International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 07 | July - 2022 Impact Factor: 7.185 ISSN: 2582-3930

LEAF DISEASE DETECTION USING CLUSTERING METHOD AND IMAGE PROCESSING

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ABSTRACT :

The revelation of plant disease is a prominent research theme in the field of computer science. With the aid of Intelligent systems, the diseases can be detected effectively .The plant leaves are mainly affected by varied micro organisms. This paper centers on the discovery of disease in plants using the input picture. The disease identification concerns the steps like transfiguration of the picture format from RGB to Grayscale. Adaptive Histogram Equalization (AHE) is accustomed to improvise the contrast in the picture. The 13 prominent attributes are extracted by handling a feature extraction method called GLCM or Gray Level Co-occurrence Matrix .The standard benchmark images are trained using SVM classifier and the outcomes are displayed in the output screen. Keywords: AHE, Feature extraction, GLCM, SVM classifier.

1. INTRODUCTION

The revelation of disease is decisive in enriching the grade of the agricultural output and intercepting the overall depletion of the plants. The research on plant ailment is the mechanism of learning the detectable patterns visible on the plant. The plants being exposed to the outside environment get diseases from exposure. [1]Plants are attacked by several diseases which usually target the specific plant parts like stem, fruit, leaf, seed etc. [2]Leaf symptoms are an important origin of knowledge to detect the diseases in multiple types of plants and therefore it has to be contemplated in identifying the disease. This paper reports about the revelation of leaf disease using Image processing strategies, as it is a trendy process being used in agriculture. Pooja V et.al [3], focused on five sorts of disease with training set of 227 images and testing of 121 images. They have inured K-means clustering algorithm for segmentation and used varied feature extraction strategies like skewness, contrast, etc.to pull out desired features. SVM classifiers were implemented for classification. Their model procured a recognition rate of 92.4%. In the proposed work, initially we take the picture of the leaf to identify which section is corrupted. Then image preprocessing is done where the picture is changed from RGB to Grayscale and Adaptive Histogram Equalization (AHE) is applied to enhance the contrast of the picture. There are many

features in the image like texture, edges, morphology, color .Monica Jhuria et al [4] accounts color, texture and morphology. They have proved that morphological results are good than other results. S.W.Zhang et.al [5], have employed K – nearest neighbor classifiers to recognize the plant disease. The 13 prominent features are accounted in this paper. The outcomes of the features are matched and the results are classified using SVM classifiers and the resultants are presented to the user. Pranjali.B.Padol et.al [6], have used Linear SVM classifier and K-means clustering to identify diseases in grape leaf. Their model procured an accuracy of 88.89%.

2. LITERATURE REVIEW:

Arti N. Rathod (2014) et al. proposed in agriculture research of automatic leaf disease detection is essential research topic as it may prove benefits in monitoring large fields of crops, and thus automatically detect symptoms of disease as soon as they appear on plant leaves. There are the main steps for disease detection of Image Acquisition, Image Preprocessing, Image Segmentation, Feature Extraction and Statistical Analysis. This proposed work is in first image filtering using median filter and convert the RGB image to CIELAB color component, in second step image segmented using the k-medoid technique, in next step masking green-pixels & Remove of masked green pixels, after in next step calculate the Texture features Statistics, in last this features passed in neural network. The Neural Network classification performs well and could successfully detect and classify the tested disease.

Ms. Kiran R. Gavhale (2014) et al. described diseases in plants cause major production and economic losses as well as reduction in both quality and quantity of agricultural products. Now a day's plant diseases detection has received increasing attention in monitoring large field of crops Farmers experience great difficulties in switching from one disease control policy to another. The naked eye observation of experts is the traditional approach adopted in practice for detection and identification of plant diseases. In this paper we review the need of simple plant leaves disease detection system that would facilitate advancements in agriculture. Early information on crop health and disease detection can facilitate the control of diseases through proper management strategies. This technique will improves productivity of crops. This paper also compares the benefits and limitations of these potential methods. It includes several steps viz. image acquisition, image pre-processing, features extraction and neural network based classification.

Dhawale Sariputra (2016) et al. proposed the conventional technique for leaf disease detection involves of calling an expert person who can identify the diseases based on his understanding and that costs too much for an ordinary farmer in an emerging country such as India as stated above. Hence an alternative is mandatory for a country like India where a low cost but technology dependent system is required. To fulfill this, purpose a system is proposed which can identify the diseases on the plants with the help of technology. It will take input image from user which is to be processed. It will preprocess the image and then the green pixels from the image is removed which are nothing but the healthy part of the leaf. The GUI development of this project is done in Matlab. These methods result is shown in GUI. In the future work other part is segmented and the useful segments are selected for further analysis which consist of feature extraction and the statistical analysis of those features. After this the final information about disease of that plant is displayed. The classifier used in this proposed system is Neural Network classifier hence once

trained such classifier can provide results in better manner compared to the conventional systems.

