20IT928 PRIEE PROJECT

FERTILISER RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

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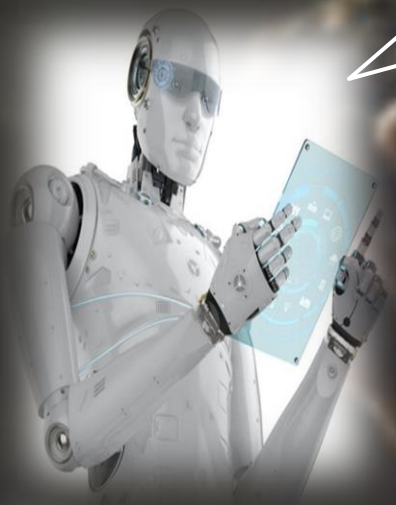
Abstract

Food security and sustainable farming practices depend heavily on agricultural productivity and crop health. In recent years, advancements in artificial intelligence (AI) have revolutionized the agricultural sector by enabling sophisticated prediction models for fertilizer recommendation and disease detection. AI methods use real-time and historical data on crop types, weather, and soil characteristics to make recommendations for fertilizers. The Crop Recommendation Module employs compatibility algorithms to provide farmers with informed insights into suitable crops, tailored to their specific environmental contexts. The subsequent Pesticide Recommendation Module complements disease predictions by suggesting targeted pesticides, thereby facilitating effective pest management. To analyze the intricate connections between input features and nutrient needs, several machine learning algorithms like SVM and Random Forest methods are used in this system, which enable accurate comparison, assist farmers in suggesting fertilizer, and detect plant disease. The outcome of the learning process is used by farmers for corrective measures for yield optimization.

Key words: Fertilizer Recommendation, Crop Recommendation, Pesticide Recommendation.

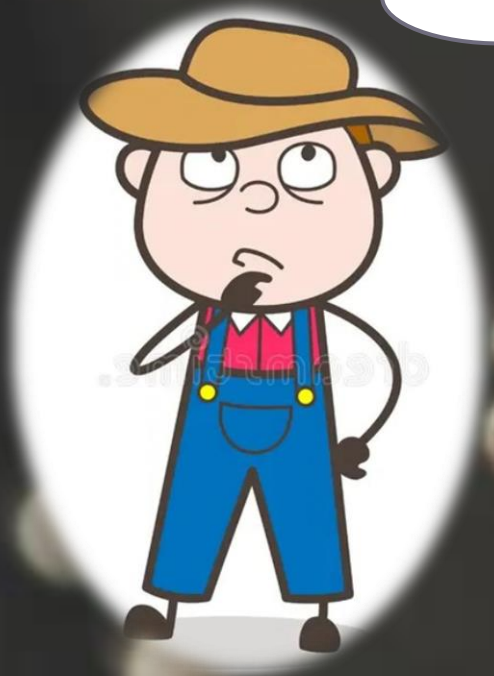
SCOPE

Use AI-based techniques to analyze soil, crop, and environmental factors to provide recommendations on the right fertilizer to improve crop quality, reduce environmental impact, and reduce production costs.



PROBLEM STATEMENT

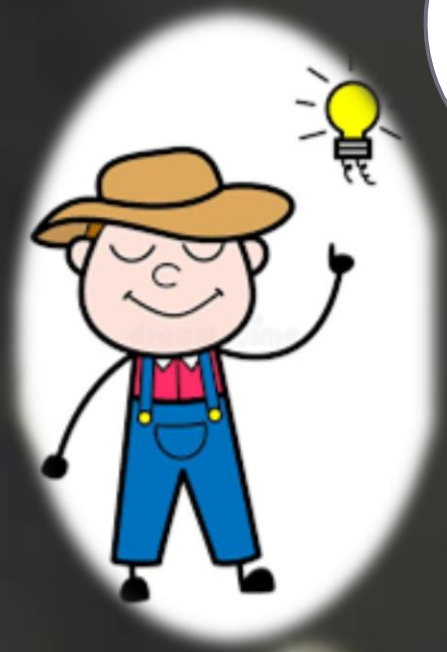
According to a study by the Associated Chambers of Commerce and Industry of India, annual crop losses due to pests amount to Rs. 50,000 crore



1. **Farmers are generally unaware about the organic fertilizers or standard fertilizers to use as per soil requirements.**

2. **Due to inadequate and imbalanced fertilization, soil degradation is occurring, which leads to nutrient mining and the development of second-generation problems in nutrient management.**

PROPOSED SYSTEM



To solve the problem by proposing a recommendation system through an ensemble model with majority voting technique crop for the site specific parameters with high accuracy and efficiency.

