Fertilizers Recommendation System for Disease Prediction

PROJECT REPORT

SUBMITTED BY

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INPARTIAL FULFILLMENT FOR THE

AWARD OF THE DEGREE

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RVS COLLEGE OF ENGINEERING AND TECHNOLOGY

COIMBATORE-641402

ANNA UNIVERSITY: CHENNAI-600025

PROJECT REPORT

Fertilizers Recommendation System for Disease Prediction

TEAM ID:PNT2022TMID42961

TEAM MEMBERS:

JEEVANANTH T (TEAM LEAD)

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1. INTRODUCTION

- India is the largest producer, consumer and importer of pulses in the world. India is the largest producer, consumer and importer of pulses in the world. Ranking second in the world farm output, agricultural sector is the main backbone of Indian economy. As on February 2018, it is estimated that over 58% of rural Indians depend on agriculture for their livelihood.
- The agricultural sector contributes around 17-18% to the country's GDP (Gross Domestic Product). Even though India has gained grain self-sufficiency, production is resource central and region based. Hence, it is essential to know the soil richness regionally.
- Farming is one among the oldest of activities practiced in our country. However, all these methods have significantly evolved over the years with changes in weather and climatic conditions, technological innovations and socio-cultural practices which has had adverse effects.

1.1 PROJECT OVERVIEW

- 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' changes in cultivation method and inadequate plant protection techniques and suggest all the precautions that can be taken for those diseases

- Applying the CNN algorithm to the dataset
- How deep neural networks detect the disease
- You will be able to know how to find the accuracy of the model
- You will be able to build web applications using the Flask framework

1.2 PURPOSE:

- Detect and recognize the plant diseases and to recommend fertilizer, it is necessary to identify the diseases and to recommend to get different and useful features needed for the purpose of analyzing later.

- Plants need 17 elements for normal growth. Carbon, hydrogen, and oxygen come from the air and water. Soil is the principal source of other nutrients. Primary nutrients (nitrogen, phosphorus, and potassium) are used in relatively large amounts by plants, and often are supplemented as fertilizers.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

- Adequate mineral nutrition is central to crop production. However, it can also exert considerable Influence on disease development. Fertilizer application can increase or decrease development of diseases caused by different pathogens, and the mechanisms responsible are complex, including effects of nutrients on

- plant growth, plant resistance mechanisms and direct effects on the pathogen. The effects of mineral nutrition on plant disease and the mechanisms responsible for those effects have been dealt with comprehensively elsewhere. In India, around 40% of land is kept and grown using reliable irrigation technologies, while the rest relies on the monsoon environment for water. Irrigation decreases reliance on the monsoon, increases food security, and boosts agricultural production.
- Most research articles use humidity, moisture, and temperature sensors near the plant's root, with an external device handling all of the data provided by the sensors and transmitting it directly to an Android application.

2.2 REFERENCE

S.NO	TITLE & AUTHOR	YEAR	TECHNIQUE	PROPOSED SYSTEM
1	Leaf Identification Using Feature Extraction and Neural Network Satnam Singh, M. S. Bhamrah	2015	Artificial Neural Network, MATLAB	In this paper, a method is proposed for the extraction of shape features from leaf images. A classifier named as an Artificial Neural Network (ANN) is trained to identify the exact leaf class. It is done to attain high efficiency with less computational complexity. This work has been tested for the accuracy of network with different combination of image features. The results are tested on 80 leaf images. It is revealed that this method gives 98.8% accuracy with a minimum of seven input features. This approach is more promising for leaf identification systems that have minimum input and demand less computation time. Neural Network also developed and trained to classify and recognize plants from leaf images. This work is implemented using the image processing and neural network toolboxes in MATLAB.
2	IOT based Crop Recommendation, Crop Disease Prediction, and Its Solution - Rani Holambe, Pooja Patil, Padmaja Pawar, Hrushikesh Joshi, Saurabh Salunkhe	2020	Crop recommendation system, crop disease prediction, Internet of Things, Machine Learning	The ML and IoT based suggestions will significantly educate the farmer and help them minimize costs and make strategic decisions by replacing intuition and passed-down knowledge with far more reliable data-driven ML models.
3	Farmer's Assistant: A Machine Learning Based Application for Agricultural	2022	Image Analysis, Deep Learning, Machine Learning	A user-friendly web application system based on machine learning and web-scraping called the 'Farmer's Assistant'. With our system, we are successfully able to provide several features - crop recommendation using

	Solutions- Shloka Gupta, Aparna Bhonde, Akshay Chopade, Nishit Jain			Random Forest algorithm, fertilizer recommendation using a rule-based classification system, and crop disease detection using Efficient Net model on leaf images.
4	Soil Based Fertilizer Recommendation System for Crop Disease Prediction System - P. Pandi Selvi, P. Poornima	2021	Long- or Short-Term Memory algorithm.	The proposed system was able to analyse the soil nutrient type efficiently, kind of leaf disease present in the crop and predict the fertilizer in a proficient manner. The approach was flexible, and can be extended to the needs of the users in a better manner.
5	Classification of lady's finger plant leaf using deep learning L. Selvam, P. Kavitha	2020	Deep Learning	A custom CNN architecture is proposed in this article to classify ladies finger plant leaf image into three categories namely healthy, disease and leaf burn. The dataset contains 1088 samples of lady's finger plant leaf images, among which 457 images are identified as healthy (non-disease) leaves, 509 images as disease and pest infected and 122 images as leaf burn due to fertilizer overdose. The images were taken directly from the agriculture farms of different villages of Tiruvannamalai district, Tamil Nadu, India. The proposed CNN architecture achieved 96% classification accuracy.
6	Plant Leaf Disease Recognition Using FastAI Image Classification Aditya Chakraborty, Debarun Kumer, K. V. Deeba	2021	FastAI Image Classification	The motivation of this paper therefore is to solve all these issues by building a light-weight and cost-efficient deep learning architecture with the proposed DenseNet-121 model that classifies leaf images from a dataset called 'PlantDoc' across 28 classes with 1874 training images and 468 validation images. A separate test dataset is held out only for checking model performance on unknown data. Implementation is done using Fastai

				framework, because of its faster computational power, easy workflow, and unique data cleaning functionalities. Overall, the classification accuracy achieved is 92.5%.
7	Corn Leaf Diseases Diagnosis Based on K-Means Clustering and Deep Learning Helong Yu, Jiawen Liu, Chengcheng Chen, Ali Asghar Heidari, Qian Zhang, Huiling Chen, Majdi M. Mafarja, H. Turabieh	2021	K-means clustering and an improved deep learning model	This paper proposes a method based on K-means clustering and an improved deep learning model for accurately diagnosing three common diseases of corn leaves: grey spot, leaf spot, and rust. First, to diagnose three diseases, use the K-means algorithm to cluster sample images and then feed them into the improved deep learning model. This paper investigates the impact of various k values (2, 4, 8, 16, 32, and 64) and models (VGG-16, ResNet18, Inception v3, VGG-19, and the improved deep learning model) on corn disease diagnosis. The experiment results indicate that the method has the most significant identification effect on 32-means samples, and the diagnostic recall of leaf spot, rust, and gray spot disease is 89.24 %, 100 %, and 90.95 %, respectively. Similarly, VGG-16 and ResNet18 also achieve the best diagnostic results on 32-means samples, and their average diagnostic accuracy is 84.42% and 83.75%. In addition, Inception v3 (83.05%) and VGG-19 (82.63%) perform best on the 64-means samples. For the three corn diseases, the approach cited in this paper has an average diagnostic accuracy of 93%. It has a more significant diagnostic effect than the other four approaches and can be applied to the agricultural field to protect crops.
8	Detecting	2022	Machine Learning	The sample images are collected and

	Turmeric Taphrina Maculans Disease using Machine Learning Algorithms C. Vanitha, S. Malathy, P. Shenbagavalli, S. Krishna, K. Kavin		Algorithm	dataset of the turmeric leaf is prepared. It is an image processing technique. The conversion of image is done by analysing the image. Plant illness ID is the main area in farming. The ID of plant sicknesses require close observing, and subsequently this paper embraces advances to oversee turmeric plant infections brought about by organisms to empower creation of top-notch crop yields. Different picture handling and ML methods are utilized to recognize and arrange the illnesses in turmeric leaf. The leaf pictures of various classes are pre-handled and sectioned to advance productive component extraction. ML calculations like k-implies calculation are utilized.
9	Plant Disease Prediction and classification using Deep Learning ConvNets A. Lakshmanarao, M. Babu, T. Kiran	2021	Deep Learning ConvNets	In this paper, we applied "Convnets" for plant disease detection and classification. We collected a Plant Village dataset from Kaggle. It contains images of 15 different classes of plant leaves of three different plants potato, pepper, tomato. We divided the dataset into three datasets and applied Convnets on three datasets. We achieved an accuracy of 98.3%,98.5%,95% for potato plant disease detection, pepper plant disease detection, tomato plant disease detection. Experimental results have shown that our model achieved a good accuracy rate for plant leaf disease detection and classification.
10	Multi-Level Deep Learning Model for Potato Leaf Disease Recognition Javed Rashid, I. Khan, Ghulam	2021	Deep Learning	In this research, a multi-level deep learning model for potato leaf disease recognition has developed. At the first level, it extracts the potato leaves from the potato plant image using the YOLOv5 image segmentation technique. At the second level, a novel

	Ali, Sultan H. Almotiri, Mohammed A. Alghamdi, Khalid Masood			deep learning technique has been developed using a convolutional neural network to detect the early blight and late blight potato diseases from potato leaf images. The proposed potato leaf disease detection model was trained and tested on a potato leaf disease dataset. The potato leaf disease dataset contains 4062 images collected from the Central Punjab region of Pakistan. The proposed deep learning technique achieved 99.75% accuracy on the potato leaf disease dataset. The performance of the proposed techniques was also evaluated on the Plant Village dataset. The proposed technique is also compared with the state-of-the-art models and achieved significantly concerning the accuracy and computational cost.

