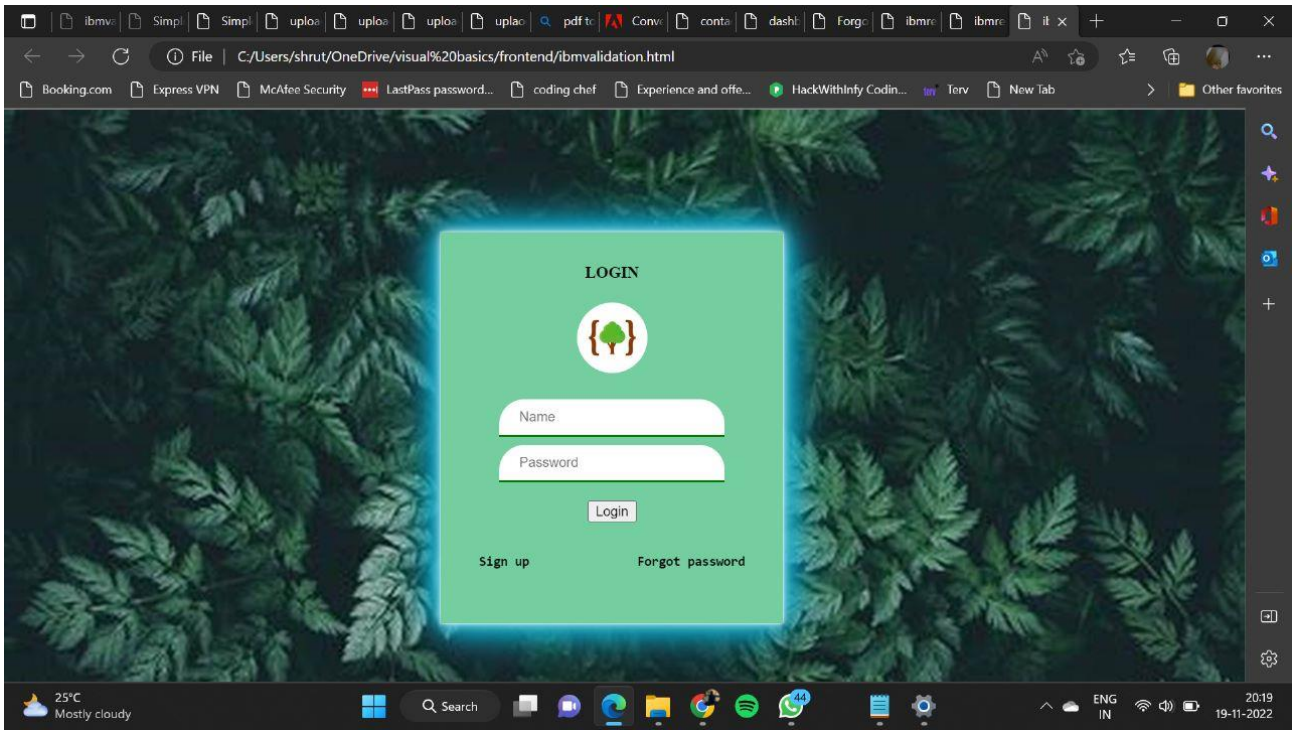
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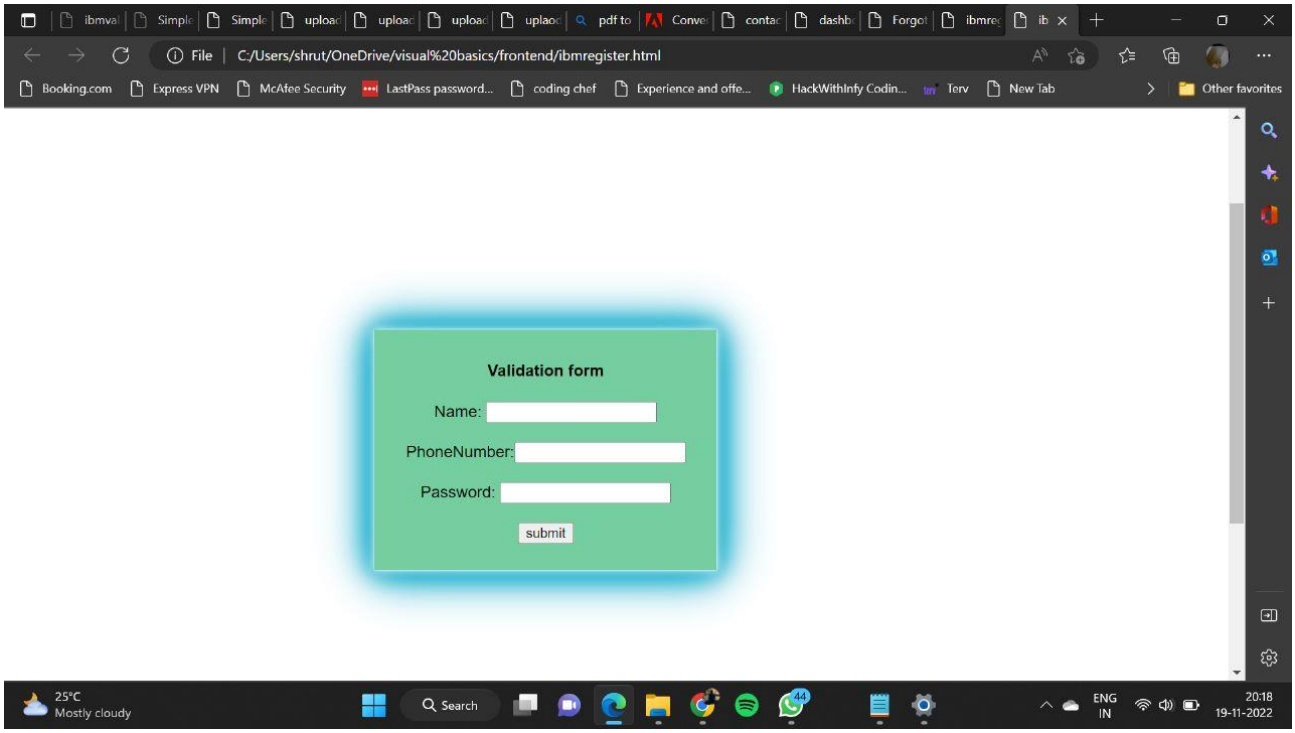
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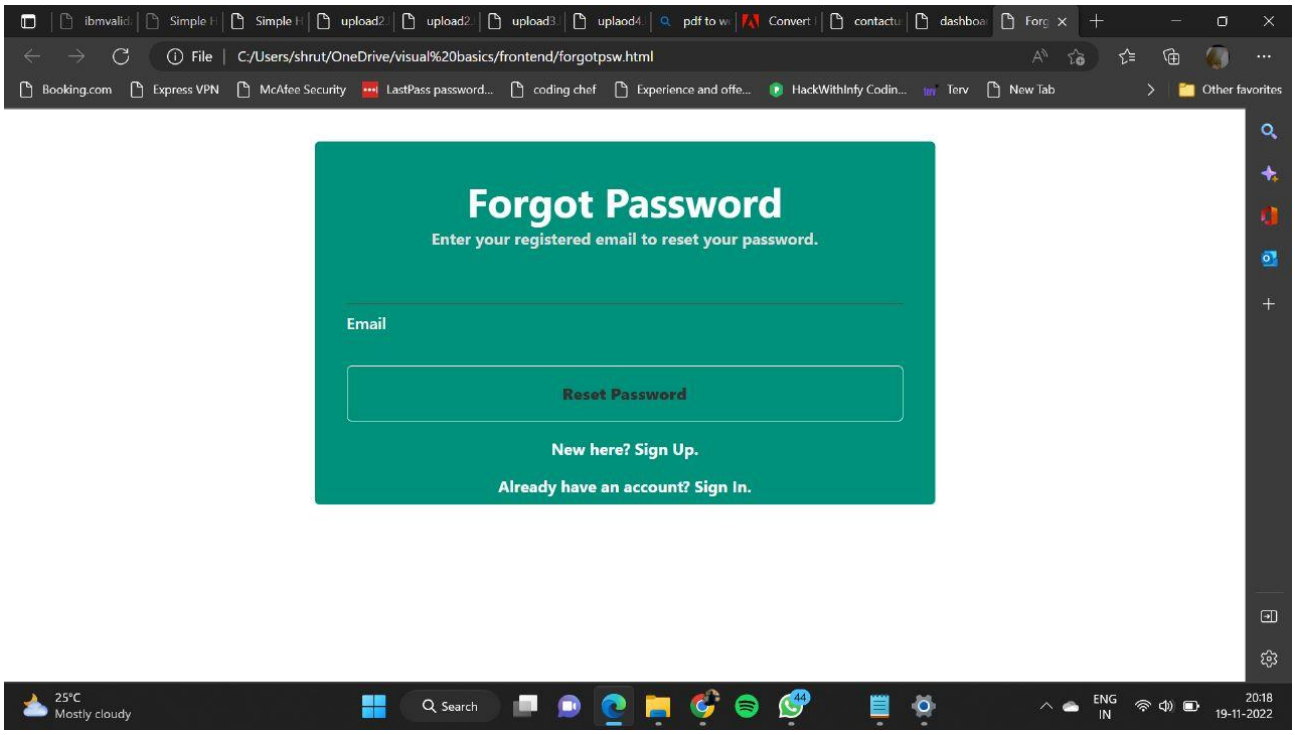
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Forgot Password
