Plant Leaves Diseases Detection using Image Processing

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Abstract : Plant leaves play most important role in growth of the plant. There are many research area in the agriculture field such as leaves, root, and fruit etc. This paper classify the six type of plant leaves diseases such as Bacterial blight, Alternaria leaf spot, Grey Mildew, Myrothecium leaf spot, Leaf curl and normal leaf. The classification of the diseases is done based on the GLCM texture features. Finally classified the diseases by using Multi SVM supervised machine learning technique. The classification accuracy is found to be 97 percent.

IndexTerms - Leaves Diseases,GLCM Texture features,Image processing ,Thresholding.

I. INTRODUCTION

Image Processing in the Agriculture field has a lot of scope for researcher. There are different research areas in agriculture field such as leaf, root, fruit etc. A deep study is required to achieve the study and analysis in this field. The proposed work is research on the plant leaf diseases. The different type of plant leaf that is caused by the bacterial, viral diseases, and fungal disease. In the proposed work we classify the six type of diseases such as Bacterial bright, Leaf curl, Myrothecium leaf spot, Grey Mildew, Alternaria leaf spot and normal leaf. Generally in the image processing step for leaf diseases detection is image acquisition, image pre-processing, feature extraction and classification. Image acquisition is the process to capture the image using Digital camera, or mobile phone. In the image pre-processing step remove the noise from the image and in the feature extraction model extract the features from the leaf and finally use different machine learning technique to classify the diseases. The proposed work use Multi SVM supervised machine learning technique to classify the leaf diseases. In the literature paper there is some limitation for classification of the diseases such as less acquire and less number of image in the database. The accuracy of the process is more when compared with existing method. The reliability of the process is well optimum due to the limited number of the dataset is used. This paper divided into five sections. In section II describe the type of leaf diseases, Section III proposed system, Section IV result and Section V conclusion and future work.

II. TYPE OF LEAF DISEASES

There are various type of Plant leaf diseases such as Bacterial blight, Leaf curl, Alternaria leaf diseases, Myrothecium leaf spot, Grey mildew etc.

A. Bacterial Blight - The disease appears on different parts of plant, both at seedling and mature plant stages. The disease first appears on the leaves in form of water soaked region, then turns into black and gets dried up. In some cotton plants, water soaked region gets enlarged into angular reddish spots of about 1 mm in diameter.

Figure 1 Bacterial blight

B. Leaf Curl - Initially swelling and darkening of leaf veins occur, it is followed by cupping of immature leaves and curling of leaf margins as shown in Figure 2. In some cases the growth extending from the veins on the lower side of the leaf can also occur to have the appearance of cup-shaped structure [1]

Figure 2 Leaf curl

C. Alternaria Leaf Diseases - It appears in the form of circular spot of size 1-10mm in size and having color which can vary from circular brown, grey-brown to tan color refer as Figure 2. Irregular dead areas may develop as a result of union of older spots. Mature spots have dead centers which crack and fall out. The disease is more prominent on lower leaves of the plants as compare to the upper part leaves.

Figure 3 Alternaria leaf disease

D. Myrothecium - Myrothecium leaf spot caused by *Myrothecium roridum* Tode. The symptoms consists of lesions with concentric necrotic rings, with salient structures (sporodochia) irregularly dispensed. Symptoms of Myrothecium spots appear anywhere on leaves. These spots in the beginning appear water-soaked and are dark brown to black in color as shown in Figure 4. Irregularly shaped black sporodochia can form with a white fringe of mycelium. These spore structures appear in concentric rings within the necrotic areas on the lower surface of the leaf.

Figure 4 Myrothecium diseases

E. Grey Mildew - Grey mildew is one of the easier plant diseases to identify, as its symptoms are quite distinctive. Infected plants display white powdery spots on the leaves and stems. The lower leaves are the most affected, but the mildew can appear on any above-ground part of the plant. As the disease progresses, the spots get larger and denser as large numbers of asexual spores are formed, and the mildew may spread up and down the length of the plant. Powdery mildew grows well in environments with high humidity and moderate temperatures.

Figure 5 Grey Mildew

III. PROPOSED METHOD

In the process the plant leaf diseases identification from pictures of leaves in a natural background, retrieving an accurate contour is a challenging and crucial issue. In this process, we introduce a method designed to deal with the obstacles raised by such complex images, for simple and lobed tree leaves. A first pre-processing step resized the input image in 256X256 format then apply the median filter to remove the noise from the input image. In segmentation step based on the OTSU's and morphological operator performed to extract the affected part from the leaf then thresholding. Combining global shape descriptors we extract the features like GLCM features, the leaves are then classified by using the algorithm multi SVM classifier.