2.3 PROBLEM STATEMENT

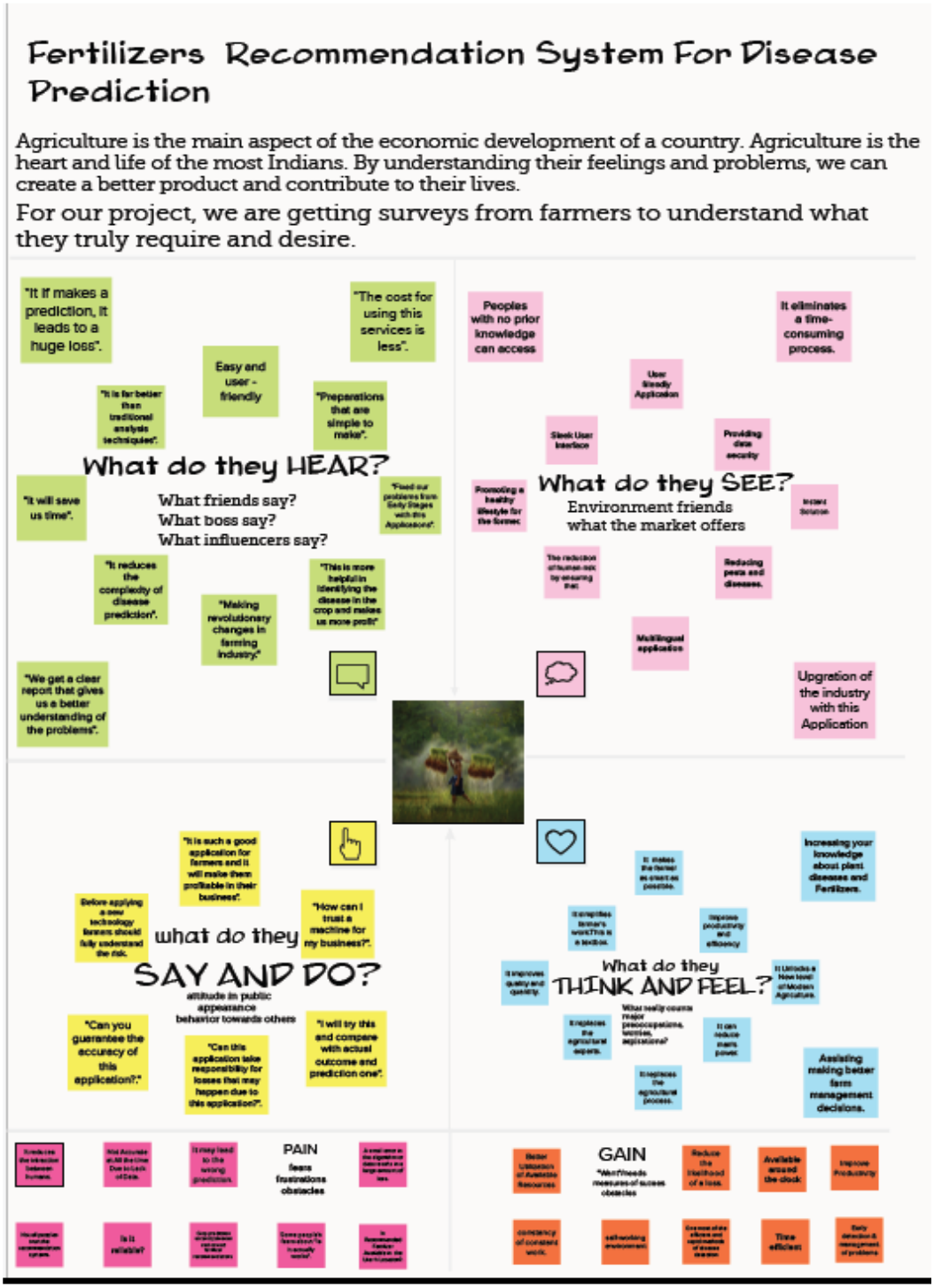
- Person A owns his own farmland and is engaged in agriculture, while person B grows crops at home. They both faced a problem in choosing fertilizer and controlling of plant diseases.
- They want to know the best fertilizer recommendations for plants with the disease.
- Farmer has faced huge losses for a long time.
- This problem is usually faced by most farmers and gardeners.
- They need to know the results immediately.

Who does the problem affect?	This problem affects the persons who do agriculture and gardeners.
What is the issue?	Disease in crops and plants. This disease reduces the plants growth and productivity. Plant diseases in general are caused by abnormal physiological functions of plants.
Where does the issue occur?	This problem exists on farmlands as well as on homegrown plants.
Why is it important that we fix the problem?	It is important for peoples healthy life.it is required for the growth of better quantity & quality food products.it is important to maximise the crop yield.
What solution to solve this issue?	An automated system is introduced to identify different disease on plants by checking the symptoms shown on the leaves of the plants. simply taking a photo we can easily identify disease.
What methodology used to solve this issue?	Machine learning technics are used to identify the diseases and suggest precautions that can be taken for those diseases and also suitable fertilizer is recommended.

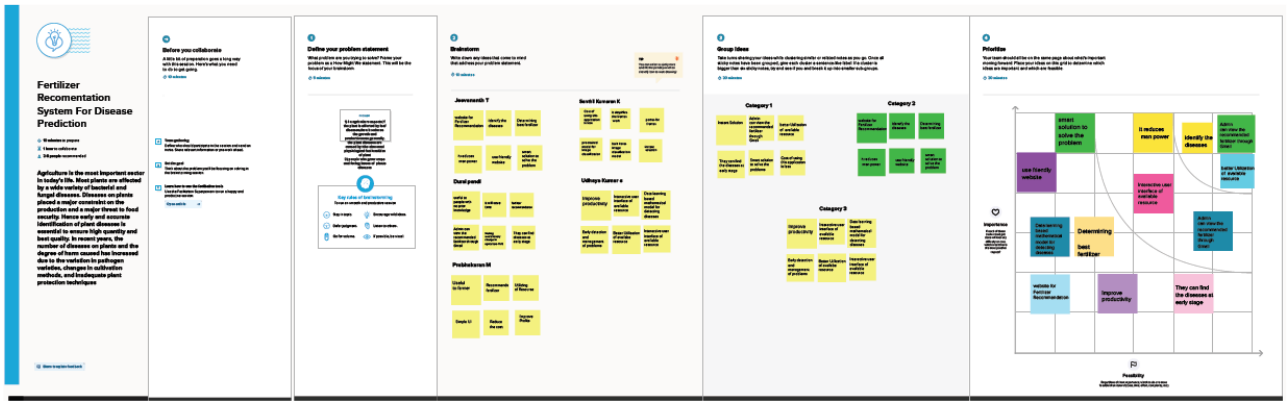
3. IDEATION& PROPOSED SOLUTION

3.1 EMPATHY MAP

A fast and exact approach to identify plant infections appears so critical for the good thing about trade and biology to agriculture. Disease control procedures can be a waste of money and time if the disease isn't properly identified and it can lead to more plant loss. Our project proposes a deep on the model will achieve its goal by categorising photos of leaves into unhealthy categories based on defect patterns.



3.2 IDEATION & BRAINSTORMING

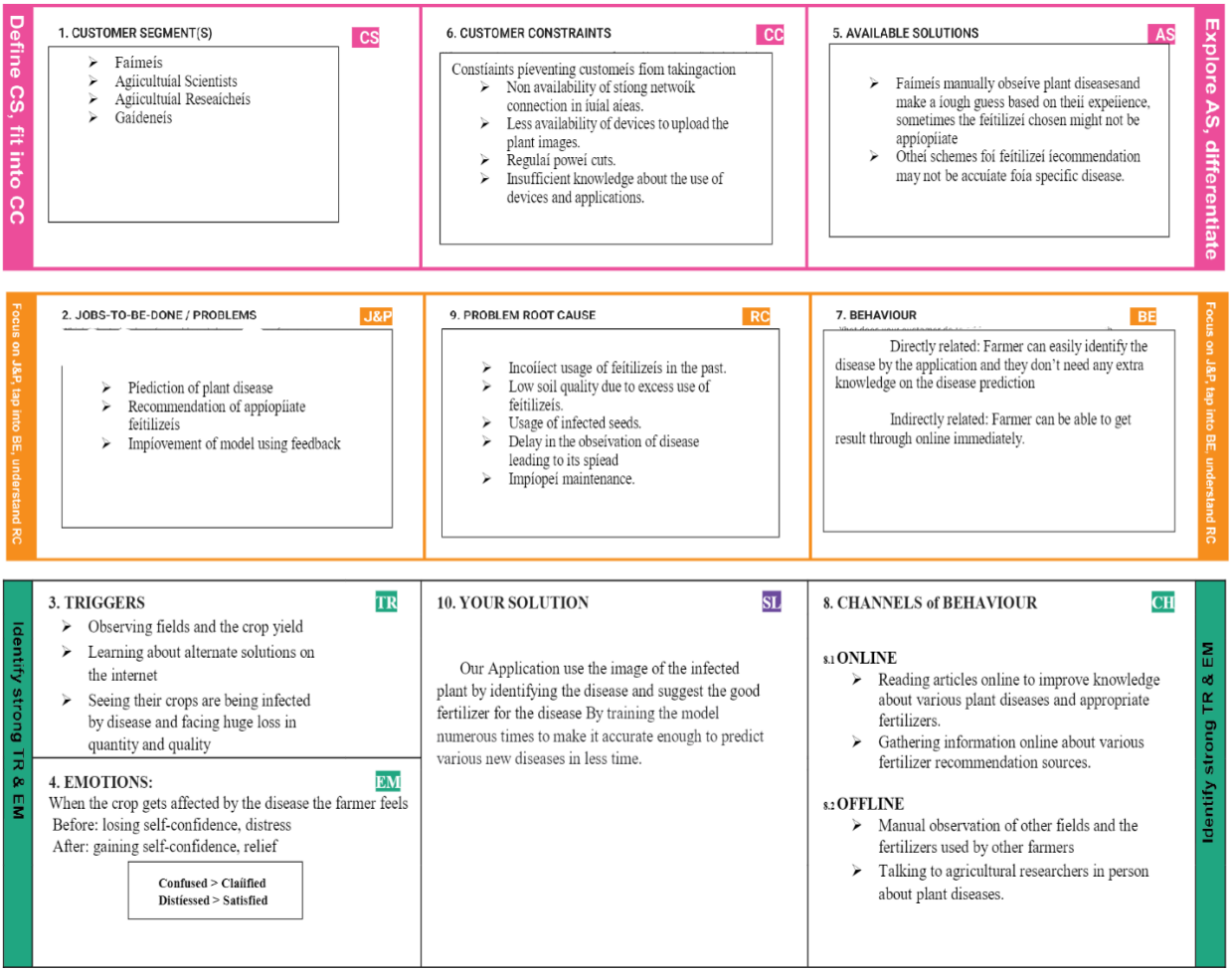


3.3 PROPOSED SOLUTION

PARAMETER	DESCRIPTION
Problem statement (Problem to be solved)	In agriculture precautions has to be taken to save the plant6s from disease. Hence this application is used to predict the disease in plants crops grown by farmers and gardeners & provide a way to cure and nurture it.
Idea/solution description	The farmer and gardener can upload the picture of the infected plant or crop and this system will predict the disease and provide remedies along with the fertilizer recommendation.
Novelty/Uniqueness	This application recommends the best fertilizer for the plant and they can consult with the agricultural experts. they can also report the improvement of the plants after using the fertilizer.

