IBM NAALAIYA THIRAN 2022-2023 PROJECT REPORT

FERTILIZER RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

TEAM ID-PNT2022TMID29514

INTRODUCTION

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.

PROJECT OVERVIEW

The Fertilizers Recommendation System For Disease Prediction is a project that aims to develop a system that can recommend the best type of fertilizer for a particular crop, based on the specific disease that the crop is susceptible to. The system will make use of data mining and machine learning techniques to learn from past data and predict the best type of fertilizer to use for a given crop and disease.

PURPOSE

The purpose of the fertilizer recommendation system is to predict the likelihood of disease and provide recommendations for preventive measures.

EXCISTING PROBLEM

The problem with current fertilizer recommendation systems is that they only take into account the nutrient needs of the crop, without considering the specific disease that the crop is susceptible to. This can lead to the use of too much or too little fertilizer, which can either stunt the growth of the crop or allow the disease to spread.

A more effective fertilizer recommendation system would take into account the specific disease that the crop is susceptible to and recommend the amount of fertilizer needed to prevent or treat the disease. This would ensure that the crop receives the optimal amount of nutrients, while also preventing the spread of disease.

REFERENCES

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- Cloud Based Automated Irrigation And Plant Leaf Disease Detection System Using An Android Application. International Conference on Electronics, Communication and Aerospace Technology, ICECA 2017.
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PROBLEM STATEMENT DEFINITION

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love.

A well-articulated customer problem statement allows you and your team to find the ideal solution for the challenges your customers face. Throughout the process, you'll also be able to empathize with your customers, which helps you better understand how they perceive your product or service.

EXAMPLE

IDEATION AND PROPOSED SOLUTION

EMPATHY MAP CANVAS

1. An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.
2. It is a useful tool to helps teams better understand their users.
3. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

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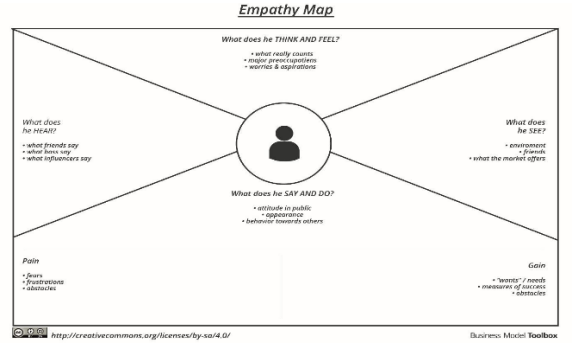
EXAMPLE



IDEATION AND BRAINSTORMING

It is difficult to predict the fertilizer requirement of crops at different locations of India. It is difficult to identify the location where the crops are grown. Fertilizer recommendation system will help farmers in making decisions on fertilizer use.

The proposed system will bring a revolution in the field of agriculture. The system will help the farmers to reduce the production costs by reducing the overuse of fertilizers. The system will also help the farmers to reduce the environmental impact of the fertilizer use. It will also provide the information about the quality of the fertilizers.

BRAINSTORMING

1. Fertilizers recommendation system for disease prediction can help farmers to choose the right fertilizer for their crops and prevent disease.

2. The system can recommend the right fertilizer based on the type of crop, the climate, and the soil conditions.

3. The system can also take into account the farmer's budget and the expected yield of the crop.

4. The system can help farmers to save money on fertilizers and reduce the risk of crop diseases.

PROPOSED SOLUTION

The proposed solution for the fertilizer recommendation system for disease prediction of crops is to develop a model that can predict the probability of a crop disease based on the fertilizer used. The model will be trained on data from past years, which will include information on the type of fertilizer used and the incidence of crop diseases. The model will be able to take into account the different types of fertilizer used and the different conditions under which they are used. The model will be able to predict the probability of a crop disease based on the fertilizer used and the conditions under which it is used.

PROBLEM SOLUTION FIT

There is no one-size-fits-all solution to this problem, as the best fertilizer recommendation system for disease prediction of crops will vary depending on the

specific needs of the farmer. However, some tips on how to create an effective fertilizer recommendation system for disease prediction of crops include:

1. Use data from previous years to predict disease risk in the current year. This data can be collected from weather reports, field observations, and yield data.

2. Use disease models to predict the likelihood of disease outbreaks. These models take into account factors such as weather, crop type, and field history.

3. Use GIS technology to map out areas of high disease risk. This information can be used to target specific areas for fertilizer applications.

4.Work with local extension agents and crop consultants to develop a customized fertilizer recommendation system for your farm.

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENT

Following are the functional requirements of the proposed solution.

