Fertilizer Recommendation System
For Disease Prediction

Introduction

Machine learning is particularly effective in detecting and recognizing plant illnesses, as well as providing early disease signs identification. Plant pathologists can use digital image processing to evaluate digital photos to diagnose plant diseases. Simply said, the use of computer vision and image processing techniques benefits farmers across all areas of agriculture. Typically, aberrant physiological functions of plants are what lead to plant diseases. As a result, the differentiation between the plants' normal physiological functionalities and abnormal physiological functionalities leads to the generation of the characteristic symptoms. The pathogens that often infect plant leaves are found on the stems of the plants. Different image processing techniques can forecast these various leaf signs and illnesses. These many techniques make use of several core operations including segmentation, feature extraction, and classification, among others. Most often, segmentation is used to distinguish between healthy and diseased tissues of leaves in order to forecast and diagnose leaf diseases.

Literature Review

[1] The suggested technique employs SVM to categorize tree leaves, diagnose the illness, and provide a fertilizer. The suggested approach is contrasted with the currently available CNN-based leaf disease prediction. When compared to the current CNN, the suggested SVM approach produces superior results. The accuracy of identifying leaf illness using CNN is 0.6 and SVM is 0.8 for the same set of photos. F-Measure for CNN is 0.7 and 0.8 for SVM.

A**dvantages:** Segmenting the healthy tissues from the sick tissues of leaves, for example, can help forecast and diagnose leaf illnesses.

Disadvantages: The proposed technique is being implemented in this further study using existing public datasets. Additionally, different segmentation methods might be used to increase accuracy. To detect diseases that affect other plant parts, such stems and fruits, the suggested method might be further developed.

[2] Detection of Leaf Diseases and Classification using Digital Image Processing International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), IEEE,
2017.

Advantages: 90% of the time, the technology accurately identifies illnesses on citrus leaf surfaces.

Disadvantages: Only citrus leaves can be used by the system to detect the illness**.**

This essay primarily focuses on identifying and categorizing soybean plant leaf diseases. The suggested approach divides the leaf diseases into three groups, including Septoria leaf blight, frog eye, and downy mildew, using SVM. Using a large dataset of 4775 photos, the suggested method provides maximum average classification accuracy stated to be about 90%.

Algorithm used: Gray-Level Co-Occurrence Matrix (GLCM) features, SVM, K-Means Clustering.

[3] Semi-automatic leaf disease detection and classification system for soybean culture IET Image Processing, 2018

This paper 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.SVM algorithm is used in this publication.

Advantages: The system assists in determining the condition's severity.

Disadvantages: Since the system requires leaf images from an online collection, real-time implementation is not possible.

Algorithm used: SVM.

[4] Cloud Based Automated Irrigation And Plant Leaf Disease Detection System Using An Android Application. International Conference on Electronics, Communication and Aero-space Technology, ICECA 2017.

Advantages: The technique for detecting plant leaf disease is easy to use and economical.

Disadvantages: The performance of the system may be impacted by any hardware issues.

The current article suggests an Android application for cloud and IoT-based irrigation and plant leaf disease detection. They employ soil moisture sensors, temperature sensors, and sensor data sent to the cloud to monitor irrigation systems. Additionally, the user can identify plant leaf disease. K-means clustering is used to extract features.

Algorithm used: K-means clustering.

[5] The author suggests a strategy that, by recommending the best crops, aids in agricultural production prediction. In order to determine what crop should be put in the field to enhance production, it also focuses on soil types. Soil types are crucial for agricultural output. Information about the soil may be retrieved by factoring in the weather from the previous year to the calculation.

Advantages: It enables us to foresee which crops might thrive in a specific environment. Crop quality can also be increased using data sets relating to weather and disease. We can categorize the data using prediction algorithms according to the illness, and we can forecast soil and crops using the data that was taken from the classifier.

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

[6] The current work examines and describes image processing strategies for identifying plant diseases in numerous plant species. BPNN, SVM, K-means clustering, and SGDM are the most common approaches used to identify plant diseases.
Disadvantages: Some of the issues in these approaches include the impact of background data on the final picture, optimization of the methodology for a specific plant leaf disease,and automation of the technique for continuous automated monitoring of plant leaf diseasesin real-world field circumstances.

[7] In this research, we present the "Farmer's Assistant," a user-friendly online application system based on machine learning and web scraping. With the help of our system, we are able to offer a number of features, including crop recommendation using the Random Forest algorithm, fertilizer advice using a rule-based classification system, and crop disease diagnosis using the Efficient Net model on leaf pictures. The user may submit data utilizing forms on our user interface and receive responses right away. Additionally, we apply the LIME interpretability approach to explain our predictions on the illness detection image. This method may help us understand why our model predicts the outcomes it does, and we may then use this understanding to enhance our datasets and models.
A**dvantages:** We can let users know whether certain crops and fertilisers are available on well-known purchasing websites, and we may even let users purchase the recommended crops and fertilisers straight from our app.
Disadvantages: To offer fine-grained segmentations of the dataset's sick area. The absence of such data makes this impractical. However, we may incorporate a segmentation annotation tool inside our programmed so that users can point up any shortcomings. Additionally, we can identify the unhealthy regions in the picture by using various unsupervised methods. In our forthcoming work, we plan to include these features and fill in these gaps.

Detection of unhealthy region of plant leaves using neural network.International Journal of Latest Engineering Research and Applications (IJLERA) ISSN: 2455-7137Volume – 01, Issue – 05, August – 2016, PP – 34-42
RGM image acquisition and create the color transformation structure.Convert the infected cluster from RGM to HIS translation.Configuring Neural networks for recognition for grading and percentage uses Naive bayes system.
Advantages: Naïve bayes system used to provide the accurate percentage.
Disadvantages: Duration of development long. Computationally expensive while using neural network in this model.

References:

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