A Novel Approach for Plant Disease Detection

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ABSTRACT

The most important factor in reduction of quality and quantity of crop is due to plant disease. Identifying plant disease is a key to prevent agricultural losses. The aim of this paper is to develop a software solution which automatically detect and classify plant disease. Agricultural productivity is something on which economy highly depends. This is the one of the reasons that disease detection in plants plays an important role in agriculture field, as having disease in plants are quite natural. If proper care is not taken in this area then it causes serious effects on plants and due to which respective product quality, quantity or productivity is affected. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself it detects the symptoms of diseases i.e. when they appear on plant leaves. A System has been proposed which can detect the disease and provide cure using an android mobile application. In the system the photos of plant leaves are captured and are sent to the cloud server, which is further processed and compared with the diseased plant leaf images in the cloud database. Based on the comparison a list of plant diseases suspected are given to the user via the android mobile application.

Keyword : - *Image Processing ,Plant disease,Segmentation,SIFT.*

1. INTRODUCTION

Agriculture has played the most significant role in the economic development of most of the developing countries including India. Plant diseases require careful diagnosis and timely handling to protect the crops from heavy losses. It is a known fact that the disease is identified by the farmers at a very late stage and then it becomes very difficult & expensive to control it. The main reason behind this is the non-accessibility of experts close to the farmers since large numbers of experts are difficult to produce in a country, therefore the availability of Computer based expert systems would be a boon to the farmers. The approach of this work is to create such an expert system which may be at a central location but accessible to the farmers in the way of sending images to the central expertsystem and getting the information about the disease and its remedies. In this approach, the human experts will provide the expertise to identify the diseases.

Various diseases occur in different parts of the plant can be identified by observing the change in symptoms, spots, colour etc. The less time consuming and automatic diagnosis technique is the major requirement in agriculture to improve the crop production rate. Recently, image processing approaches have been used to solve the different problems based on agriculture applications like to detect disease leaf, stem, and fruit. Leaf disease severity measurement and detection using image processing had reported by different researchers .

2. PROBLEM STATEMENT

As the effect of global warming there are sudden changes in environment and this affects the crop production. Unexpected changes in environment leads to degrade quality as well as the production. To implement system which automatically detects the plant diseases. The system will also help farmers to get the cure related to it. Thus system will automatically send notification regarding the detected disease and suggestions to the farmer.

2.1 Proposed Solution

This research proposes an Android based disease detection and classification system. The proposed system will allow young farmers who are in possession smartphone to take pictures of diseased plants leaves. The image will be submitted to the application where the classification will be performed. Based on the results of the classification, the app will give the farmer some management tips for the identified disease. identified disease and how to prevent the disease in the future. The app should be accessible offline too with an option to update the system when internet connection is established. The overview of the proposed system is shown in figure. The system consists of the client side and the server side operations. Given the high computational needs of the classification, no inference will be done on the mobile application. All machine learning operations will be handled separately by dedicated servers. The client side will be an Android mobile app designed with JAVA. The mobile app will allow the user to take pictures using their smartphone or upload pictures which already exist in their phone gallery or it can take live picture through camera. The user interface has to be friendly enough with little navigation and allow the user to perform the tasks with much difficulty. The mobile app will also have a library of common diseases to allow the user to search and view the information about the management of the disease.

The system will have an ORACLE database server for storing the disease information. This server will be queried using the classification result to provide the management information that matches the identified disease and algorithms which will be used for running the inference.

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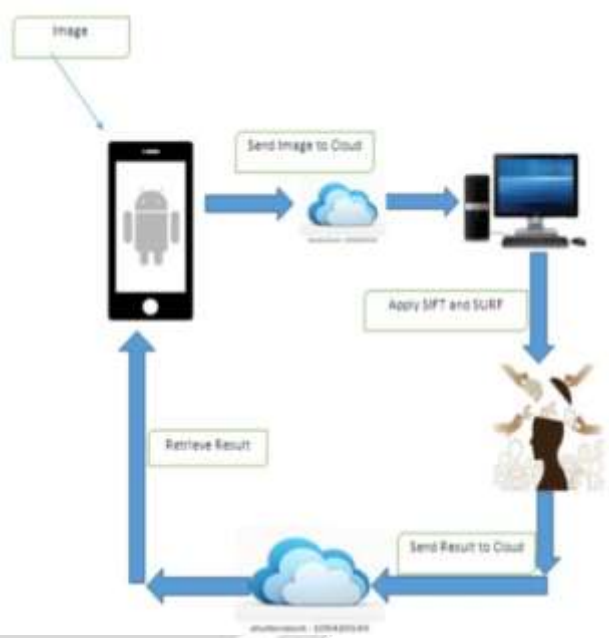

3. IMPLEMENTATION DETAILS

The proposed system will allow young farmers who are in possession smartphone to take pictures of diseased plants leaves. The image will be submitted to the application where the classification will be performed. Based on the results of the classification, the app will give the farmer some management tips for the identified disease**.**

3.1 Login Module

For login, user should need to register first. If user is already registered, then he can login through his username and password.

