Fertilizer Recommendation System For Disease Prediction

Introduction

Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyse the digital images using digital image processing for diagnosis of plant diseases. Application of computer vision and image processing strategies simply assist farmers in all of the regions of agriculture. Generally, the plant diseases are caused by the abnormal physiological functionalities of plants. Therefore, the characteristic symptoms are generated based on the differentiation between normal physiological functionalities and abnormal physiological functionalities of the plants. Mostly, the plant leaf diseases are caused by Pathogens which are positioned on the stems of the plants. These different symptoms and diseases of leaves are predicted by different methods in image processing. These different methods include different fundamental processes like segmentation, feature extraction and classification and so on. Mostly, the prediction and diagnosis of leaf diseases are depending on the segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

Literature Review:

[1]The author proposed a method which helps us to find the crop affected by disease and recommend a fertilizer for the crop based on the severity level. The fertilizers may be organic or inorganic. The algorithm that they used to train the model is Support Vector machine. Leaves are affected by bacteria, fungi, virus, and other insects. Support Vector Machine (SVM) algorithm classifies the leaf image as normal or affected. Vectors are constructed based on leaf features such as color, shape, textures. Then hyperplane constructed with conditions to categorize the preprocessed leaves and also implement multiclass classifier, to predict diseases in leaf image.

Advantages:

The proposed SVM technique gives a better result. 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.

Disadvantages:

The accuracy of this algorithm can further be improved and does not provide accurate result for all diseased crops.

[2]Plant disease detection has been a very active field and there are several different techniques which have been proposed over the years, the latest ones using deep learning approaches. With this system, they are able to provide several features - crop recommendation using Random Forest algorithm, fertilizer recommendation using a rule based classification system, and crop disease detection using EfficientNet model on leaf images. The user can provide the input using forms on user interface and quickly get their results. In addition, they also use the LIME interpretability method to explain the predictions on the disease detection image, which can potentially help understand why the model predicts what it predicts, and improve the datasets and models using this information.

Advantages:

For crop recommendation and fertilizer recommendation, it can provide the availability of the same on the popular algorithm. Efficient algorithm for crop disease detection.

Disadvantages:

This model performs only on images which are from the classes of the model already knows. It will not be able to detect the correct class for any out-of-domain data.

[3] The main objective of this paper is image analysis & classification techniques for detection of leaf diseases and classification. The leaf image is firstly preprocessed and then does the further work. K-Means Clustering used for image segmentation and then system extract the GLCM features from disease detected images. The disease classification done through the SVM classifier. Algorithm used: Gray-Level Co-Occurrence Matrix (GLCM) features, SVM, K-Means Clustering .

Advantages:

The system detects the diseases on citrus leaves with 90% accuracy.

Disadvantages:

System only able to detect the disease from citrus leaves.

[4]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.

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.

[5] In this system the micro-controller device is connected to the system through USB ports available and transmits the data from the device to the system. The result is generated from the received data. The NPK value of the soil is calculated using the pH value supplied from the instrument(sensor). An API is used to collect temperature and humidity. The pH value, NPK value, temperature, humidity, and rainfall are the characteristics that are used to forecast the best crop to grow in a given place. The crop is predicted using a machine learning model called XG Boost, which has a 96 percent accuracy rate. Based on the NPK value acquired from the device for a certain soil, a suitable fertilizer is advised for the crop. Proper recommendations for increasing soil fertility are presented (NPK). Deep learning techniques and CNN models are used to forecast if the crop is affected with which disease, and a viable remedy is then offered to the user.

Advantages:

Provides better accuracy than other model.

Disadvantages:

The disease detection feature can also be improved by adding dedicated cameras to the device, which will improve the device's accuracy even further.

References:

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