Nowadays, many segmentation methods exist and according to the specific use, it is difficult to choose between such methods. Moreover, optimizing their parameters is often a real challenge. To obtain better results, some authors proposed to add pre-processing steps to the segmentation workflow. In this context, Weber et al. proposed various works such as, highlighting a segmentation technique based on quasiflat zones. The novelty lies in the use of morphological tools, guided by the user, which apply the segmentation process on a pre-processed image (i.e. an over-segmentation of the image in quasi-flat zones). The proposed flow diagram is show in the figure 6.

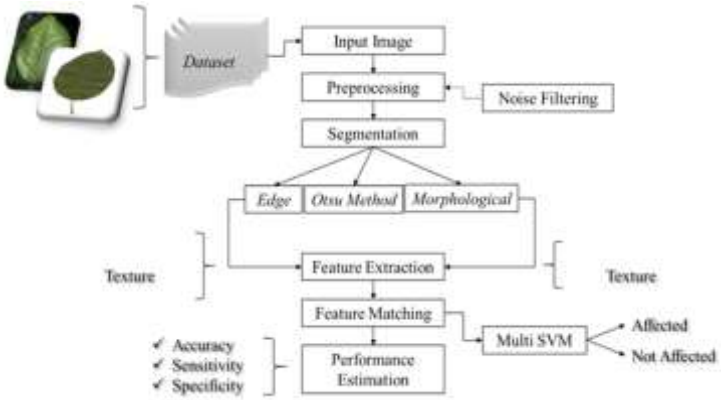

Figure 5 Proposed Flow Diagram

Advantages:

- The accuracy of the process is more when compared with the existing method.
- The reliability of the process is well optimum due to the limited number of dataset is used.

IV. EXPERIMENTAL RESULTS

The presented work use to identify the plant leaf diseases. The defined work applied on the google web image. The classification result obtained by the proposed model and the training dataset property is given in this section. In the training dataset we use 25 Image of every diseases. Total 150 Image use for dataset in JPG format.

DATASET PROPERTIES

PROPERTY	VALUE
Total dataset Image	150
Type	Color
Format	JPG
Resolution	256X256
Training Image	150
Testing Image	150
Accuracy	97%

The figure 1 Show the input image that is use for testing. This input image is first resize in 256x256 resolution then apply morphological operator and OTSU's segmentation to extract the affected part of the leaf. Figure 2 show the affected part of the image. Figure 3 show the texture features extracted by using GLCM (Gray level co-occurrence matrix). Finally figure 4 show the result and accuracy of the model.