Piyali Chatterjee (2016) et al. proposed the analysis of the plant diseases may involve the detection of the abnormalities introduced in the plant leaves, which may or may not be visible to the naked eyes. With the layman's idea of the problems in plants, one cannot proceed with any random solution in the form of any pesticide or fertilizer, unless there's a sheer and accurate understanding of the disease spots and proper pattern recognition which otherwise would lead to a catastrophic situation where besides the loss of the money, the plant will remain untreated and the diseases will also get more time to spread. In order to combat this situation effectively, an artificial intelligence technique has been employed in this paper using k-means clustering (segmentation). The work begins with image acquisition, image enhancement and restoration, and information extraction from images for further computer analysis.

Prajakta Mitkal (2016) et al. proposed nowadays many of the farmers and agro help center use the different new technology to enhance the agriculture production. Plants have become important source of energy. There are several diseases that affect plants with the potential to cause economic and social losses. Many of disease are most popular where disease spots occur on the sugar cane plant leaves. If the disease are not detected at first stage than it is more harm full to production. To find out particular disease using Digital image processing helps to find disease and provide prevention for particular disease which types pesticide need to prevent disease. Firstly take Input image in RGB form then the green pixels are removed then the image is segmented useful segment used for extraction finally texture statistics is completed and according to analysis disease prevention is provided.

Sushil R. Kamlapurkar (2016) proposed the identification of disease on the plant is a very important key to prevent a heavy loss of yield and the quantity of agricultural product. The symptoms can be observed on the parts of the plants such as leaf, stems, lesions and fruits. The leaf shows the symptoms by changing colour, showing the spots on it. This identification of the disease is done by manual observation and pathogen detection which can consume more time and may prove costly. The aim of the project is to identify and classify the disease accurately from the leaf images. The steps required in the process are Preprocessing, Training and Identification. The disease considered are Powdery Mildew, Downey Mildew which can cause heavy loss to Grape fruit. For identification of disease features of leaf such as major axis, minor axis etc. are extracted from leaf and given to classifier for classification.

3. PROPOSED METHOD:

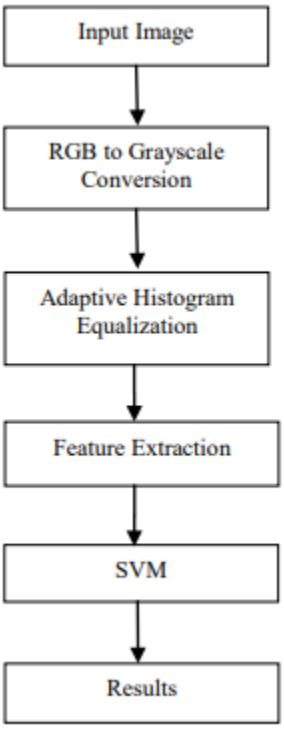


Fig1 Flow chart

Image Acquisition: This one is the first most step which captures the image of leaf to upload the snapshot in the system for further processing.

Image Pre-processing: It is carried out to improve the quality of image. Basically, it removes the noise from the image and converts RGB image into grey scale image.

Image Segmentation: segmentation of image makes image more meaningful and brings more clarity. It converts digital image into various segments, also called super-pixels.It successfully represents the boundary line of image.

Feature extraction in image: In this particular step features of leaf like color, texture, morphology, structure etc are considered to detect plant disease. It uses the color co-occurrence and coverts RGB image of leaf into HSB color space representation.

Classification: It is done for interpretation of region affected by disease . In short, it helps in identification of leaf disease.

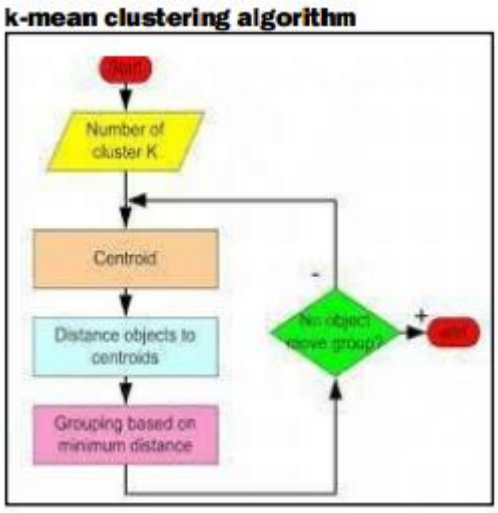


Fig 2 K-mean clustering flowchart

This algorithm is essentially used to divide the distinct object points based on the features and characteristics of the leaves into k number of groups/clusters. This is performed by using the Euclidean distance metric. The algorithm of k means is explained below:

Initialization: In this algorithm, “k” means the number of groups or clusters that can be formed, the image is therefore classified in to k number of clusters. The user is required to select the valid value of k.