Social impact/customer satisfaction	Helps farmers to get good yield out of the people will get good quality products. this application will satisfy the farmer & gardener needs.it will be more interactive
Business model (revenue model)	This application can be given to farmers in subscription bases with some ideas. Recommending fertilizer and places that have so they can get commission out of it.
Scalability of the solution	This application can be improved by adding online purchase of the fertilizer the farmers can switch to the language they are familiar with.

3.4 PROBLEM SOLUTION FIT



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

- Business Rules
- Transaction corrections, adjustments, and cancellations
- Administrative functions
- Authentication
- Authorization levels
- Audit Tracking
- External Interfaces
- Certification Requirements
- Reporting Requirements
- Historical Data

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Specific characteristics	It identifies the diseases especially rice bran diseases
FR-4	Functions	The proposed methods uses the SVM to classify tree leaves, identify the diseases and suggest the fertilizer.
FR-5	Fault tolerance	This study enables a possible prediction of crop yield from the historic data collected and offers a suggestion to farmers.
FR-6	Analyze	It helps us to classify the data based on the diseases, and data extracted from the classifier is used to predict soil and crop.

4.2 NON-FUNCTIONAL REQUIREMENT

- Performance
- Scalability
- Portability
- Compatibility
- Reliability
- Availability
- Maintainability
- Security
- Localization
- Usability

Non-functional Requirements:

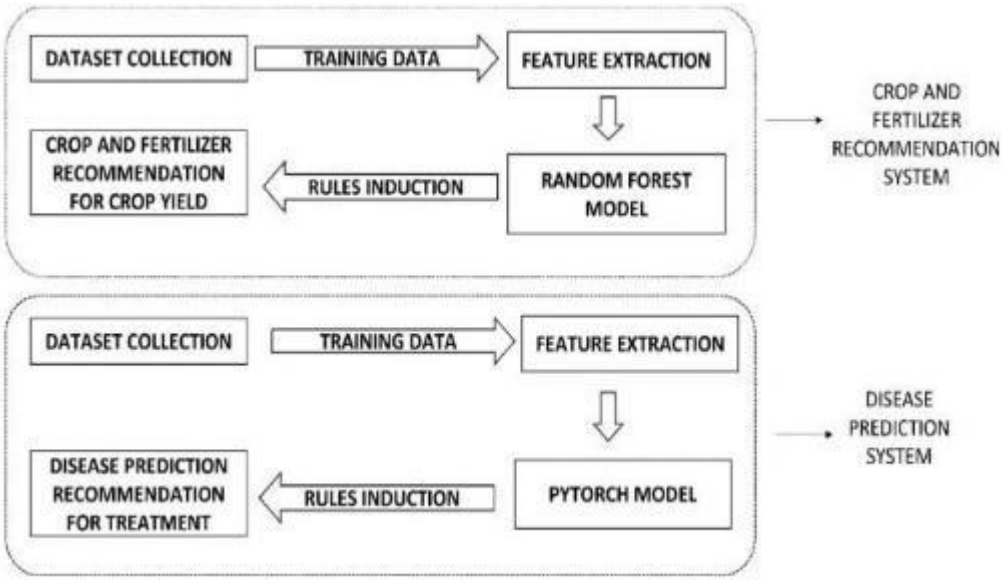
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Crop and fertilizer recommendation system help the farmer to identify the diseases.
NFR-2	**Security**	The proposed method combines two major aspects in farming , pest identification and insecticide recommendation.
NFR-3	**Reliability**	It is easy use so that health issues can be avoided.
NFR-4	**Performance**	Precision fertilizer and precision crops is mostly used. They used to predict the crop in artificial intelligence.
NFR-5	**Availability**	reduces the losses as ammonia , nitrate leaching, apply the right rate, apply accurately.
NFR-6	**Scalability**	If the soil is not replenised with nutrients through fertilizing ,crop yields will deteriorate over time.

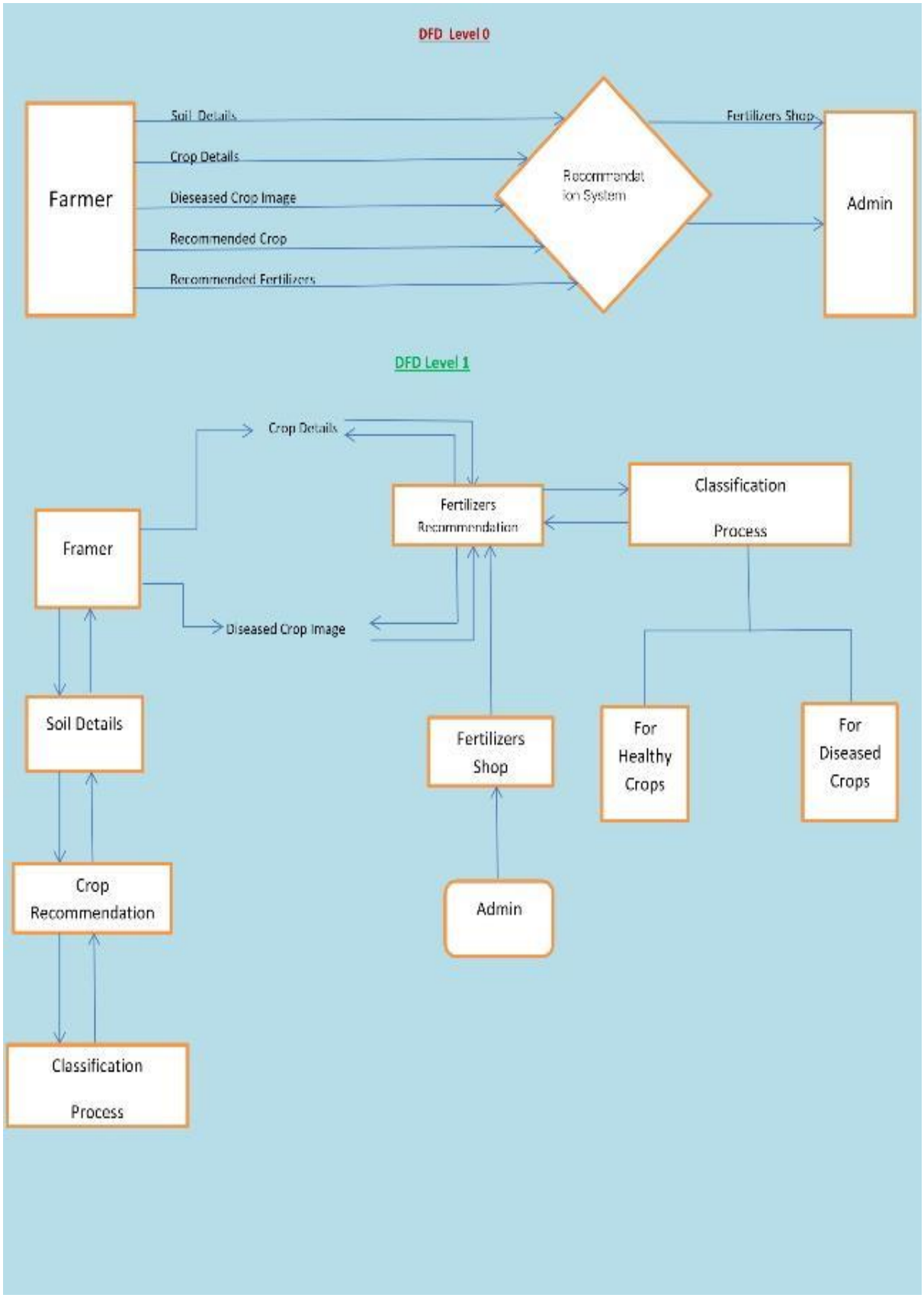
5. PROJECT DESIGN

5.1 SOLUTION & TECHNICAL ARCHITECTURE

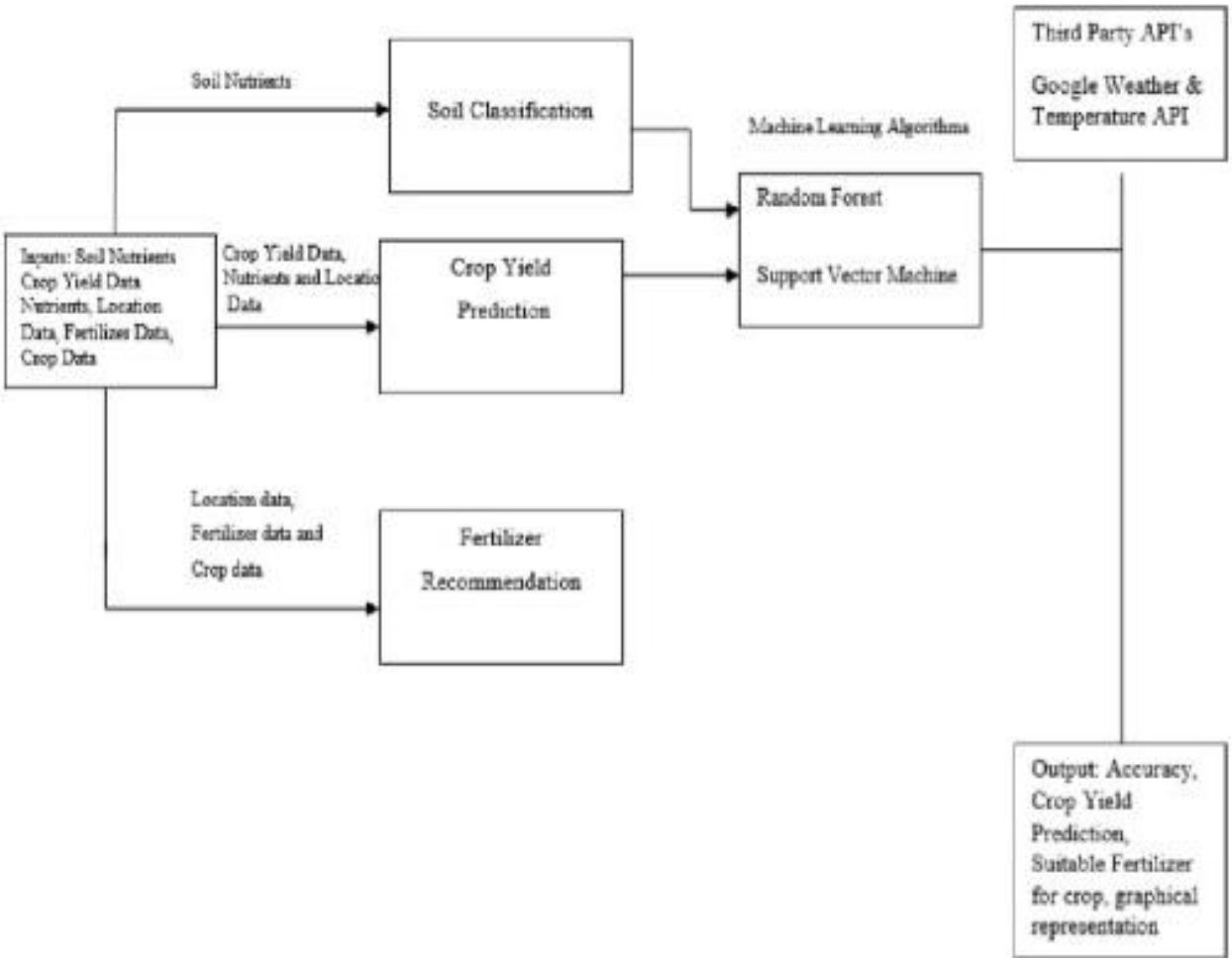
- Solution architecture is a complex process-with many sub-process-that bridges the gap between business problems and technology solutions. Its goals are to:
- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed and delivered.
-