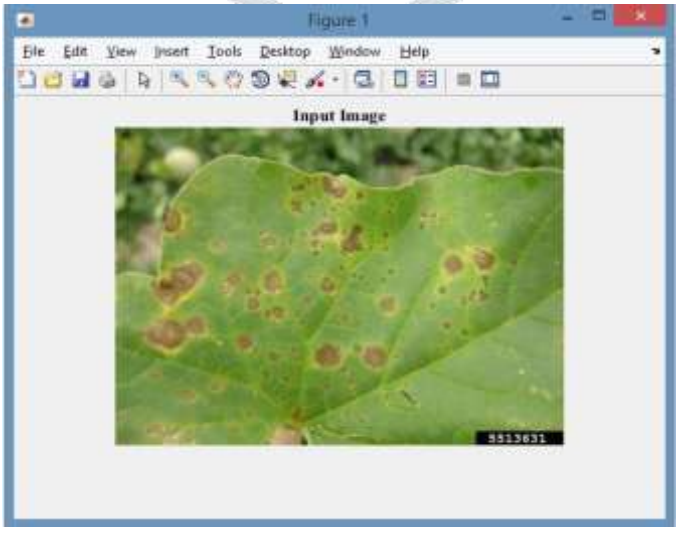

Figure 6: Input Image

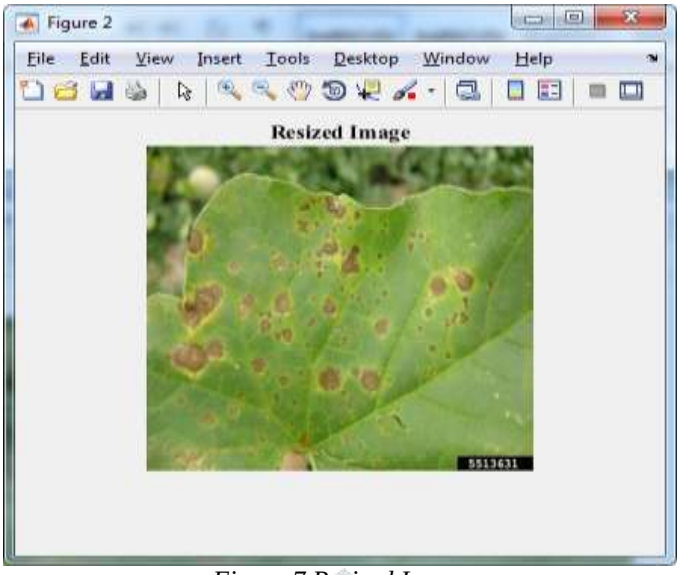

Figure 7 Resized Image

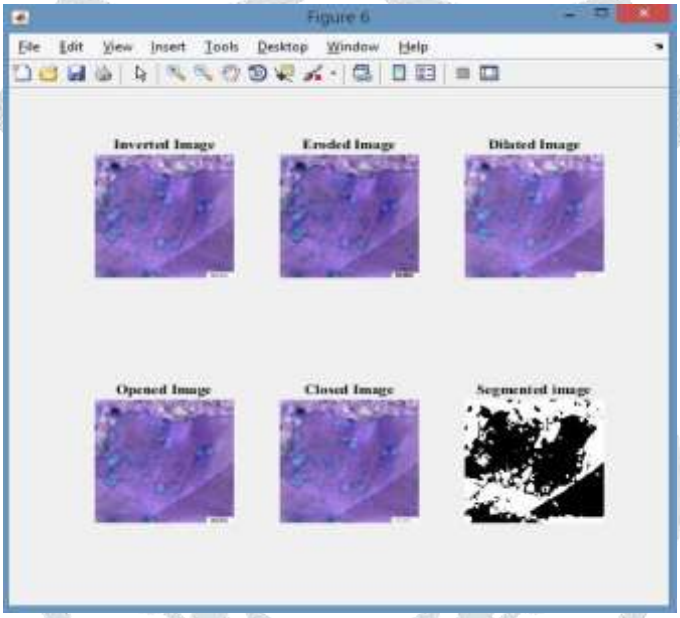

Figure 8: Segmented Image

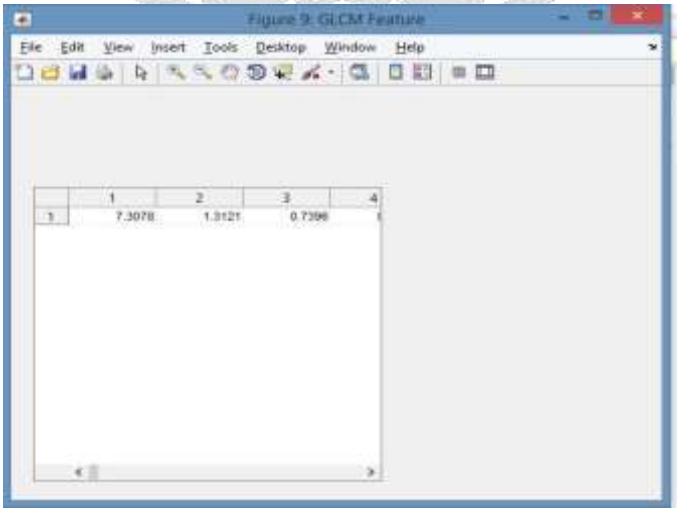

Figure 9: GLCM Extraction

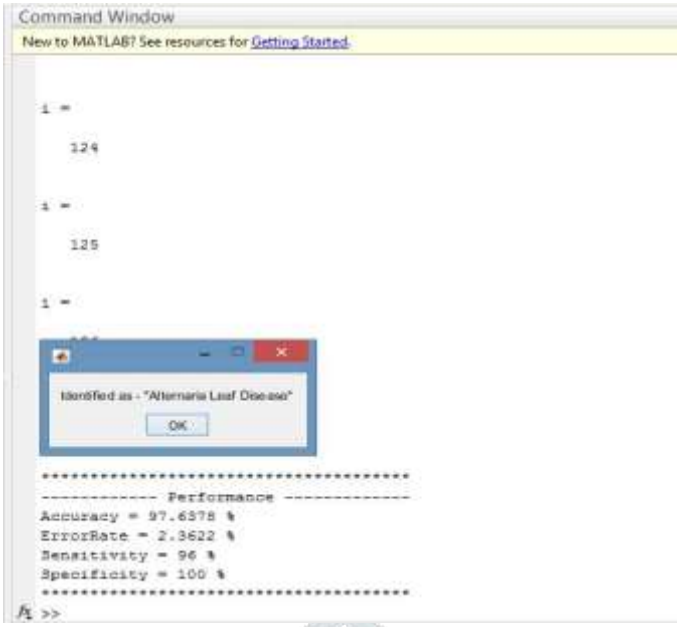

Figure 10: Result and Accuracy

V. CONCLUSION

The Proposed Work consists of four phase to classified the plant leaf diseases. Initially the image Resize in 256X256 and filter image using median filter. Second phase identify the affected part of the leaf using OTSU's Segmentation and morphological operator. Third phase extract the texture feature using GLCM method and finally classify the diseases by using Multi SVM supervised machine learning technique. The goal of the research work is to develop an advance system that classified the leaf diseases that improve the production rate of the farming production.

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