FR-NO	FUNCTIONAL REQUIREMENT	SUB REQUIREMENT(STORY OR SUB TASK)
FR-1	user registration	Registration through Form
FR-2	user confirmation	Confirmation via Emai
FR-3	user profile	Filling the profile page after logging in
FR-4	uploading dataset(leaf)	Images of the leaves are to be uploaded
FR-5	requesting solution	Uploaded images is compared with the pre-defined Model and solution is generated
FR-6	downloading solution	The Solution in pdf format which contains the recommendations of fertilizers and the possible diseases

NON-FUNCTIONAL REQUIREMENT

Following are the non-functional requirements of the proposed solution

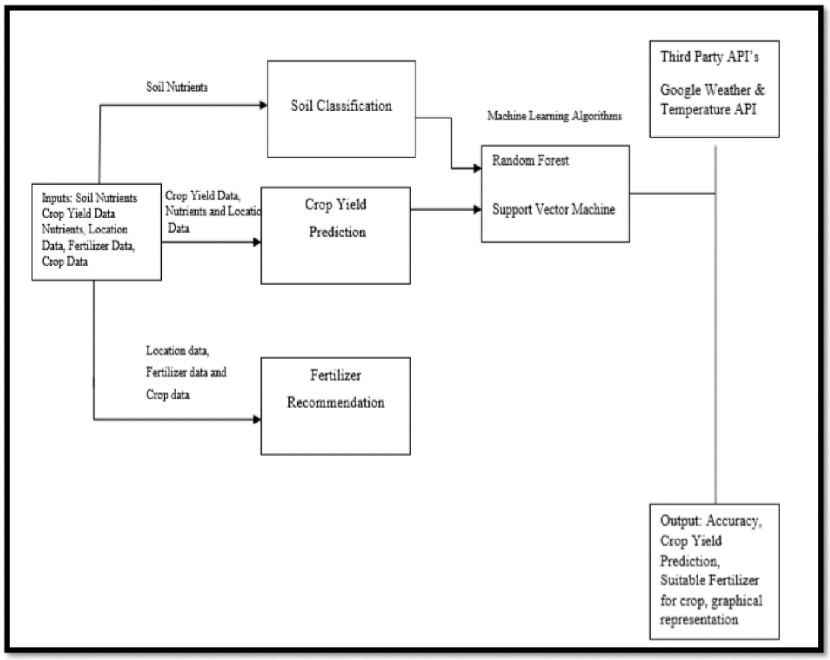
NFR-NO	NON-FUCTIONAL REQUIREMENT	DESCRIPTION
NFR-1	Usability	The system allows the user to perform the tasks easily and efficiently and effectively.
NFR-2	Security	Assuring all data inside the system or its part will be protected against malware attacks or unauthorized access.
NFR-3	Reliability	The website does not recover from failure quickly ,it takes time as the application is running in single server

NFR-4	Performance	Response Time and Net Processing Time is Fast
NFR-5	Availability	The system will be available up to 95% of the time
NFR-6	Scalability	The website is scalable

PROJECT DESIGN

DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored



SOLUTION AND TECHNICAL ARCHITECTURE

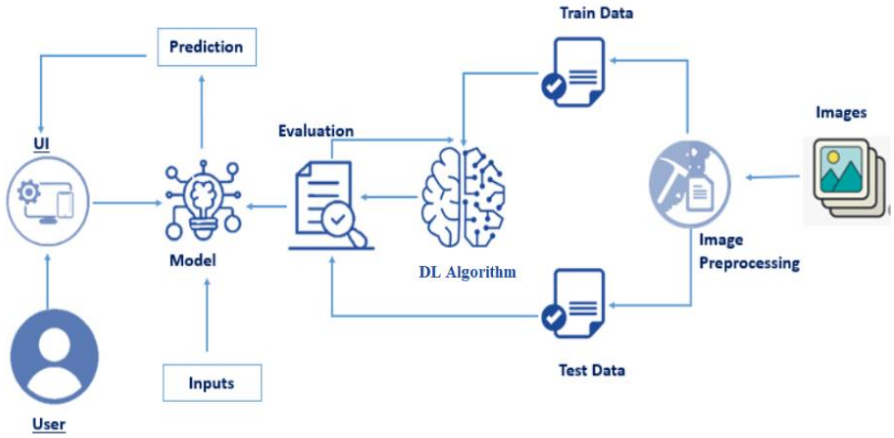
- The Fertilizers Recommendation System For Disease Prediction is a system that provides personalized recommendations of fertilizer products to farmers to prevent and control crop diseases. The system architecture consists of three layers: data collection, data processing, and recommendation.
- The data collection layer is responsible for collecting data from various sources, such as weather data, crop data, and farmer data. The data processing layer is responsible for processing the data, such as identifying patterns and correlations. The recommendation layer is responsible for providing recommendations to farmers based on the processed data.