5.2 DATA FLOW DIAGRAMS



ARCHITECTURE:



5.3 USER STORIES

User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
	Login	USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Dashboard	USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	High	Sprint-2
Customer (Webuser)	Registration	USN-4	As a user, I can register for the application through Gmail	I can register Using my username and password	High	Sprint-3
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login using my User cerdentials	High	Sprint-3
	Dashboard	USN-6	As a user,I can view the web application where I can upload my images and the fertilizer should be recommeneded	I can access my account,dashboard	High	Sprint-4
		USN-7	As a user,the fertilizer recommendeded to me should be of higher accuracy	I can access my account,dashboard	High	Sprint-4
Administrator	Login	USN-8	As a admin,I can login to the website using my login cerdentials	I can access my account,dashboard	High	Sprint-5
	Dashboard	USN-9	As a admin,I can view the dashboard of the application	I can access my account,dashboard	High	Sprint-5

6. PROJECT PLANNING AND SCHEDULING

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points (Total)	Priority	Team Members
Sprint-1	Model Creation and Training (Fruits)		Create a model which can classify diseased fruit plants from given images. I also need to test the model and deploy it on IBM Cloud	8	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Model Creation and Training (Vegetables)		Create a model which can classify diseased vegetable plants from given images	2	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points (Total)	Priority	Team Members
Sprint-2	Model Creationand Training (Vegetables)		Create a model which can classify diseased vegetable plants from given images and train onIBM Cloud	6	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Registration	USN-1	As a user, I can register by entering my email, password, and confirming my password or viaOAuth API	3	Medium	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Upload page	USN-2	As a user, I will be redirected to a page where Ican upload my pictures of crops	4	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Suggestion results	USN-3	As a user, I can view the results and then obtainthe suggestions provided by the ML model	4	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Base Flask App		A base Flask web app must be created as aninterface for the ML model	2	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K

Sprint-3	Login	USN-4	As a user/admin/shopkeeper, I can log into theapplication by entering email & password	2	High	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	User Dashboard	USN-5	As a user, I can view the previous results andhistory	3	Medium	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Integration		Integrate Flask, CNN model with Cloudant DB	5	Medium	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R
Sprint-4	Dashboard (Admin)	USN-6	As an admin, I can view other user details and uploads for other purposes	2	Medium	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Dashboard (Shopkeeper)	USN-7	As a shopkeeper, I can enter fertilizer products and then update the details if any	2	Low	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
	Containerization		Create and deploy Helm charts using Docker Image made before	2	Low	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K
						5.Bhuvanesh.K
	Containerization		Containerize Flask app using Docker	2	Low	1.Chanukya.E 2.Kaviya.K 3.Thejas.k 4.Tharani.S.R 5.Bhuvanesh.K

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	25 Oct 2022	31 Oct 2022		
Sprint-2	15	6 Days	31 Oct 2022	05 Nov 2022		
Sprint-3	15	6 Days	07 Nov 2022	12 Nov 2022		
Sprint-4	12	6 Days	14 Nov 2022	19 Nov 2022		

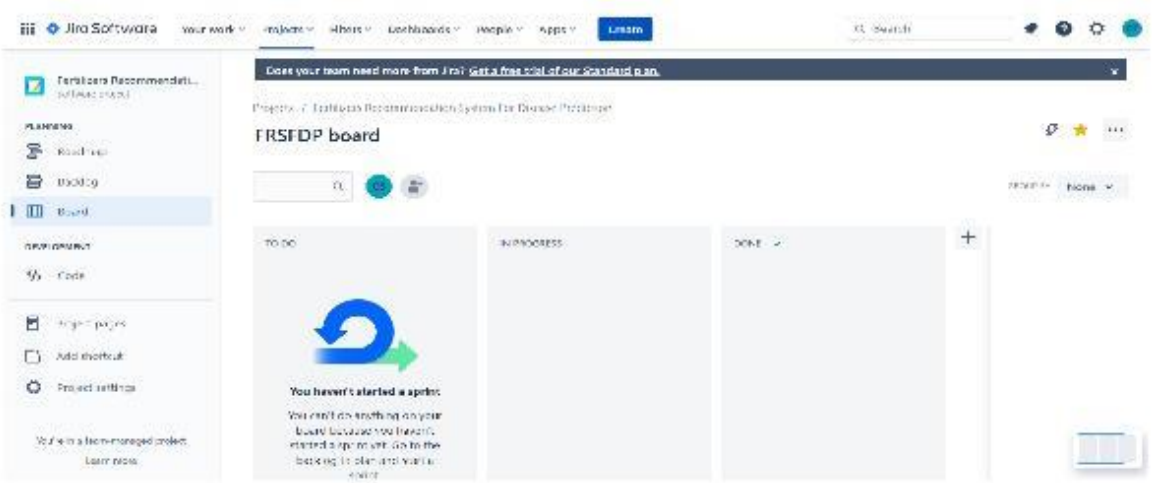
***NOTE**: Burndown charts, Velocity to be updated dynamically after end of sprints*

VELOCITY

Imagine we have a 10 days sprint duration, and the velocity of the team is 20. Let's calculate the team's average velocity per iteration unit.

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Roadmap:



REPORTS FROM JIRA

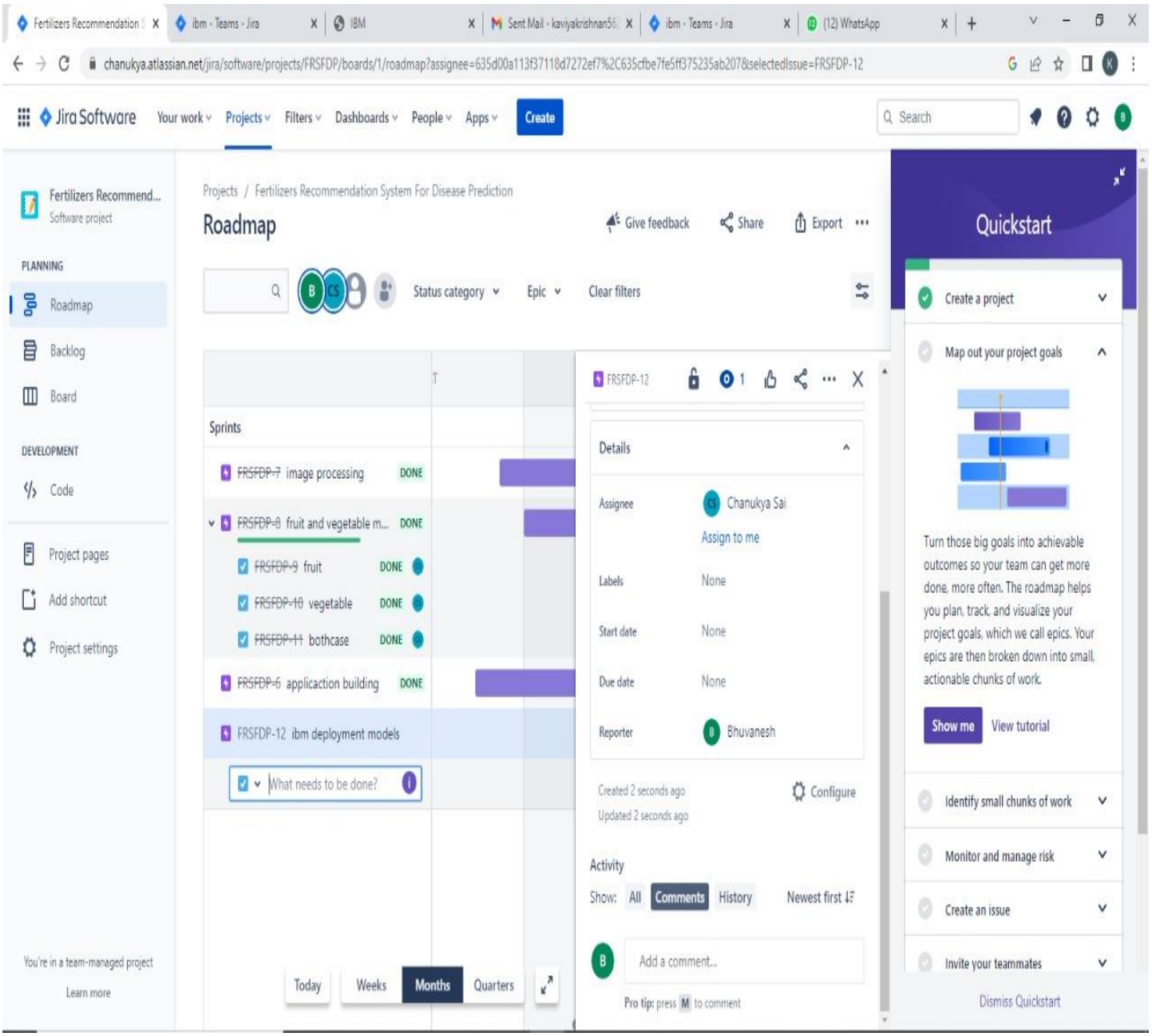
Jira Software is part of a family of products designed to help teams of all types manage work. Originally, Jira was designed as a bug and issue tracker. But today, Jira has evolved into a powerful work management tool for all kinds of use cases, from requirements and test case management to agile software development.