Working: Each and every pixel of the image is assigned according to its nearest centroid (k). The placement or position of the centroid is modified and changed by the means of data values assigned to the group. The centroid then eventually moves to the centre, of its assigned points.

Result

1. Open the file location and run the program. After running the program, GUI of MATLAB will be open where we can upload the dataset images from the system.

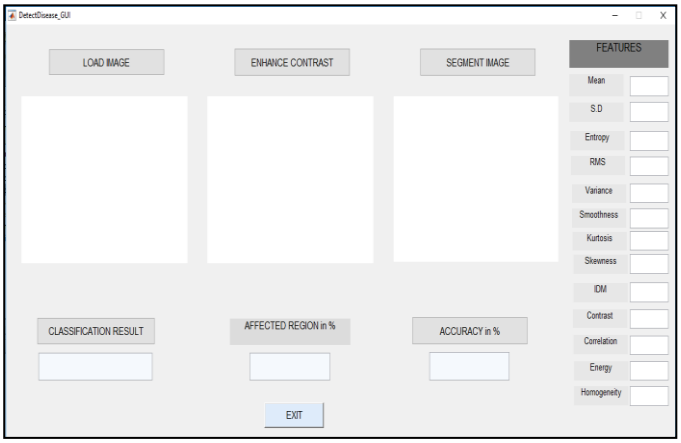


Figure 3: GUI of the program

2. Now through load image button we must select the infected leaf image of which we need to find the disease.

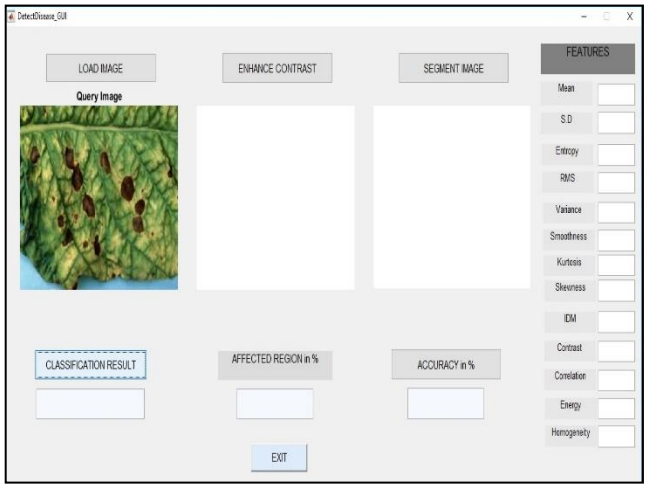


Figure 4: Selected leaf image

3. In next stage, we will enhance the contrast of the infected leaf image using enhance contrast button.

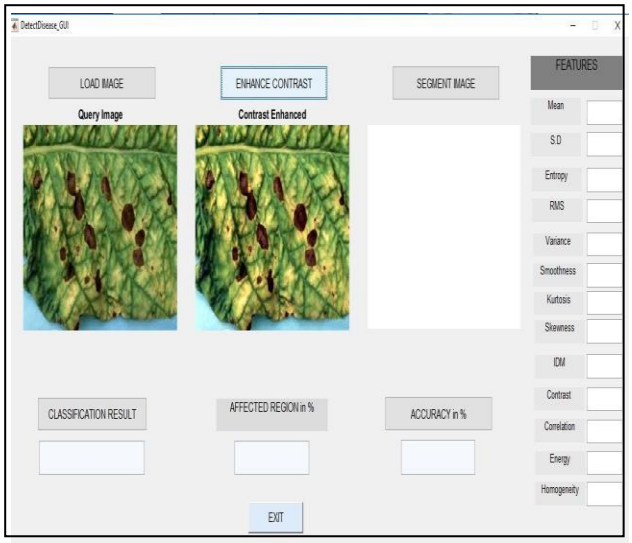


Figure 5: Enhance image contrast

4. After enhancement of contrast of the infected leaf image, segmentation process has been done using k-means clustering. These results in three cluster groups. Now we need to enter the cluster number in which the diseases part is detected out of these 3 clusters.