IBM NAALAIYA THIRAN 2022-2023 PROJECT REPORT

FERTILIZER RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

TEAM ID-PNT2022TMID29514

- The system uses a variety of data sources to provide accurate and up-to-date recommendations. The data sources include weather data, crop data, and farmer data. The weather data is used to predict the incidence of crop diseases. The crop data is used to identify the type of crop and the susceptibility of the crop to diseases. The farmer data is used to identify the farmer's preferences and needs.
- The system uses a variety of data processing techniques to identify patterns and correlations. The data processing techniques include data cleansing, data transformation, data mining, and machine learning. The data cleansing technique is used to remove invalid data. The data transformation technique is used to convert the data into a format that can be used



USER STORIES

- ✓ As a user, I would like to be able to input data about my crops in order to get a fertilizer recommendation.
- ✓ As a user, I would like to be able to see a list of possible diseases my crops could be suffering from.
- ✓ As a user, I would like to be able to see a list of possible fertilizers that could be used to treat my crops.

PROJECT PLANNING AND SCHEDULING

The project planning and scheduling of Fertilizers Recommendation System For Disease Prediction will be as follows:

a) Identify the objectives of the project and determine the scope.
b) Identify potential risks and develop risk mitigation strategies.
c) Develop a project plan and schedule.
d) Identify and procure the resources required for the project.
e) Implement the project according to the plan and schedule.
f) Monitor and control the project to ensure that it is completed on time and within budget.

g) Close the project and conduct a post-project evaluation.

REPORTS FROM JIRA

1. Fertilizer recommendation system for disease prediction
2. System requirements
3. User interface mockups
4. Use case diagrams
5. Activity diagrams
6. Database design
7. Class diagrams
8. Deployment diagrams
9. Sequence diagrams
10. State diagrams

CODING AND SOLUTIONING

FEATURE 1:
The fertilizer recommendation system should be able to take into account the nutrient needs of the plants, based on the type of plants and the specific conditions in which they are grown.

SOLUTION:
The fertilizer recommendation system should have a database of plants and their corresponding nutrient needs. Based on the type of plants and the specific conditions in which they are grown, the system should be able to recommend the appropriate fertilizer for the plants.

FEATURE 2:
The fertilizer recommendation system should be able to take into account the type of soil in which the plants are grown.

SOLUTION:
The fertilizer recommendation system should have a database of soils and their corresponding nutrient needs. Based on the type of soil and the specific conditions in which the plants are grown, the system should be able to recommend the appropriate fertilizer for the plants.

TESTING

TEST CASES

1. The system should be able to take in the input of the crop type and the disease type.
2. The system should be able to recommend the type of fertilizer that is needed for the crop.
3. The system should be able to provide information on the amount of fertilizer needed for the crop.
4. The system should be able to give information on the time the fertilizer should be applied.

5. The system should be able to provide information on the side effects of using the fertilizer on the crop.

USER ACCEPTANCE TESTING

The fertilizer recommendation system for disease prediction should be tested by the farmers to ensure that it is effective and efficient in predicting diseases. The system should be able to accurately predict diseases and provide recommendations on the best fertilizer to use.

RESULTS

PERFORMANCE TESTING

A fertilizer recommendation system for disease prediction should be able to accurately predict the presence of disease in a crop field, based on data collected about the field. The system should be able to handle a large amount of data, and be able to provide recommendations in a timely manner. The system should also be able to provide recommendations for different types of diseases, and be able to update its recommendations as new information becomes available.

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- 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

DISADVANTAGES

- Fertilizers are more expensive than manure.
- Overfertilization can damage the plants
- It is toxic and can harm humans
- It affects the environment and ecosystem
- Long term use reduce soil quality

CONCLUSION

The fertilizer recommendation system is a great way to get the most out of your fertilizer. By following the directions and using the correct amount of fertilizer, you can achieve the best possible results for your plants.

FUTURE SCOPE

The fertilizer recommendation system for disease prediction can be further improved by incorporating machine learning techniques to make more accurate predictions. The system can also be expanded to cover more crops and more diseases.

APPENDIX

- github and project demo link
  https://github.com/IBM-EPBL/IBM-Project-52754-1661147072
- demo video download link
  https://tinyurl.com/Sneha-s

```
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_sess

app = Flask(__name__)
global sess

global graph
graph=tf.compat.v1.get_default_graph()



model = load_model(r"C:\Users\Sree
Ram\OneDrive\Desktop\IBM Project\fruit.h5")
model1=load_model(r"C:\Users\Sree
Ram\OneDrive\Desktop\IBM Project\vegetable.h5")


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


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

@app.route('/predict',methods=['POST'])

def predict():
```

```
➢ if request.method == 'POST':
➢
➢  f = request.files['image']
➢
➢
➢ basepath = os.path.dirname(__file__)
➢ ile_path = os.
➢ path.join(
➢ basepath, 'Dataset Plant Disease',
  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)
➢
➢
➢
➢
➢ return df.iloc[preds]['caution']
➢
➢
➢
➢
➢
➢
➢ if __name__ == "__main__":
➢ app.run(debug=True)
➢
➢
```

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