Machine learning techniques are used to identify the diseases and suggest appropriate fertilizer that can be taken for those diseases by recommending organic fertilizer on the basis of N, P, K values and crop.

So we planned to design a web application for achieving above objectives.

LITERATURE SURVEY

The research paper **[1],** authored by Ms. Kiran R. Gavhale, Ujwalla Gawande which mainly focuses on the detecting and classifying the leaf disease of soybean plant. Using SVM the proposed system classifies the leaf disease in 3 classes like i.e., downy mil- dew, frog eye, and septoria leaf blight etc. The proposed system gives maximum average classification accuracy reported is ~90% using a big dataset of 4775 images. The system helps to compute the disease severity. The system uses leaf images taken from an online dataset, so cannot implement in real time.

ADVANTAGES:

The system helps to compute the disease severity.

DISADVANTAGES:

The system uses leaf images taken from an online dataset, so cannot implement in real time.

LITERATURE SURVEY

The research paper **[2],** authored by R. Neela, P. where proposes a method which helps us predict crop yield by suggesting the best crops. It also focuses on soil types in order to identify which crop should be planted in the field to increase productivity. In terms of crop yield, soil types are vital. By incorporating the weather details of the previous year into the equation, soil information can be obtained. 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. Due to the changing climatic conditions, accurate results cannot be predicted by this system.

ADVANTAGES :

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.

DISADVANTAGES :

Due to the changing climatic conditions, accurate results cannot be predicted by this system

LITERATURE SURVEY

The research paper **[3],** authored by Duan Yan-e, proposes an android application for irrigation and plant leaf disease detection with cloud and IoT. For monitoring irrigation system, they use soil moisture and temperature sensor and sensor data send to the cloud. The user can also detect the plant leaf disease. K means clustering used for feature extraction. K- means clustering algorithm is used here. Other than this there are some other levels which can be used for sentimental analysis these are document level, sentence level, entity and aspect level to study positive and negative, interrogative, sarcastic, good and bad functionality, sentiment without sentiment, conditional sentence and author and reader understanding points. It is simple and cost-effective system for plant leaf disease detection. Any H/w failures may affect the system performance.

ADVANTAGES:

It is simple and cost effective system for plant leaf disease detection.

DISADVANTAGES:

Any H/w failures may affect the system performance.

LITERATURE SURVEY

The research paper **[4],** authored by R.Meena Prakash, G.P.Saraswathy, G.Ramalakshmi, K.H. Mangaleswari, T.Kaviya 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. The prediction and diagnosing of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves. 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.

ADVANTAGES :

The prediction and diagnosing of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

DISADVANTAGES :

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.

LITERATURE SURVEY

The researh paper [5], authored by Shloka Gupta,Nishit Jain ,Akshay Chopade, propose 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 like crop recommendation using Random Forest algorithm, fertilizer recommendation using a rule-based classification system, and crop disease detection using Efficient Net modelon leaf images. The user can provide the input using forms on our user interface and quickly get their results. In addition, we also use the LIME interpretability method to explain our predictions on the disease detection image, which can potentially help understand why our model predicts what it predicts, and improve the datasets and models using this information. 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.

ADVANTAGES :