Enter your registered email to reset your password.
Email
Reset Password
New here? Sign Up.
Already have an account? Sign In.
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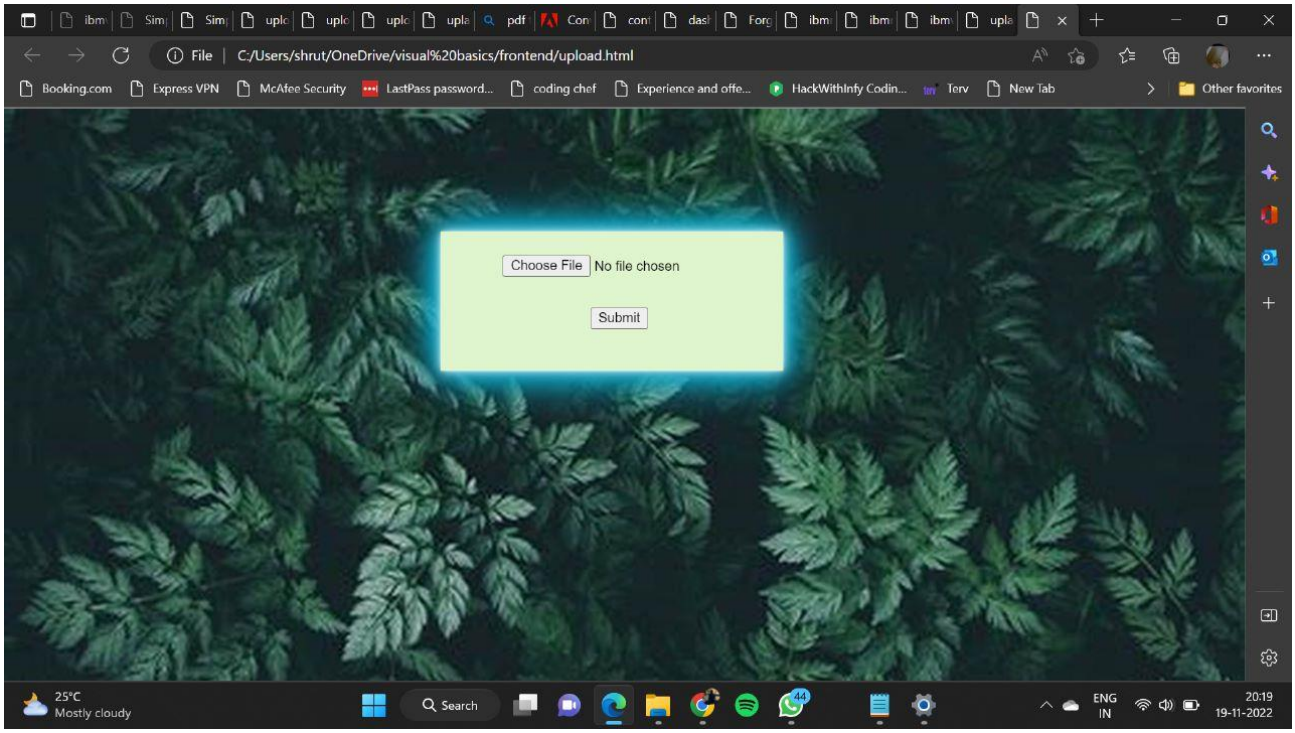
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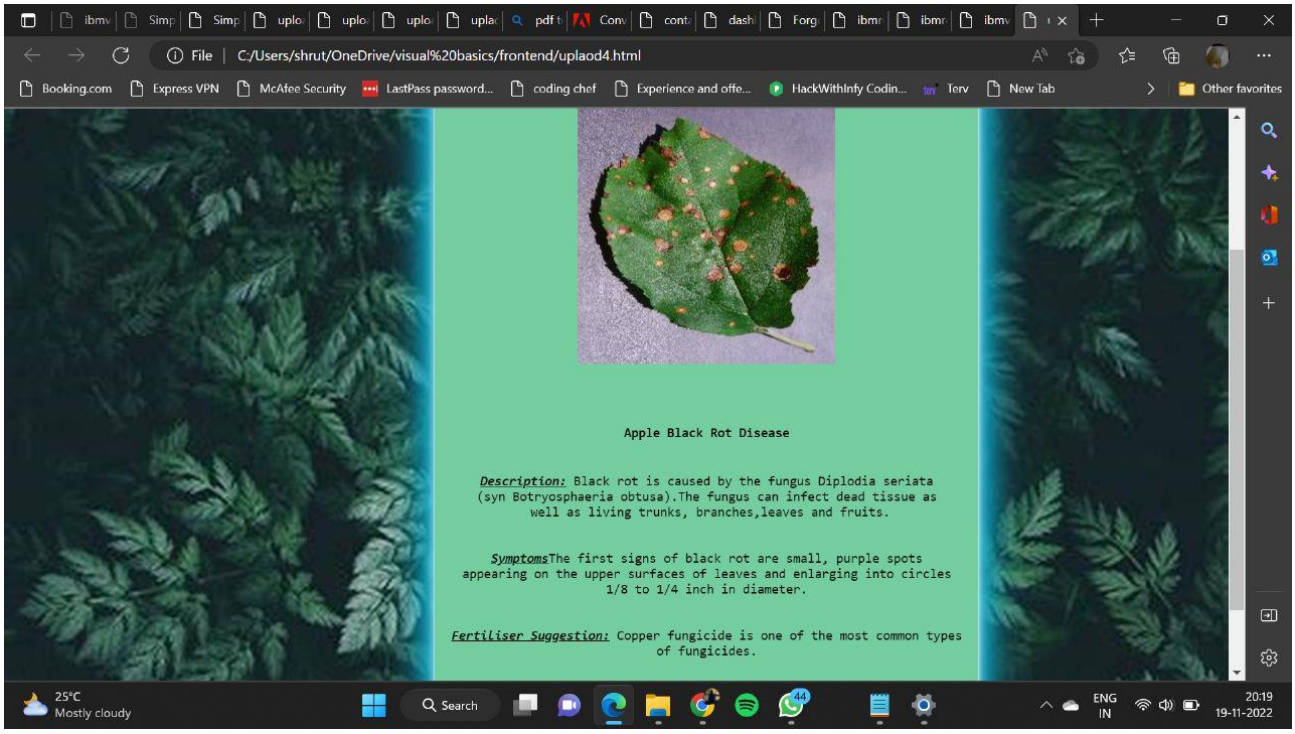
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Apple Black Rot Disease
Description: Black rot is caused by the fungus Diplodia seriata (syn Botryosphaeria obtusa).The fungus can infect dead tissue as well as living trunks, branches,leaves and fruits.
SymptomsThe first signs of black rot are small, purple spots appearing on the upper surfaces of leaves and enlarging into circles 1/8 to 1/4 inch in diameter.
Fertiliser Suggestion: Copper fungicide is one of the most common types of fungicides.
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