3.2 Basic Steps for Plant Disease Detection

1. Image Acqusition

To remove noise in image or other object removal, different pre-processing techniques is considered. Image clipping i.e. cropping of the leaf image to get the interested image region. Image smoothing is done using the smoothing filter. Image enhancement is carried out for increasing the contrast.

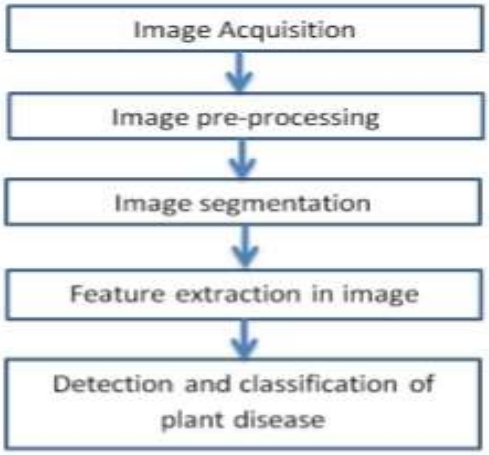

Chart -2: Basic Steps

2. Image Processing

To remove noise in image or other object removal, different pre-processing techniques is considered. Image clipping i.e. cropping of the leaf image to get the interested image region. Image smoothing is done using the smoothing filter. Image enhancement is carried out for increasing the contrast.

3. Image Segmentation

Segmentation means partitioning of image into various part of same features or having some similarity. The segmentation can be done using various methods. The RGB to HSV (Hue Saturation Value) conversion in preprocessing step has been used followed by extracting the region of interest (ROI) from the original image using multi thresholding. The color based and cluster based methods has been used for segmentation. The Scale Invariant FeatureTransform (SIFT) technique automatically recognizes the plant species based on the leaf shape has also used.

4. Feature Extraction in Image

Feature extraction plays an important role for identification of an object. In many application of image processing feature extraction is used. Color, texture, morphology, edges etc. are the features which can be used in plant disease detection.

5. Detectionand Classification

After extracting color and texture features,the classification is performed by using Support Vector Machine (SVM).classification used in the interpretation of the extracted diseased region in an image which helps in the identification of the type of disease infection in leaves.

4. RESULTS

The results of the leaf disease detection are as follows:

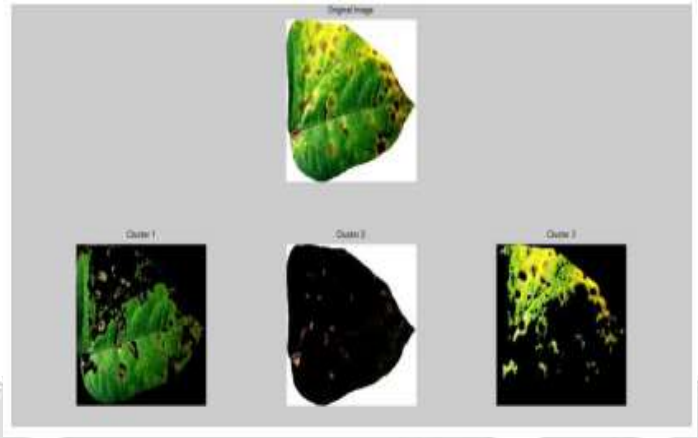

Fig -3 - Results

5. CONCLUSIONS

We would like to conclude that as stated earlier system will be fulfilled with all the requirements. There will be no traditional systems required. This will require low cost, its range of motion is more and information conveyed is more accurate as compared to other devices. System will always available with user. The experimental results indicate that the proposed approach is a valuable approach, which can significantly support an accurate detection of leaf diseases in a little computational effort.The proposed scheme will be helpful in the diagnosis of leaf disease. A leaf disease severity scale can be prepared by calculating the total leaf area, and finding the percentage diseased area. Based on the disease severity levels amount and frequency of specific quantities of pesticide application can be regulated, which reduces the cost pesticide used for treatment. Also helpful in reducing environmental pollution due to regulated and controlled application of pesticides.

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