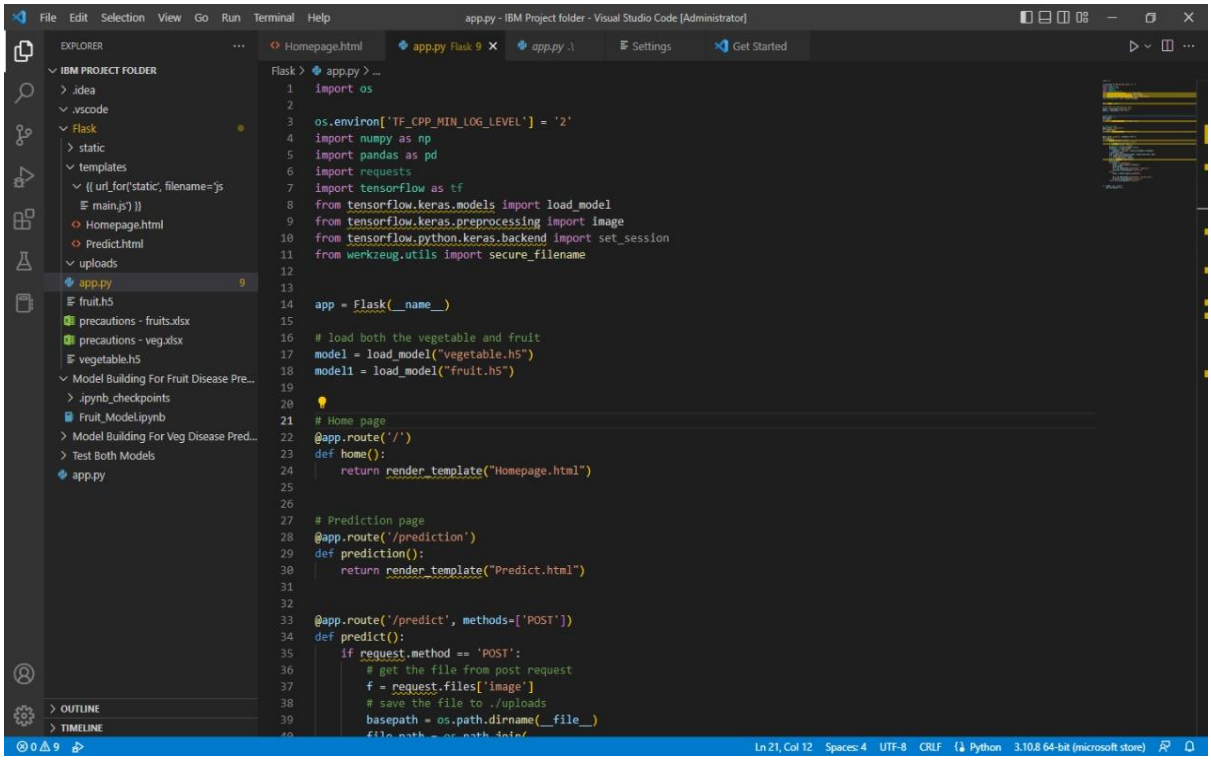
Jira is one of the best open-source tools for planning and tracking in Agile methodology. Development teams use Jira for tracking bugs and

projects, managing Scrums, and visualizing workflows with Kanban boards. Workflows in Jira make it easy to plan, track, release, and report on software.

7. CODING & SOLUTION TESTING

7.1 FEATURE 1



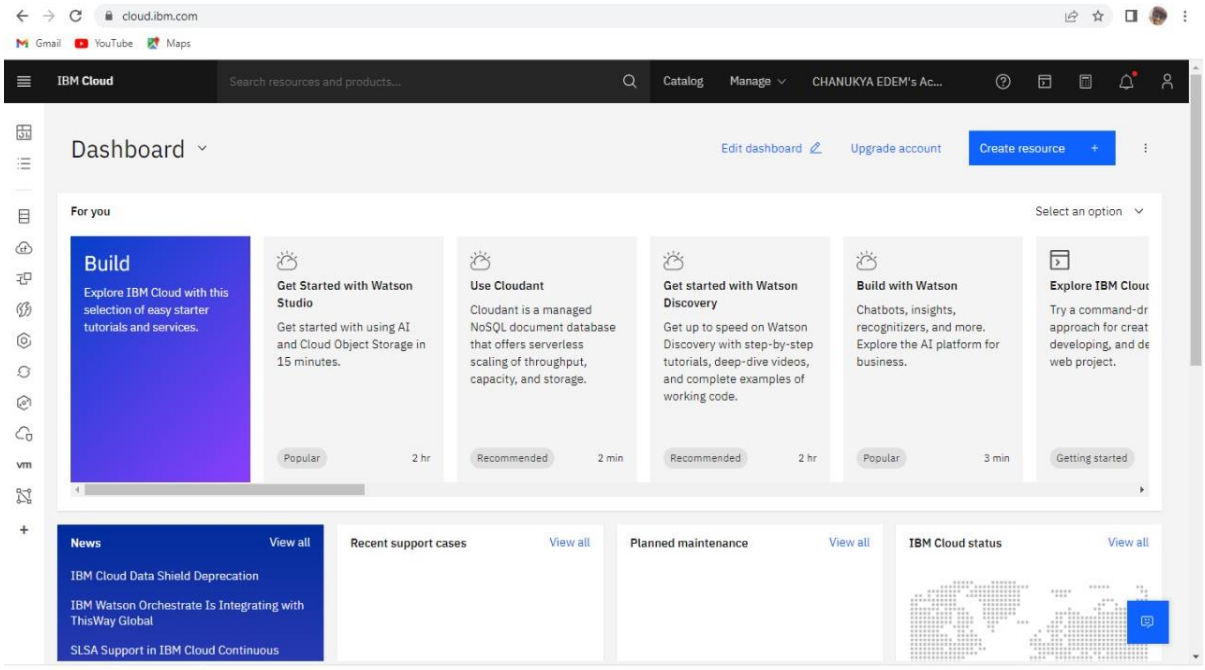


PYTHON CODE FOR FLASK:

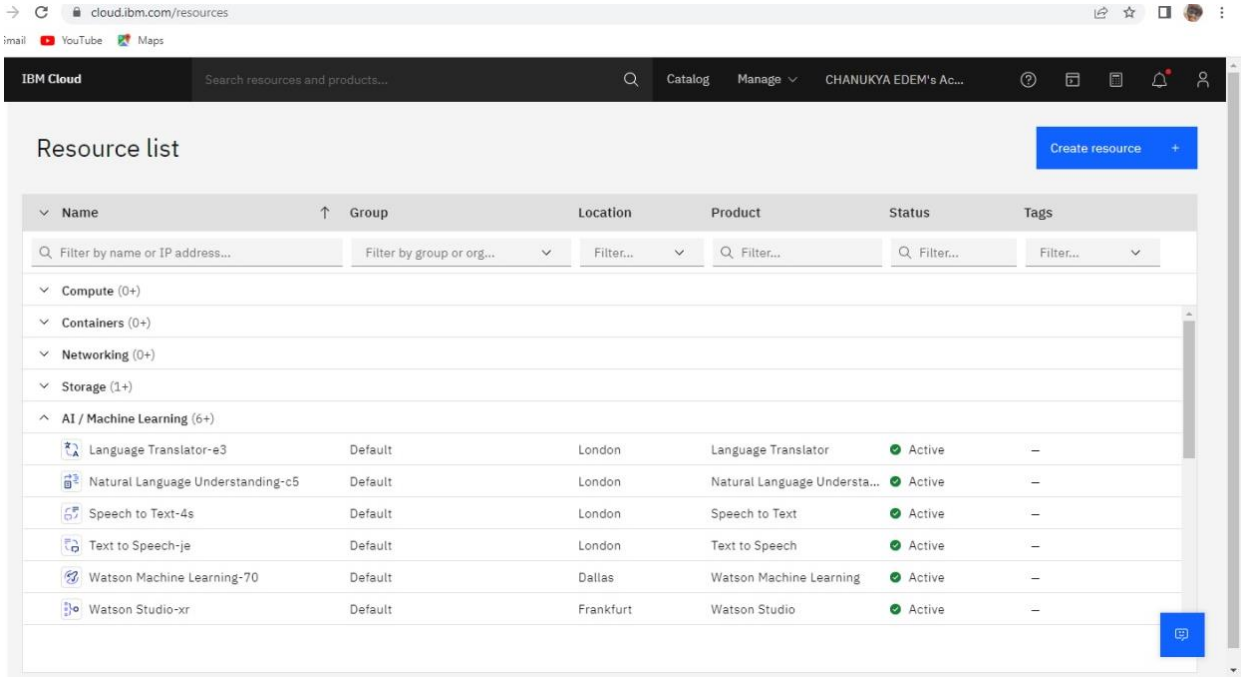
```
import requests
from tensorflow.keras.preprocessing import image
from tensorflow.keras.models import load_model
import numpy as np
import pandas as pd
import tensorflow as tf
from flask import Flask, request, render_template, redirect, url_for
import os
from werkzeug.utils import secure_filename
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)
s
```

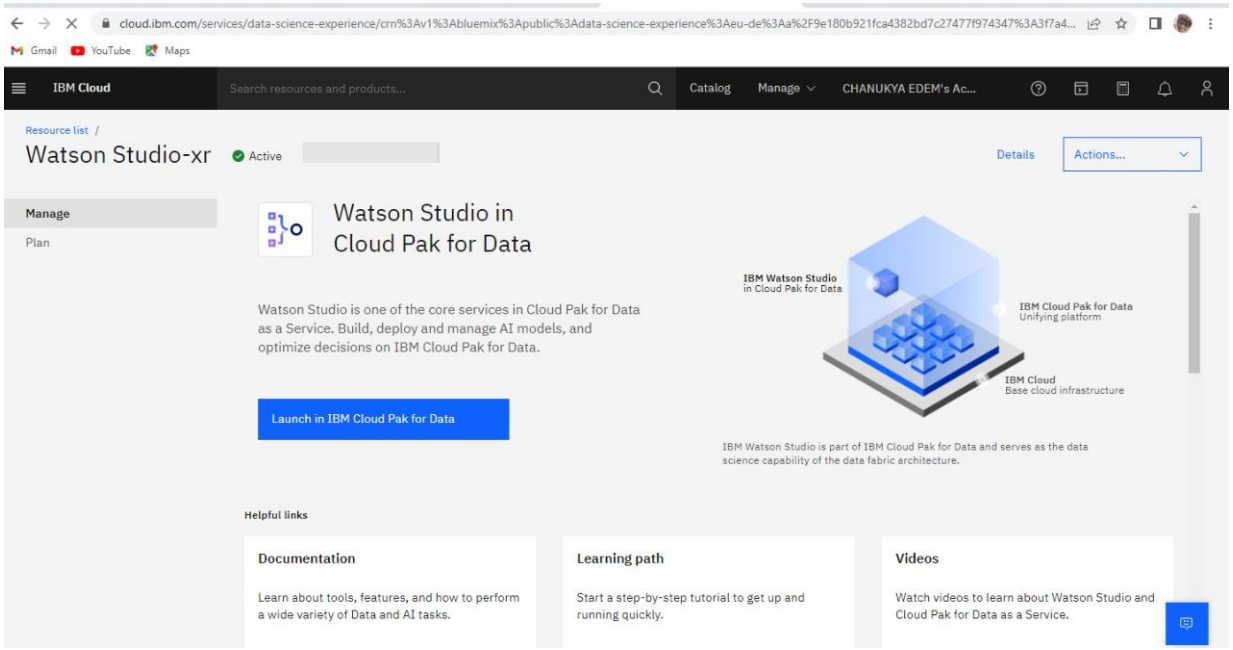
ADDING TO IBM CLOUD DEPLOYMENT:

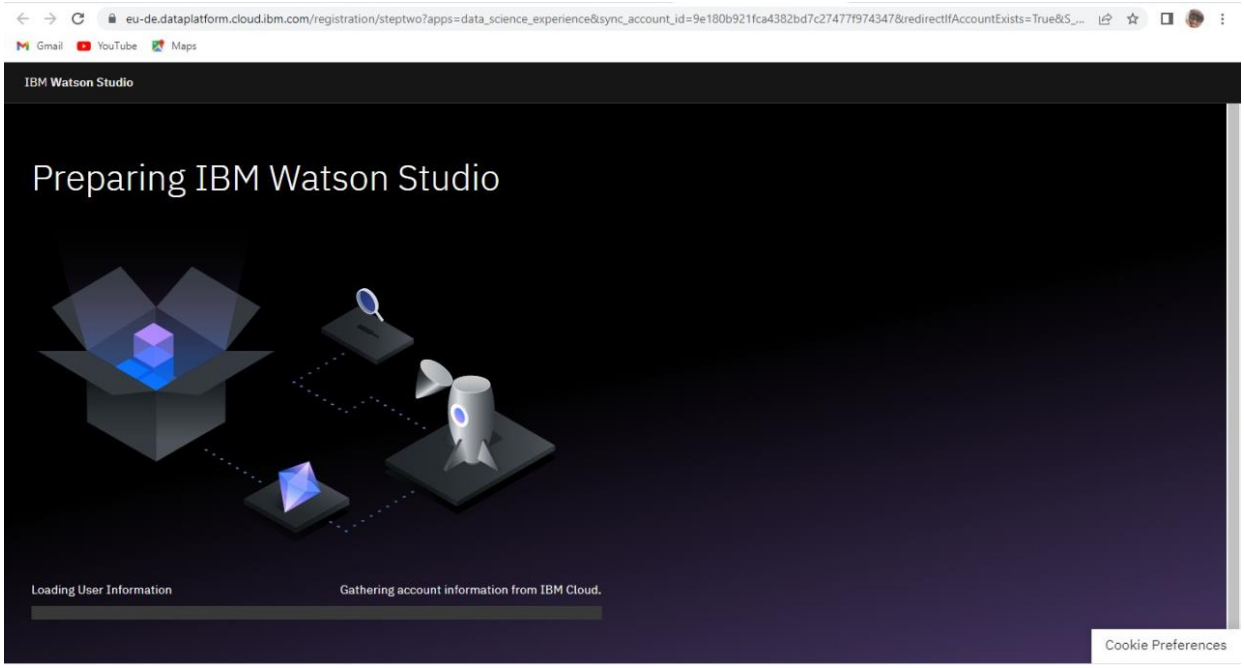


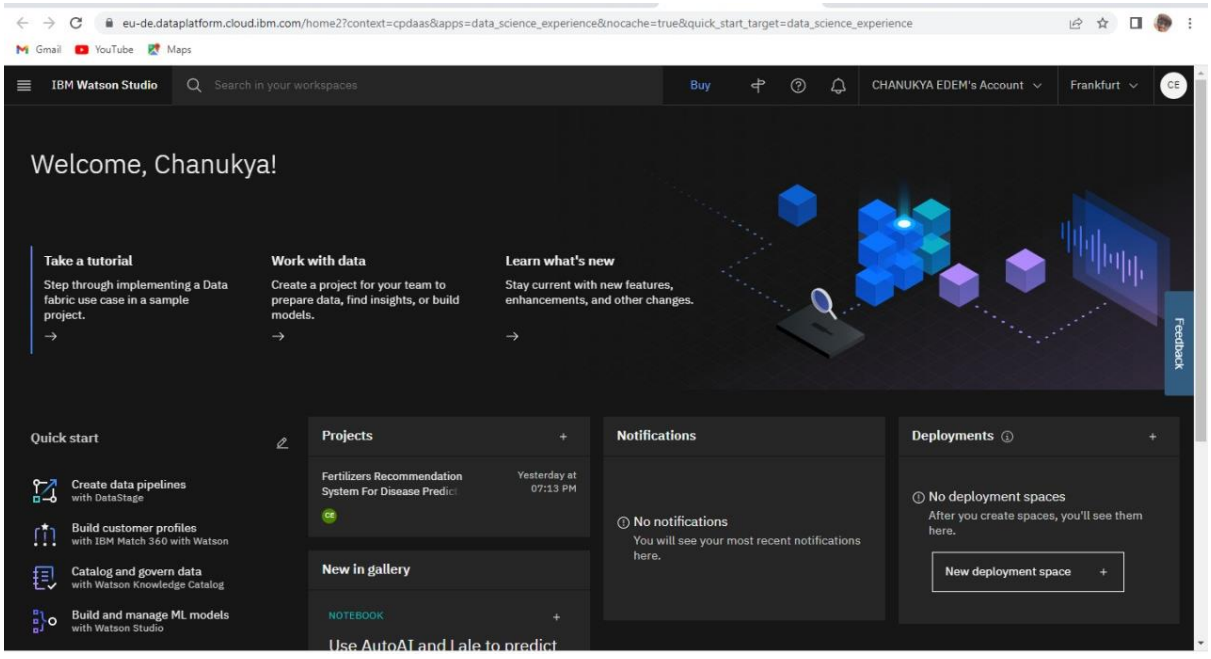
IBM CLOUD RESOURSE LIST:



IBM WATSON STUDIO:




