Cotton Crop Disease Detection System

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ABSTRACT

Cotton is the most important cash crop in India. It is also known as “White Gold” or “The King of fibers” among all cash crops in the country. About 80-90% of the diseases which occur on the leaves of cotton are Alternaria leaf spot, Cercospora leaf spot, Bacterial blight, and Red Spot. This paper presents a survey ofthe detection and classification of cotton leaf diseases. It is difficult for human eyes to identify the exact type of leaf disease which occurs on the leaf of the plant. Thus, in order to identify the cotton leaf diseases accurately, the use of image processing and machine learning techniques can be helpful. Different segmented images will be used for extracting the features such as color, shape, and texture from the images. At last, these extracted features will be used as inputs of the classifier.

Keywords: Image Processing, Segmentation, Feature Extraction, Classification, Detection.

1. INTRODUCTION

Identification of the symptoms of leaf diseases by means of image processing techniques.The proposed work is the development of an efficient diagnosis system that focuses on leaf disease identification by processing acquired digital images of leaves of the plant. These images are made to undergo a set of pre-processing methods for image enhancement. A satisfying set of visual texture features from the region of interest are extracted for detecting diseases accurately.

Generally, the study seeks to measure the extent to which diseases affect plants most especially, plant leaves. Specifically, the study seeks to:

1. Detect and identify diseases on a plant leaf.
2. Quantify and measure the severity of the disease on plant leaves.

Figure 1. *Diseases*

2. DESIGN AND OPERATION

The proposed disease detection system is mainly divided into five steps. Each step performs some significant task.

Step 1: Image Acquisition
This is the very first step for the proposed disease detection system. In this step, the database images of cotton leaves are collected to process on it. These database images are captured through the high-resolution camera and stored in jpg format

Step 2: Image Pre-processing
The collected database is then processed through the computer system for pre-processing. Captured images stored in RGB format are then cropped and resized to some standard size. Image processing in agricultural applications consist of three

(1) Image enhancement

(2) Image feature extraction and

(3) Image featureclassification.

The input image has to be pre-processed because images are corrupted by a type of multiplicative noise like light intensity and shadow on a cotton leaf images that may contain useful information about the leaf spot that can be used in the diagnosis.

Step 3 Image Segmentation
The leaf spot in the captured image generally contains reflection from source, which forms some intense spot in the Cotton leaf, but pixel value within the cotton leaf is over a particular threshold then it is replaced by the pixel value of some neighbourhood pixel.

Step 4 Image Enhancement
The image enhancement of normalized image has been carried out due to reasons of low contract, background Illumination, and non-uniform brightness. This type of problem can be overcome by the removal of background Illumination in order to get a good distributed texture image.

Step 5 Feature Extraction
In this, colour feature variance is used for matching the train image features to database images.

Step 6 Classification
Instance-based classifiers, such as the k-mean classifier operate on the premises that arrangement of unknown instances can be done by concerning the unknown to the known considering to some distance/match function. The instinct is that 2 instances distant separately in the instance space defined by the appropriate distance function are less probable than 2 closely located instances to belong to the similar class. The objective of the k-mean clustering algorithm is to use a database in which the data points are separated into several separate classes to predict the classification of a new sample point. The non-parametric k-mean classifier is tested in this study. It classifies a test sample to a class according to the majority of the trainingneighbours in the feature space by using the minimum Euclidean distance criterion.

3. A FUNCTIONAL DESCRIPTION OF THE MODULE

A MATLAB code is written to classify the Leaf. Steps to run:
1. In the GUI click on Load Image and load the image.
2. Next click on Segment Image, then enters the cluster no containing the ROI, i.e. only thedisease affected part or the healthy part.
3. Click on classification results.
4. Then measure accuracy.

