Ideation Phase
Literature Survey

Date	**01 October 2022**
Team ID	**PNT2022TMID26231**
Project Name	**Fertilizers Recommendation System for Disease Prediction**
Maximum Marks	**4 Marks**

Introduction

Plant diseases are one kind of natural disaster that affect the normal growth of plants and even cause plant death during the whole growth process of plants from seed development to seedling and seedling growth. In machine vision tasks, plant diseases and pests tend to be the concepts of human experience rather than a purely mathematical definition. Detection of plant disease through some automatic technique is beneficial as it reduces the large work of monitoring in big farms of crops, and at the very early stage itself it detects the symptoms of diseases i.e. when they appear on plant leaves. Without proper identification of the disease and the disease-causing agent, disease control measures can be a waste of time and money and lead to further plant losses. Proper disease diagnosis is therefore vital. 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 segmentation such as segmenting the healthy tissues from diseased tissues of leaves.

Literature Review

[1] Detection and recognition of plant diseases using machine learning are very efficient in providing symptoms of identifying diseases at their earliest. Plant pathologists can analyze digital images using digital image processing for the diagnosis of plant diseases. The proposed method uses SVM to classify tree leaves, identify the disease and suggest 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 the existing CNN.

Advantages: This project uses a Support Vector Machine to identify diseases in leaves. The accuracy of this system is more than compared to CNN. The F- measure for the given set of images is high. The proportion of the actual positives is identified correctly.

Disadvantages: It doesn't provide 100% accuracy as the system is implemented with existing datasets. This system cannot identify diseases in other plant organs. It can cause memory leaks over time as it is developed using dot NET.

[2] The project proposes a deep learning-based model that will be trained with photos of healthy and diseased crop leaves from a dataset. The model will achieve its goal by

categorizing photos of leaves into unhealthy categories based on defect patterns. The generated datasets of diseased and healthy leaves are combined and trained under Random Forest to identify the sick and healthy pictures,

Advantages: Deep Learning methods were used in this project to correctly detect plant diseases. This project mainly detects and distinguishes between a healthy plant and different diseases. It provides suitable remedies to cure the disease.

Disadvantages: The system is not robust as it contains only one image dataset. There is no availability of an application or website for the farmers to work. This project does not apply to many crops so the users may not get a suitable remedy.

[3] Displayed by Rakesh Kumar, M.P. Singh, Prabhat Kumar, and J.P. Singh proposed the utilization of seven machine learning methods, for example, ANN, SVM, KNN, Decision Tree, Random Forest, GBDT, and Regularized Gradient Forest for crop choice. The framework is intended to recover every one of the yields sowed and time of development at a specific time. The yield rate of each harvest is acquired and the crops giving higher yields are chosen. The framework additionally proposes an arrangement of crops to be planted to get higher yields.

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: 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 diseases in real-world field circumstances.

[4] In this paper, we propose a user-friendly web application system based on machine learning and web scraping. With this system, we are successfully able to provide several features - crop recommendation using the Random Forest algorithm, fertilizer recommendation using a rule-based classification system, and crop disease detection using the model on leaf images.

Advantages: For crop recommendation and fertilizer recommendation, we can provide the availability of the same on popular shopping websites, and possibly allow users to buy the crops and fertilizers directly from our application.

Disadvantages: To provide fine-grained segmentations of the diseased portion of the dataset. this is not possible due to the 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. Also, we can use some unsupervised algorithms to pinpoint the diseased areas in the image. We intend to add these features and fix these gaps in our upcoming work.

[5] Ashourloo et al. [2016] disease severity detection can be analyzed using spectral vegetation indices (SVIs) and the author analyzed the method of leaf rust detection like partial least square regression (PLSR), Gaussian process regression (GPR) and v-Support Vector Regression (v-SVR) and also analyzed how training data size has its impact on the result and how the disease symptoms have its effects on the prediction accuracy. Based on the analysis made GPR performs better and SVIs are sensible to different disease symptoms. The accuracy is high when there is a small sample data set is used for the GPR method. PLSR, v-SVR, and GPR can be used to test various varieties in a plant using a different sensor.

Advantages: It allows us to predict which crops would be appropriate for a given climate. Using the weather and disease-related data sets, crop quality can also be improved. Prediction 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.