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Classification of Brinjal Leaf Diseases using K-Means Clustering

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***Abstract*—Agriculture is very important field in our nation. To detect the disease of brinjal leaf using image processing and segmentation techniques. There are some diseases that are common in all type of leaves but there are some critical diseases on the brinjal leaf. Hence it is detection and classification method to improve and accelerate the agriculturist decision making process. In segmentation, we use K-means clustering algorithm. The smallest or even the most uncertain disease in the leaves is detected. In the field of detection of vegetable disease using digital image processing techniques we are classifying different diseases of brinjal leaf with the related features. The accuracy of detected output will also be verified with iterations.**

Keywords*— *K-Means Clustering, SVM

I. INTRODUCTION

As weather cannot be controlled by the farmers since they lost control of most farming practices. If the farm is affected by a pest or a disease, it is to be rectified with immediate effect without any delay. Most of the disease in plants can be identified by monitoring the leaves. Farmers used to monitor the plant at definite time intervals and if they are unable to identify the symptom of a disease, they will apply approximate quantity of fertilizer or pesticide. But normally the farmers are not in a position to identify the actual disease deficiency. This results in the application of wrong fertilizer and finally it will affect the plant as well as the soil. The problem can be solved by automating the process of detection of disease deficiency which can be done with the help of several image processing techniques.

Today's farmers are not able to identify the diseases at the early stages due to lack of knowledge of infections and diseases that can attack the crop. With the rapid development of computer vision and image processing technology, it is possible to improve the accuracy and efficiency of the conventional agriculture work, such as pest detection and early warning.

II. MAJOR DISEASES

A. Alternaria Alternata

Alternaria leaf spot caused by alternaria alternate is one of the important foliar diseases of brinjal. The spots are mostly irregular and coalesce to cover large areas of the leaf blade. Severely affected leaves drop off as shown in Fig.1

Fig. 1 Alternaria Alternata

B. Antracnose

It is one of the major disease and is controlled mainly by the use of chemicals. This disease is shown in Fig. 2

Fig. 2 Antracnose

C. Bacterial blight

Fig. 3 shows the disease that attacks the young plants as well as mature plants. The infected young plants show dwarfing and stunting due to the shortening of the internodes [6]. Such plants do not flower and fruit.

Fig. 3 Bacterial Blight

D. Leaf spot

The disease symptoms are characterized by angular to irregular in shape, chlorotic lesion, later turning greyish-brown. Fig. 4 shows severely infected leaves that drop off prematurely, resulting in reduced fruit yield.

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Fig. 4 Leaf Spot

III. FLOW DIAGRAM

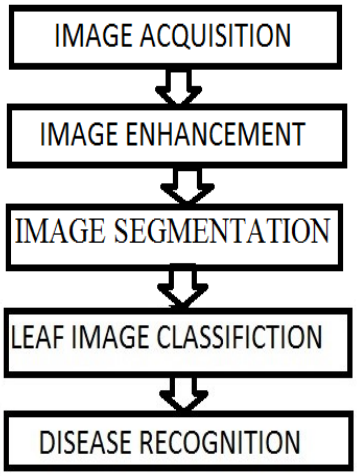

Fig. 5 Flow Diagram

A. Image Acquisition

Image acquisition is the process in which acquired and converted to the desired output format. For this application an analog image is first captured and then converted to the digital image for further processing.

B. Image Enhancement

The pre-processing steps are performed on the acquired image. Increase the contrast of the image by still or active binarisation, look-up tables or image plane separation. Decrease the image resolution decrease via binning. Image rotation. Convert color images to gray scale images.

C. Image segmentation

Segmentation was used to identify the object of image that we are interested. We have three approaches to do it. The first is Edge detection. The second is to use threshold. The third is the region-based segmentation. It does not mean that these three of that method can solve all of the problems that we met, but these approaches are the basic methods in segmentation.

