Fertilizers Recommendation System for Disease Prediction

Abstract:

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 Support Vector Machine. The disease-based similarity measure is used for fertilizer recommendation.

Methods and Materials used:

A digital camera or similar devices are used to take images of different types, and then those are used to identify the affected area in leaves. Then different types of image-processing techniques are applied to them, the process those images, to get different and useful features needed for the purpose of analysing later-Plant leaf disease identification is especially needed to predict both the quality and quantity of the First segmentation step primarily based on a mild polygonal leaf model is first achieved and later used to guide the evolution of an energetic contour. Combining global shape descriptors given by the polygonal model with local curvature-based features, the leaves are then classified overleaf datasets. In this research work introduce a method designed to deal with the obstacles raised by such complex images, for simple and plant leaves. A first segmentation step based on graph-cut approach is first performed and later used to guide the evolution of leaf boundaries, and implement classification algorithm to classify the diseases.
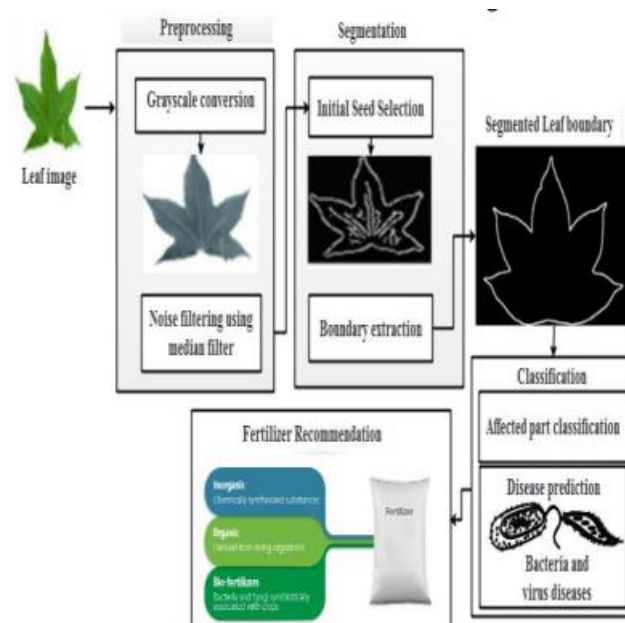
Image Classification Steps:

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

1. **Image acquisition:** To get the image of a leaf so that evaluation in the direction of a class can be accomplished.
2. **Pre-processing:** The purpose of image pre-processing is improving image statistics so that undesired distortions are suppressed and image capabilities which are probably relevant for similar processing are emphasized. The pre-processing receives an image as input and generates an output image as a grayscale, an invert and a smoothed one.
3. **Segmentation:** Implements Guided active contour method. Unconstrained active contours applied to the difficult natural images. Dealing with unsatisfying contours, which would try and make their way through every possible grab cut in the border of the leaf. The proposed solution is used the polygonal model obtained after the first step not only as an initial leaf contour but also as a shape prior that will guide its evolution towards the real leaf boundary.
4. **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 colour, shape, textures. Then hyperplane constructed with conditions to categorize the pre-processed leaves and also implement multiclass classifier, to predict diseases in leaf image with improved accuracy.
5. **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.

SVM Classification Algorithm:

Support Vector Machine (SVM) SVM is a binary classifier to analyse the data and recognize the pattern for classification. The main goal is to design a hyperplane that classifies all the training vectors in different classes. The objective of SVM is to identify a function Fx which obtain the hyper-plane. Hyperplane separates two classes of data sets. The linear classifier is defined as the optimal separating hyperplane. The data sets can be separated in two ways: linearly separated or nonlinearly separated. The vectors are said to be optimally separated if they are separated without error and the distance between the two closest vector points is maximum.