Fertilizers Recommendation System for Plant Disease Prediction

Abstract

Indian agriculture is very important because of the country's expanding population and rising food needs. Therefore, it is necessary to increase crop productivity. Farmers' inadequate understanding and diseases brought on by bacteria, fungus, and viruses are the main causes of low agricultural yields. Applying techniques for plant disease identification helps stop and manage this. Machine learning techniques will be used in the process of identifying plant diseases since they apply information most often to themselves, provide excellent methods for spotting plant diseases, and suggest appropriate fertilisers.

Introduction

Agriculture is the main aspect of country development. Many people lead their life from agriculture field, which gives fully related to agricultural products. Plant disease, especially on leaves, is one of the major factors of reductions in both quality and quantity of the food crops. In agricultural aspects, if the plant is affected by leaf disease then it reduces the growth of the agricultural level. Finding the leaf disease is an important role of agriculture preservation. After pre-processing using a median filter, segmentation is done by Guided Active Contour method and finally, the leaf disease is identified by using Machine Learning Algorithm. The disease-based similarity measure is used for fertilizer recommendation.

Literature Review

[1]. Convolutional neural network models were created for this proposed model in order to diagnose and detect plant diseases utilising deep learning techniques and photos of plant leaves. An open library of 87,848 photos with 25 different plant species in 58 different classes of [plant, illness] pairs was used to train the suggested models. A high success rate model is an excellent early detection tool.

Author: Konstantinos P. Ferentinos et al.

Algorithm used: CNN

Advantages: In detecting the corresponding combination [plant, disease] some models gets success 99.53%.

Disadvantages: Not every model can achieve a high accuracy rate.

[2]. In this model, the performance for detecting wheat leaf rust was examined at the canopy level and for three different leaf area indices (LAI) levels: high, medium, and low. Four techniques were utilised to analyse the effectiveness of rust detection. This also predicts the disease severity level. The experiment was carried out in the north western region of Iran on 7000 hectares of wheat fields in order to analyse performance. It makes use of hyperspectral reflectance data that was collected under various environmental conditions. Hyperspectral pictures can be utilised to identify wheat rust based on the experiment's findings.

Author: Azadbakht et al.

Algorithm used: Gaussian Process Regression, Random Forest Regression, V-Support Vector Regression.

Advantages: It is used to forecast the severity of the illness in wheat plants.

Disadvantages: The results of this model on smaller fields and home farming are unknown because it is only used in vast areas.

[3]. Many different plant diseases have been attributed to various types of bacteria or fungi. Machine learning algorithms can be used to forecast it. Numerous researchers test various algorithms and produce varying outcomes. Disease classification by algorithms is challenging. We can recognise the mulberry plant disease using the CNN technique.

Author: Sherlyet.al.

Algorithm used: CNN

Advantages: The mulberry plant's illnesses are simple to identify.

Disadvantages: Lack of spatial invariance with respect to the supplied data, A large amount of training data is needed.

[4]. To anticipate plant illnesses, this model uses the leaves of tomato and potato plants. They gather pictures of plant leaves from websites as well as those that they take with their digital camera when visiting farms. The suggested approach outperforms k-means and SVM.

Author: Monalisa Sahaet al.

Algorithm used: SVM and K-Means

Advantages: When using several SVM classes, the results are superior and the performance analysis is 99%. K-means has an efficiency of 88.6%, whereas SVM has a 91% efficiency.

Disadvantages: As the support vector classifier works by putting data points, above and below the classifying hyperplane there is no probabilistic explanation for the classification.

[5]. There are three different forms of plant leaf illnesses, thus the leaves are collected and the dataset is maintained according to disease type. They gather leaves from various plants, such as jasmine, grape, apple, beans, and roses, and use various techniques to identify diseases in the leaves with varying degrees of precision.

Author: Sridevi Sakhamuriet al.

Algorithm used: K-means, SVM, ANN.

Advantages: With the k-means algorithm, accuracy was 88.8%, with SVM, it was 95%, and with ANN, it ranged from 70% to 95% for various disorders.

Disadvantages: K-means requires that the number of clusters (k) be specified beforehand. It is unable to deal with noisy data and outliers. A lot of computer power is needed for artificial neural networks.

[6]. In this strategy researchers used a public dataset that includes both good and unhealthy photos of tomato, apple, maize, grape, and potato plants. They employed Random Forest Classifier for the classification.

Author: Pranesh Kulkarni et al.

Algorithm used: Random Forest Classifier.

Advantages: This model provides a 93% accuracy rate.

Disadvantages: This approach calls for a lot more resources and computational power.

[7]. Pomegranate disease forecast. To find bacterial, fungal, and viral illnesses in fruit, researchers utilised SVM, ANN, KNN, and PNN classifiers. For picture segmentation using K-means clustering, fuzzy c-means provides the maximum accuracy. Few diseases, they claimed, were covered by the current system.

Author: Jayashriet al.

Algorithm used: SVM, ANN, KNN, PNN, K-means, Fuzzy C.

Advantages: This model revealed bacterial, fungal, and viral diseases.

Disadvantages: Few diseases were covered by the current system.

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