COTTON DISEASES DETECTION USING IMAGE PROCESSING

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Abstract: This project presents an approach for careful detection of diseases, diagnosis and timely handling to prevent the crops from heavy losses. So for the study of interest is the leaf rather than whole cotton plant because about 85-95% of diseases occurred on the cotton leaves like Alternaria, Cercospora and Red Leaf Spot. Image processing technique is used for detecting diseases on cotton leaves early and accurately. It is used to analyze the cotton diseases which will be useful to farmers. K-mean clustering method is used in our project for accurate detection of cotton leaves. The purpose behind use of this method is it gives more accurate result as compare to other methods with less execution time. The accuracy of K-mean clustering is 89.56%.

Key Words: Classification, Diagnosis, Diseases, K-mean Clustering Algorithm.

I. INTRODUCTION

This project work is exposes to automatic detection of disease on cotton leaves. Cotton is one of the major domains in agriculture which decides economy of the nation. However there are certain issues with field crop like to identify deficiency of nutrition in plants, to identify various diseases, various pests which affect crops. Each issue has an importance. Among one is detection of pests so that proper action should be taken to control it leading to minimize loss.

When any of such a condition occurs then farmers aware about the pest, then they can take correct action and control the situation but if farmers does not have correct knowledge, then misidentification of any pests can be possible and incorrect controls measure like non-affecting pesticides can be used leading to wasting of work and money and most importance it may lead to serious problem to crops. Otherwise they may approach to any agricultural experts who give them suggestion regarding detection of diseases and increase the crop productivity. But, commonly they may face following situations like: Sometimes they have to go long distances for approaching the expert and expert may not be available at that time. Sometimes, the expert whom a farmer contacts, may not be in a position to advise the farmer with the available information and knowledge.

The method used in our project for accurate detection of diseases on cotton leaves is K-mean clustering. Accuracy of K-mean clustering is 89.56%. Execution time required for detection of diseases using K-mean clustering is less.

II. PROPOSED WORK

2.1. Recognition system

It is common practice to have the preprocessing of Cotton leaf images before it has been extracted and classified. There are five main steps used for the detection of plant leaf diseases as shown in fig. The processing scheme consists of image acquisition through digital camera or web, image preprocessing includes image enhancement and image segmentation where the affected and useful area are segmented, feature extraction and classification. Finally the presence of diseases on the plant leaf will be identified. In the initial step, RGB images of leaf samples were picked up.

Cotton is one of the major domains in agriculture which decides economy. Diseases on the cotton plant are decreases productivity of the cotton production. Thus image processing technique is used for detecting diseases on cotton leaves early and accurately.

![Fig.2.1 Block diagram](image)

Image Acquisition: For capturing the rich details of cotton leaf patterns, an acquisition system should have a minimum resolution of 512 X 512 pixels in frame.
Image preprocessing: In this proposal initially preprocessing the input image using histogram equalization is applied to increase the contrast in low contrast image.

Feature Extraction: In this, Color feature variance is used for matching the train image features to database images.

Leaf Segmentation: For detection of internal and external boundaries of the cotton leaf, use K-mean clustering algorithm.

Leaf Recognition: Before actual recognition process of cotton leaf image, the disease spot is located using color feature technique.

2.2 Flowchart

The proposed method is flexible for all image sizes. It is common practice to have the preprocessing of Cotton leaf images before it has been extracted and classified. The processing scheme consists of image acquisition through digital camera or web, image preprocessing includes image enhancement and image segmentation where the affected and useful area are segmented, feature extraction and classification. Finally the presence of diseases on the plant leaf will be identified. For feature extraction, we are using K-mean clustering algorithm method for classification and Neural-network as recognizer.

2.2 Processing stages

There are five main steps used for the detection of plant leaf diseases as shown in fig. The processing scheme consists of image acquisition through digital camera or web, image pre-processing includes image enhancement and image segmentation where the affected and useful area are segmented, feature extraction and classification. Finally the presence of diseases on the plant leaf will be identified.
3. Feature extraction:

Feature extraction involves simplifying the amount of resources required to describe a large set of data accurately. When performing analysis of complex data one of the major problems stems from the number of variables involved. Analysis with a large number of variables generally requires a large amount of memory and computation power or a classification algorithm which over fits the training sample and generalizes poorly to new samples. Feature extraction is a general term for methods of constructing combinations of the variables to get around these problems while still describing the data with sufficient accuracy.

### III. CLASSIFICATION

3.1 Analysis:

<table>
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<tr>
<th>NAME</th>
<th>Healthy1</th>
<th>Healthy2</th>
<th>Healthy3</th>
<th>Healthy4</th>
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<td>2.13</td>
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<tr>
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<td>2.13</td>
<td>-89.41</td>
<td>-99.46</td>
</tr>
</tbody>
</table>

Table 3.2 Comparison of two healthy images:

3.2. Result:

3.2.1 Brown spot detection:
Fig 3.2.1 Brown spot detection

Brown spot occur at all crop stage, but infection is most critical during maximum tillering up to the ripening stages of the crop.

1.2.2 Alternaria leaf spot detection:

![Original input image](image1)

![Alternaria leaf spot](image2)

a. Original input image  

b. Alternaria leaf spot

RGB image is converted into binary and given to segmentation algorithm. Erosion and dilation is performed on segmented image to detect alternaria leaf spot detection.

IV. REFERENCE


