FERTILIZERS RECOMMENDATION SYSTEM FOR DISEASE PREDICTION

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. Fertilizers are additional substances supplied to the crops to increase their productivity. These are used by the farmers daily to increase the crop yield. These fertilizers contain essential nutrients required by the plants, including nitrogen, potassium, and phosphorus. Fertilizer destroys plant microbiome's ability to protect against disease: Healthy microbiomes on plant leaves protect against pathogens, though not on fertilized plants. In this project we are using recent technology systems to recommend the best and rich Fertilizers which are used for disease prediction.

REQUIRED TECHNOLOGIES:

- Python
- Deep learning
- CNN
- Image Processing Techniques

PROJECT DESCRIPTION:

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. 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.To compare the performance of the proposed SVM method with the existing CNN (Convolutional Neural Network) method. Metrics such as True Positive, False Positive, True Negative, False Negative are used.

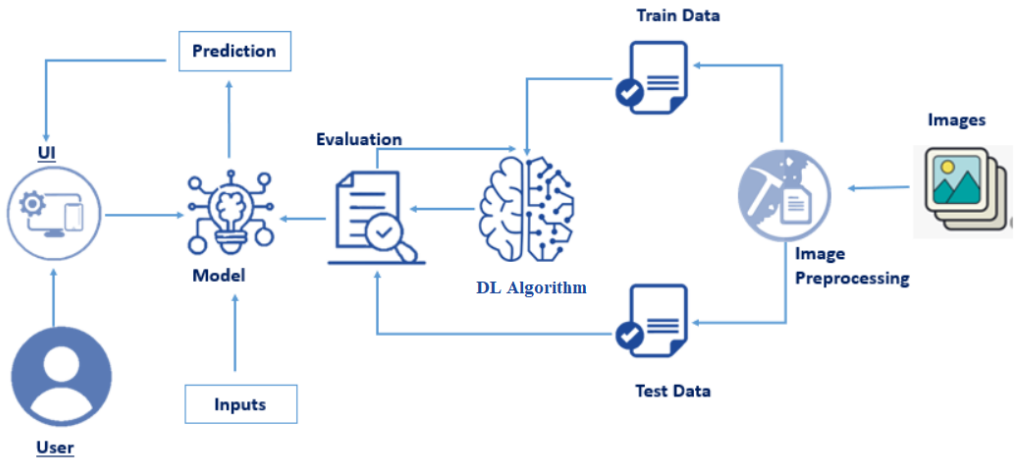

Image Classification Steps : The proposed image classification technique is divided into the following steps:

- Image acquisition: To get the image of a leaf so that evaluation in the direction of a class can be accomplished.
- Preprocessing: The purpose of image preprocessing is improving image statistics so that undesired distortions are suppressed and image capabilities which are probably relevant for similar processing are emphasized. The preprocessing receives an image as input and generates an output image as a grayscale, an invert and a smoothed one.

Segmentation: Implements active contour approach with guidance. applied unrestricted active shapes to the challenging nature photos. Dealing with uneven curves that would attempt to find their way via each grab opening in the leaf's

edge.The proposed remedy makes use of the polygonal model produced after the first step serves as both a basic leaf contour and a it will take on before it evolves into the genuine leaf boundary.

Disease Prediction: 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 hyperplanes are constructed with conditions to categorize the preprocessed leaves and also implement a multiclass classifier, to predict diseases in leaf image with improved accuracy.

Fertilizer Recommendation: Recommend the fertilizer for affected leaves based on severity level. Fertilizers may be organic or inorganic. Admin can store the fertilizers based on disease categorization with severity levels. The measurements of fertilizers suggested based on disease severity.

BENEFITS & OUTCOMES:

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.

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-7829-1658900524

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