D. Leaf Image Classification

The SVM classifier was used for classification and differences between the affected leaves. The image of disease affected leaf is depicted .First the captured images are classified as affected and unaffected leaves. Distribution of color is the same for unaffected leaves, but for the affected leaves the distribution of color is not uniform. This is because the values of the pixels of the affected leaves were totally different form the pixel values from the normal leaves.

E. Disease Recognition

After collecting the features of the leaf image, a recognizer is used to recognize the disease in the leaf image from the database. For classification the Support Vector Machine (SVM) classifier, which is a supervised machine learning algorithm can be used.

IV. RESULTS

A. GUI Overview

Fig. 6 shows the graphical user interface overview used for this topic.

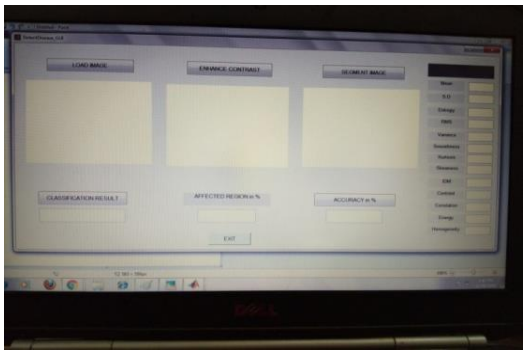

Fig. 6 Graphical User Interface

B. Segmentation and Selection of Clusters

K-Means clustering is used and the segmentation is done for a particular image and 3 clusters are formed as shown in fig. 7

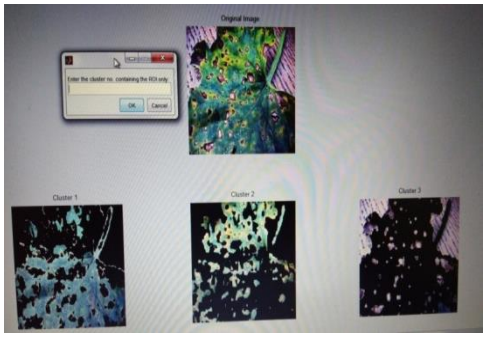

Fig. 7 Segmentation and Selection of Clusters

C. Examples

- Classification: Bacterial Blight [Fig. 8]

  Affected region: 15.0142

  Accuracy: 98.3871%

CONCLUSION

In this present paper, the new trend for the brinjal leaf disease detection using K-means clustering has been outlined. The different clusters have been used for the detection of disease. The accuracy of the result is verified with 500 iterations.

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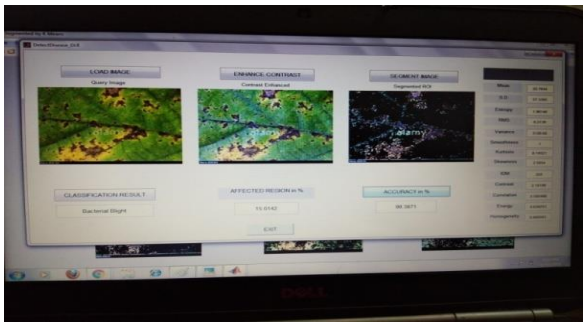

Fig. 8 Bacterial Blight

- Classification: Anthracnose [Fig. 9]
  Affected region: 11.9856
  Accuracy: 96.7742%

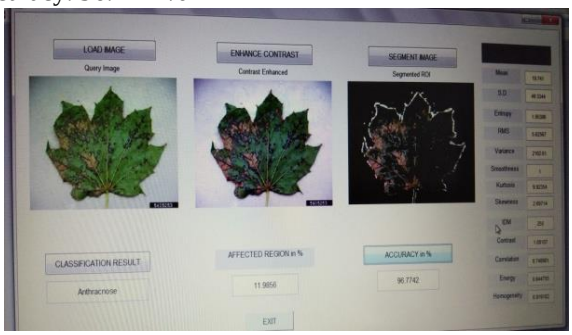

Fig. 9 Anthracnose

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