eu-de.dataplatform.cloud.ibm.com/registration/steptwo?apps=data_science_experience&sync_account_id=9e180b921fca4382bd7c27477f974347&redirectIfAccountExists=True&S_...
Gmail
YouTube
Maps
IBM Watson Studio
Preparing IBM Watson Studio
Loading User Information
Gathering account information from IBM Cloud.
Cookie Preferences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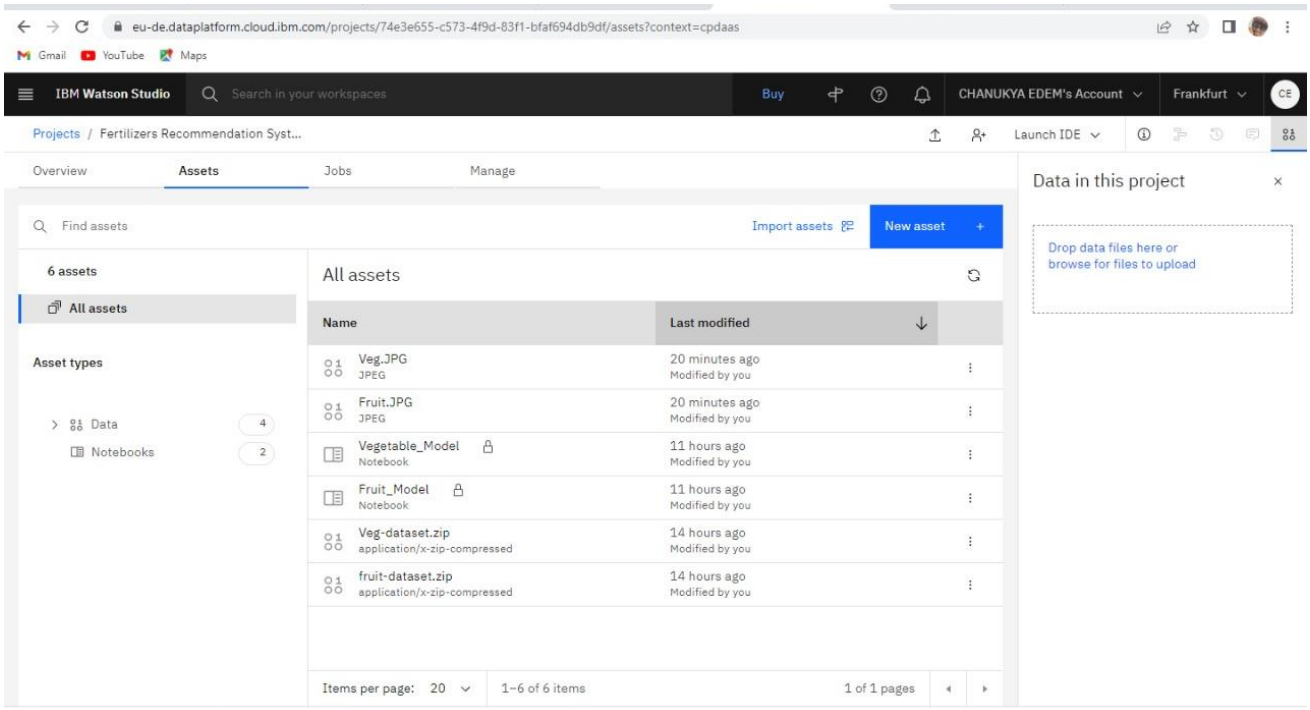
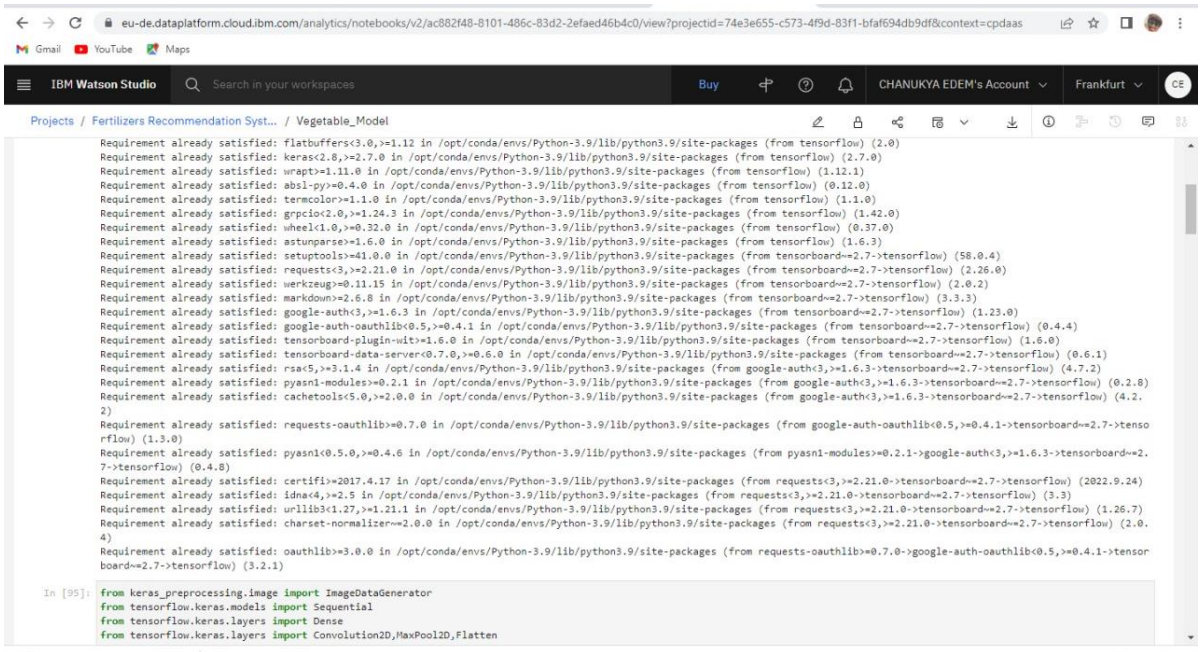
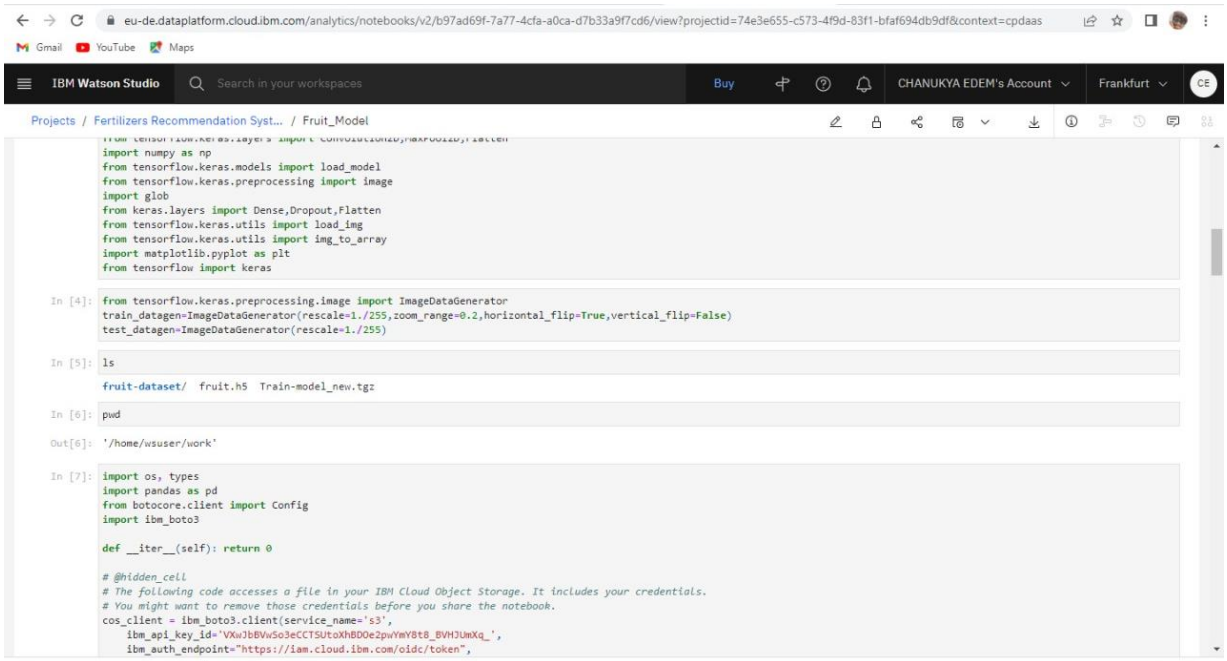
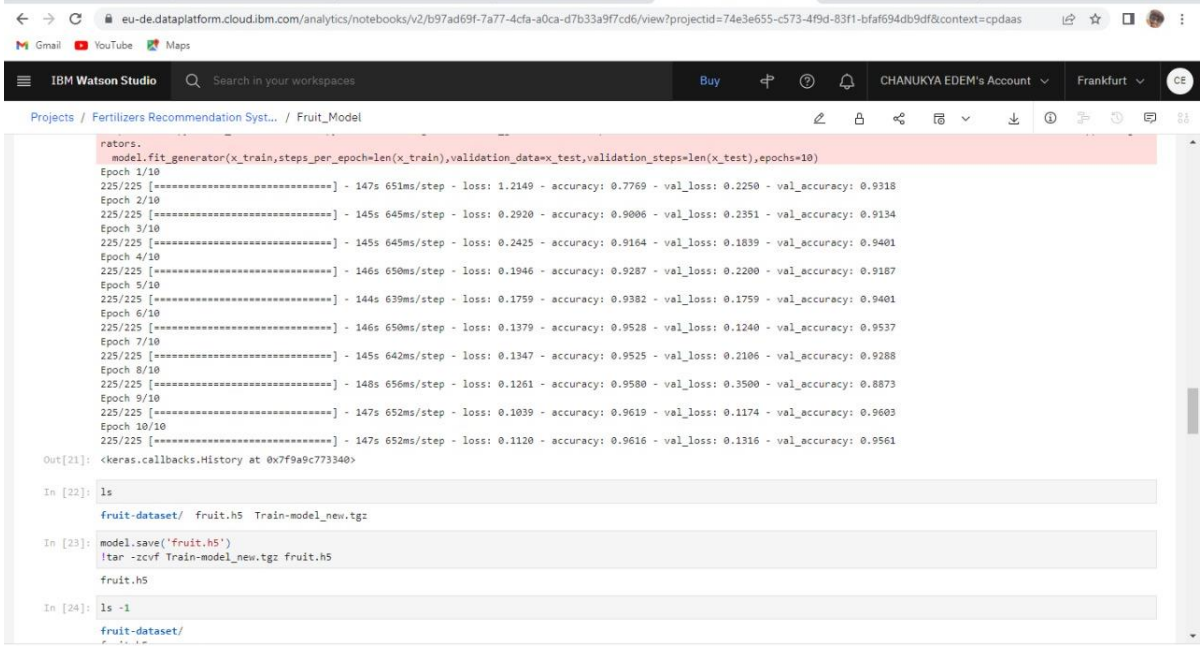
Gmail
YouTube
Maps
IBM Watson Studio
Search in your workspaces
Buy
CHANUKYA EDEM's Account
Frankfurt
CE
Welcome, Chanukya!
Take a tutorial
Step through implementing a Data fabric use case in a sample project.
Work with data
Create a project for your team to prepare data, find insights, or build models.
Learn what's new
Stay current with new features, enhancements, and other changes.
Feedback
Quick start
Create data pipelines with DataStage
Build customer profiles with IBM Match 360 with Watson
Catalog and govern data with Watson Knowledge Catalog
Build and manage ML models with Watson Studio
Projects
Fertilizers Recommendation System For Disease Predict
Yesterday at 07:13 PM
New in gallery
NOTEBOOK
Use AutoAI and Lale to predict
Notifications
No notifications
You will see your most recent notifications here.
Deployments
No deployment spaces
After you create spaces, you'll see them here.
New deployment space



CNN DEPLOYMENT IN IBM CLOUD:

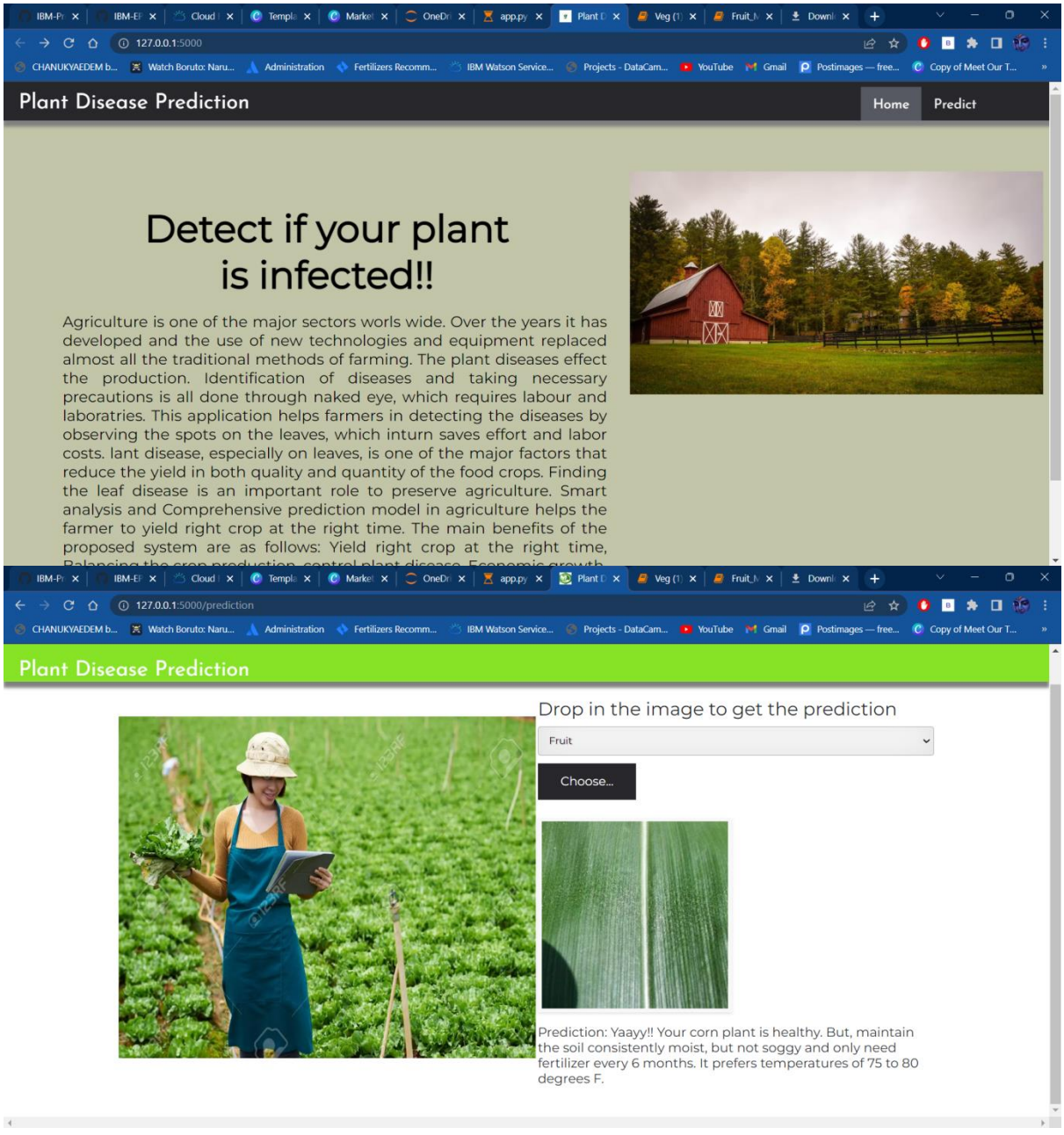


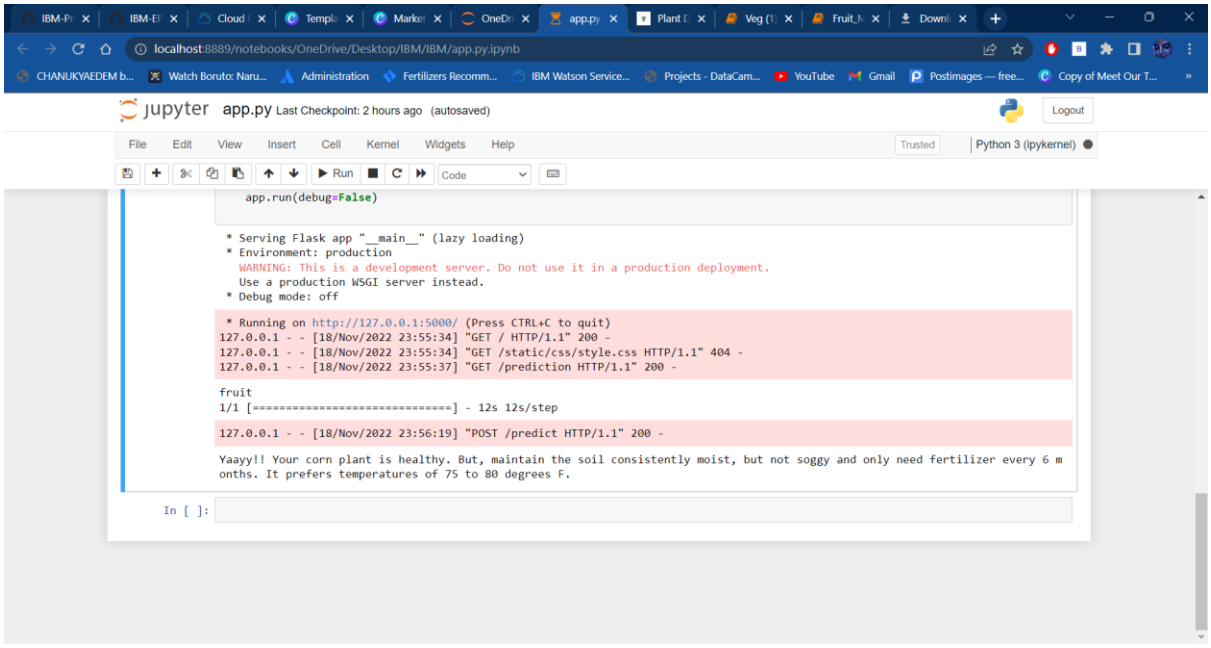

eu-de.dataplatform.cloud.ibm.com/analytics/notebooks/v2/b97ad69f-7a77-4cfa-a0ca-d7b33a9f7cd6/view?projectid=74e3e655-c573-4f9d-83f1-bfaf694db9df&context=cpdaas
Gmail
YouTube
Maps
IBM Watson Studio
Search in your workspaces
Buy
CHANUKYA EDEM's Account
Frankfurt
Projects / Fertilizers Recommendation Syst... / Fruit_Model
import numpy as np
from tensorflow.keras.models import load_model
from tensorflow.keras.preprocessing import image
import glob
from keras.layers import Dense,Dropout,Flatten
from tensorflow.keras.utils import load_img
from tensorflow.keras.utils import img_to_array
import matplotlib.pyplot as plt
from tensorflow import keras
In [4]:
from tensorflow.keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255,zoom_range=0.2,horizontal_flip=True,vertical_flip=False)
test_datagen=ImageDataGenerator(rescale=1./255)
In [5]:
ls
fruit-dataset/ fruit.h5 Train-model_new.tgz
In [6]:
pwd
Out[6]:
'/home/wsuser/work'
In [7]:
import os, types
import pandas as pd
from botocore.client import Config
import ibm_boto3
def __iter__(self): return 0
# @hidden_cell
# The following code accesses a file in your IBM Cloud Object Storage. It includes your credentials.
# You might want to remove those credentials before you share the notebook.
cos_client = ibm_boto3.client(service_name='s3',
ibm_api_key_id='VXwJbBVwSo3eCCTSUtoXhBDOe2pwYmY8t8_BVH3UmXq_',
ibm_auth_endpoint="https://iam.cloud.ibm.com/oidc/token",


eu-de.dataplatform.cloud.ibm.com/analytics/notebooks/v2/b97ad69f-7a77-4cfa-a0ca-d7b33a9f7cd6/view?projectid=74e3e655-c573-4f9d-83f1-bfaf694db9df&context=cpdaas
Gmail
YouTube
Maps
IBM Watson Studio
Search in your workspaces
Buy
CHANUKYA EDEM's Account
Frankfurt
Projects / Fertilizers Recommendation Syst... / Fruit_Model
rators.
model.fit_generator(x_train,steps_per_epoch=len(x_train),validation_data=x_test,validation_steps=len(x_test),epochs=10)
Epoch 1/10
225/225 [==========] - 147s 651ms/step - loss: 1.2149 - accuracy: 0.7769 - val_loss: 0.2250 - val_accuracy: 0.9318
Epoch 2/10
225/225 [==========] - 145s 645ms/step - loss: 0.2920 - accuracy: 0.9006 - val_loss: 0.2351 - val_accuracy: 0.9134
Epoch 3/10
225/225 [==========] - 145s 645ms/step - loss: 0.2425 - accuracy: 0.9164 - val_loss: 0.1839 - val_accuracy: 0.9401
Epoch 4/10
225/225 [==========] - 146s 650ms/step - loss: 0.1946 - accuracy: 0.9287 - val_loss: 0.2200 - val_accuracy: 0.9187
Epoch 5/10
225/225 [==========] - 144s 639ms/step - loss: 0.1759 - accuracy: 0.9382 - val_loss: 0.1759 - val_accuracy: 0.9401
Epoch 6/10
225/225 [==========] - 146s 650ms/step - loss: 0.1379 - accuracy: 0.9528 - val_loss: 0.1240 - val_accuracy: 0.9537
Epoch 7/10
225/225 [==========] - 145s 642ms/step - loss: 0.1347 - accuracy: 0.9525 - val_loss: 0.2106 - val_accuracy: 0.9288
Epoch 8/10
225/225 [==========] - 148s 656ms/step - loss: 0.1261 - accuracy: 0.9580 - val_loss: 0.3500 - val_accuracy: 0.8873
Epoch 9/10
225/225 [==========] - 147s 652ms/step - loss: 0.1039 - accuracy: 0.9619 - val_loss: 0.1174 - val_accuracy: 0.9603
Epoch 10/10
225/225 [==========] - 147s 652ms/step - loss: 0.1120 - accuracy: 0.9616 - val_loss: 0.1316 - val_accuracy: 0.9561
Out[21]:
<keras.callbacks.History at 0x7f9a9c773340>
In [22]:
ls
fruit-dataset/ fruit.h5 Train-model_new.tgz
In [23]:
model.save('fruit.h5')
!tar -zcvf Train-model_new.tgz fruit.h5
fruit.h5
In [24]:
ls -1
fruit-dataset/

7.2 FEATURE 2

HTML PAGES FOR WEB APPLICATION





8. ADVANTAGES

- The system comes with a model to be precise and accurate in predicting crop yield and deliver the end user with proper recommendations about required fertilizer ratio based on atmospheric and soil parameters of the land which enhance to increase the crop yield and increase farmer revenue. The prediction of crop yield based on location and proper implementation of algorithms have proved that the higher crop yield can be achieved. From above work I conclude that for soil classification Random Forest is good with accuracy 86.35% compare to Support Vector Machine. For crop yield prediction Support Vector Machine is good with accuracy 99.47% compare to Random Forest algorithm. The work can be extended further to add following functionality. Mobile application can be build to help farmers by uploading image of farms. Crop diseases detection using image processing in which user get pesticides based on disease images. Implement Smart Irrigation System for farms to get higher yield.
- Fertilizers have all nutrients required for plants growth.

- It is soluble and easily absorbed by plants.
- It enhances the metabolism of plants.
- It is easily available in the market.
- Highly needed for large production.

9. CONCLUSION

- The core strategy of this project is to predict the crop based on the soil nutrient content and the location where the crop is growing. This system will help he farmers to choose the right crop for their land and to give the suitable amount of fertilizer to produce the maximum yield. The Support Vector Machine algorithm helps to predict the crop the precisely based on the pre-processed crop data. This system will also help the new comers to choose the crop which will grow in their area and produce them a good profit.
- A decent amount of profit will attract more people towards the agriculture. Also, the crop growth is based on the climate conditions in the particular area and the seasonal monsoons happens now are unpredictable, hence it is easy for the farmers when the prediction result is also based on the climatic conditions. Live weather prediction will also help the users to predict the crop water needs and also it will help the farmers to decrease the crop damage due to the rain or drought
- The prediction of crop yield based on soil data and proper implementation of algorithms have proved that a higher crop yield can be achieved. From the above work, we conclude that for soil classification Random Forest is a suitable algorithm with an accuracy of 99.09% compare to Gaussian Naive Bayes. The work can be extended further to add the following functionality. Building a website can be built to help farmers by uploading an image of farms. Crop diseases detection uses image processing in which users get pesticides based on disease images and Fertilizer prediction based on soil condition.

- By categorizing the soil samples according to the soil type, land type and macro nutrients Nitrogen (N), Phosphorus (P) and Potassium (K) present in the soil the suitable crop along with its appropriate fertilizer is suggested to the agricultural stakeholder. The month in which the yield will be high is also suggested to the user. The yield calculation is also provided for the crop selected by the farmer. The proposed crop recommendation system provides 82% of accuracy.

10. FUTURE SCOPE

- The future work is to implement Machine Learning Algorithms like Ensemble Classifiers to predict the crop yield and recommend the crop with appropriate fertilizer. In the existing system only soil characteristics were considered to provide crop recommendations. In the future work the climatic parameters will also be taken into account to provide crop recommendations. Also, the method can be extended to include diverse varieties of crop to be cultivated and to analyse its performance.

- 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.

11. APPENDIX

DEMO LINK:

https://youtu.be/Eep50KQQcL4

GIT-HUB I'D:

https://github.com/IBM-EPBL/IBM-Project-47754-1660802021