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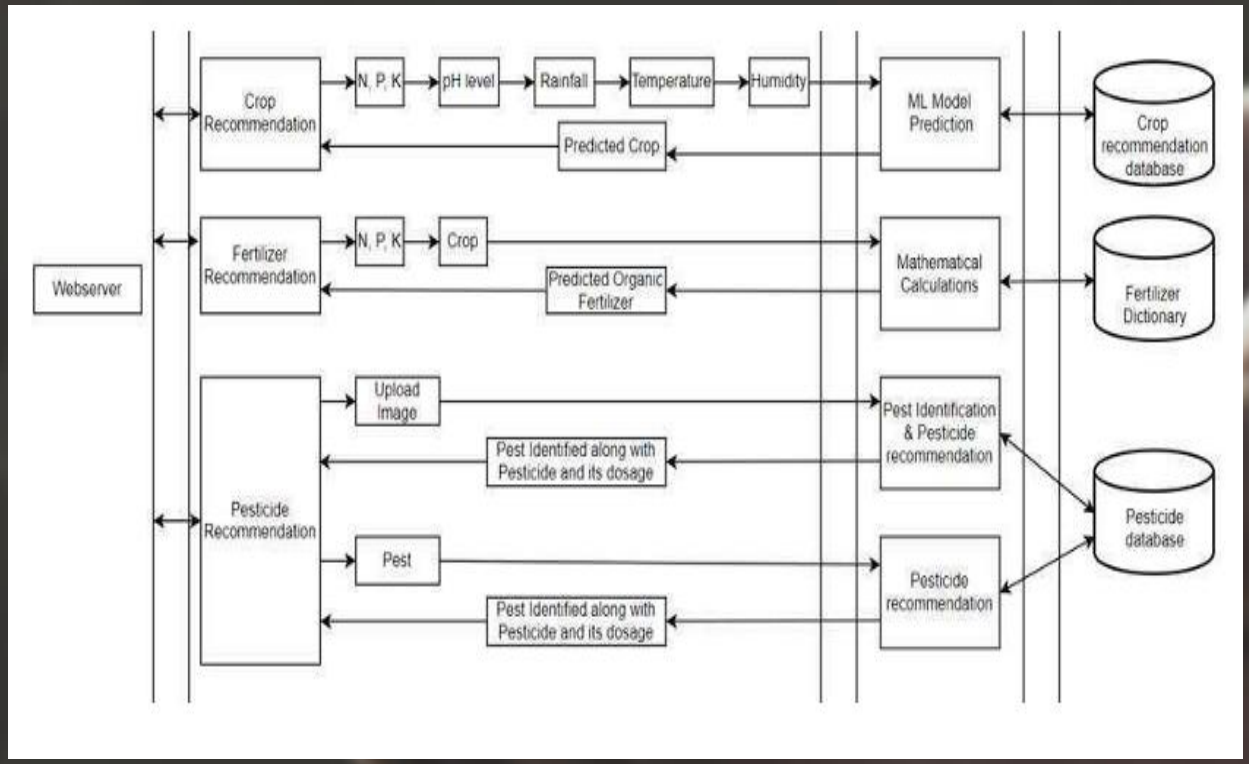
DISADVANTAGES :

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.

SYSTEM ARCHITECTURE



MODULE DESCRIPTION

These modules collectively form an integrated system that assists farmers in making informed decisions about crop selection, fertilization, and pest management. The modular design allows for flexibility and scalability, enabling the addition of new features or improvements in each module independently.

1. ***Data Collection Module:*** The Data Collection Module serves as the entry point for the system, gathering essential information from users and external sources. It collects data such as soil type, climate conditions, and previous crop history from users, and retrieves additional information from external databases or APIs. This module ensures that the system has a comprehensive set of data to make accurate recommendations.

2. ***Crop Recommendation Module:*** The Crop Recommendation Module analyzes the user input and collected data to suggest suitable crops for cultivation. Using compatibility analysis based on soil and climate conditions, it employs algorithms or rules to determine crops that are well-suited to the given environment. This module helps farmers make informed decisions about the types of crops that are likely to thrive on their land

MODULE DESCRIPTION

3. ***Fertilizer Recommendation Module:*** The Fertilizer Recommendation Module focuses on providing accurate fertilizer recommendations based on the selected crops and soil conditions. It conducts a thorough analysis of soil nutrient levels obtained from the Data Collection Module and matches the nutrient requirements of chosen crops. Utilizing a fertilizer database, this module recommends appropriate fertilizers, ensuring optimal nutrient levels for crop growth.

4. ***Disease Prediction and Pesticide Recommendation Module:*** This module serves a dual role by predicting potential diseases that may affect the selected crops and recommending pesticides to address these issues. It employs historical data and machine learning models for disease prediction, anticipating the likelihood of specific diseases based on environmental conditions and crop types. The Pesticide Recommendation component suggests effective pesticides for identified diseases, considering user preferences and environmental impact, and accessing a comprehensive pest database.

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