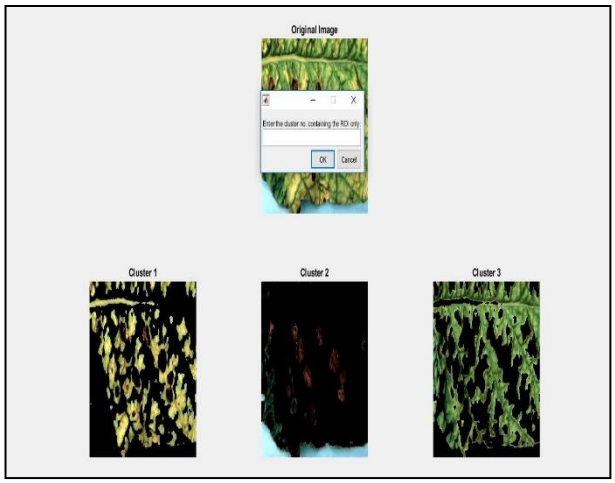


Figure 6: Image clustering

5. Suppose we select cluster-1, then the resultant extracted features are being displayed on the right side of the screen.

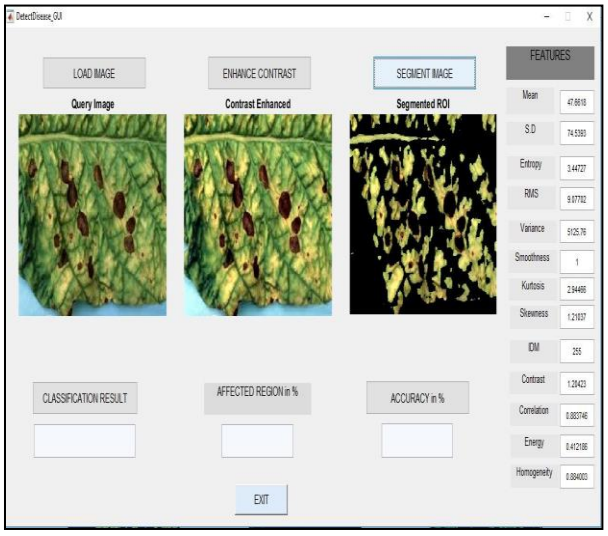


Figure 7: Feature extraction

6. Now come to classification result to view the name of the disease and percentage of affected region of the leaf area. This is obtained by simply clicking the buttons for particular

results.

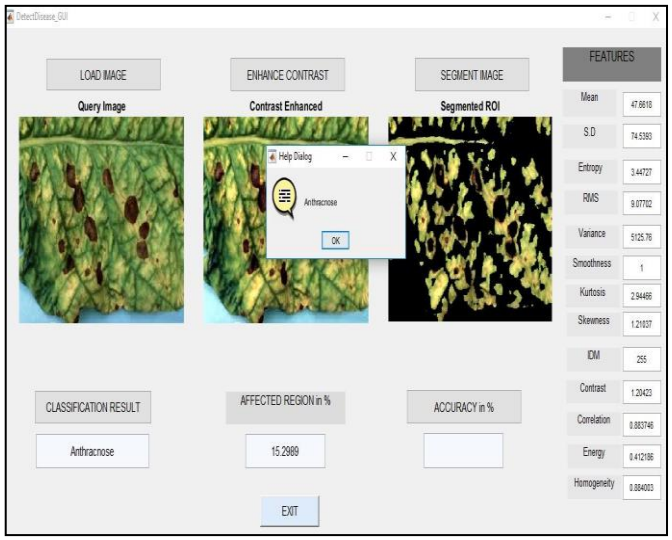
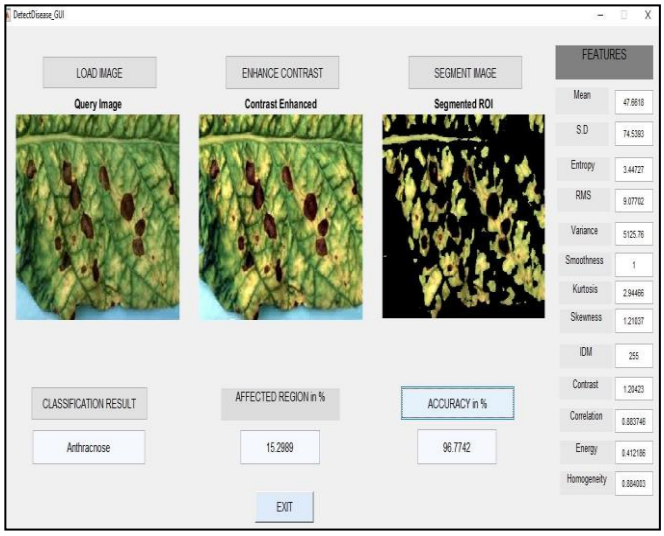


Figure 8: Classification and affected region

7. Now come to the next stage to identify the percentage of accuracy of diseased area. This gives result after 500 iterations for better accuracy.

Figure 9: Accuracy



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