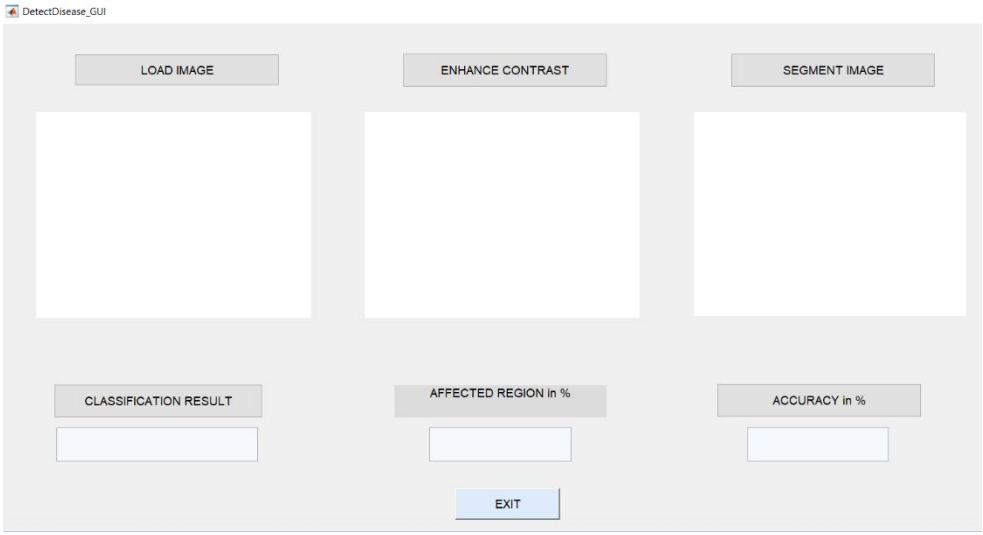

Figure 2. *GUI Interface*

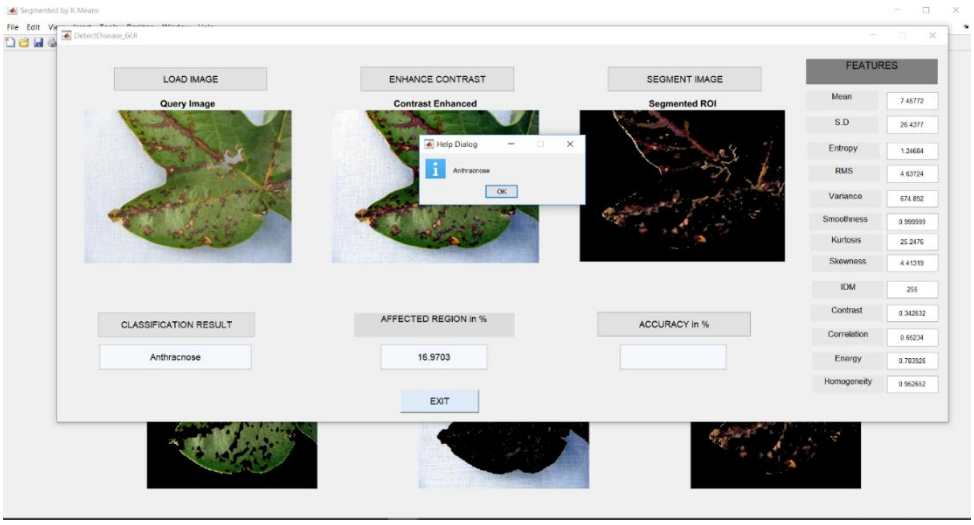

Figure 3. *Disease Detection*

4. CHALLENGES AND LIMITATION

The project detects the disease which affects plants most especially, plant leaves.The challenges are:

1. Quantify and measure the severity of the disease on plant leaves.

2. Suggest the appropriate quantity and concentration of fungicides to use on plant leaves based on the disease severity.

3. To make the application more user-friendly.The validity and reliability of the results produced by the systems that are the accuracy is a major concern for the users.

5. CONCLUSION

The proposed plant disease diagnosis system serves the farming community to improve their crop productivity by correctly classifying the disease type being occurred.The system is developed todetect plant disease.This project is meant to detect diseases on a leaf.

Plant disease does not only reduce their products but also deteriorate of their variety and its withdrawal from cultivation.The use of pesticides and fungicides in excess for the treatment of such diseases increases the danger of toxic residue level on agricultural products and has been identified as a major contributor to groundwater contamination.Again, farmers incur much loss due to the cost of these pesticides as applied on plants. Therefore, there is a need to take greater caution and minimize their use in order to protect water bodies and human life.

In the future, we can development of real-time implementation of this algorithm in the farm for continuous monitoring and detection of plant diseases. In real time system, we can monitor and give an exact solution to avoid various diseases on the cotton plant.

6. REFRENCES

[1] P. Revathi(2012)describes identifying the affected part of leaf diseases. At first, Edge detection technique is used for image segmentation, and at last, proposed a Homogenous Pixel Counting Technique for Cotton Disease Detection (HPCCDD) Algorithm for image analyzing and classification of diseases. The aim of this research to find the diseases of cotton leaf spot by image processing technique, and analyze the input images by RGB pixel counting and recognize the affected part of leaf spot by Sobel and Canny Edge detection technique and output is obtained.

[2] SantanuPhadikar and Jaya Sil (2008)described a software prototype system for disease detection and used image growing, image segmentation techniques on this.

[3] Geng Ying (2008)studied the methods of image processing. For that purpose, they used cucumber powdery mildew, speckle, and downy mildew as study samples and to relate the details of the effect of the simple and medium filter.

[4] Ajay A. Gunjar (2010)studied the regularization and extraction technology and describe the Sign features of this technology and this technology gives more accuracy than other detection feature technology.

[5] H. Al-Hiary & et al. (2010)describes the three methods of leaf disease detection: 1) To identify the affected part of the leaf by using K-means Clustering. 2) To solve the affected part of the leaf by using color co-occurrence methodology for texture analysis. 3) To find and classify the type of disease by Neural Networks (NN's). In details; first is RGB images of leaves are acquired and apply for color transformation structure. After that image is segmented by K-means clustering technique and masked the green pixels value and remove the green masked pixels and obtained the threshold value of the object by Otsu's method. The RGB images set the zero value for converting color co-occurrence technique. After that infected cluster was converted into Hue Saturation Value (HSV) and for texture, analysis issues the SGDM matrix for each image formation. Finally, the recognize the process executed the solution by Neural Networks.