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Computer Vision image Enhancement and Plant Leaves Disease Detection

Plant Disease Detection
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Abstract— Images are having high quality and clarity than original captured images after enhancing. Different real time applications such as remote sensing, medical image analysis and plant leaves disease detection are used by computer vision image enhancement (Color conversion and Histogram equalization). Original captured images are RGB images. RGB images are combination of primary colors (Red, Green and Blue). The range of this color is 0 to 255 so it is become difficult to implement application. Grayscale image application implementation is easy because it has range between 0 and 1 Histogram equalization increases the images clarity. Further plant leave disease detection is used by grayscale conversion and histogram equalization. In agriculture research of automatic leaf disease detection is important research topic. It may applicable in monitoring large fields of crops, and thus automatically detect symptoms of disease by the leaves of plant. The term disease is usually used only for destruction of live plants. Paper shows the important method to develop for detecting the plant disease. The methods studies are for increasing throughput and accurate treatment of plant disease than human prediction. Digital image processing is a technique used for enhancement of the image. To improve agricultural products automatic detection of symptoms is beneficial.

Keywords—*Image Enhancement, Histogram, Plant Leaves Detection, Feature Extraction,Classifier*

I. INTRODUCTION

Plant leaves diseases detection is used captured images for diseases analyzation and detection. Image processing considers four basic types of images for processing.

1. RGB Image: This is collection of three primary colors M x N matrices: Red, Green and Blue. All these matrices contain the range between 0 and 255.
2. Indexed Image: This is combination of two M x N matrices with an indexed image using G grey levels. This matrix has intensity values between 1 and infinity.
3. Intensity or grayscale image: A grayscale image is also called as intensity images because of the matrix values are represented by intensities. It has only one image matrix and the matrix contains the values between zero and 1.
4. Binary Image: It has only one image matrix and the range of the values between 1 and 0.

India is a cultivated country. Sharecroppers (Farmers) have huge range of diversity to select suitable crops. Research work develops the advance computing environment to identify the diseases using infected images of various leaves.

Images of leaves are taken from digital camera, smart phones and processed using image growing, then the part of the leaf sport has been used for the classifying purpose of the train and test of disease.The technique evolved into the system is both Image processing techniques and advance computing techniques to identify disease from leaves.

Disease management is a challenging task. Generally diseases are seen on the leaves or stems of the plant. Precise quantification of these visually experimental diseases, pests, traits has not studied yet because of the complexity of visual patterns. Hence there has been growing demand for more specific and sophisticated image pattern understanding.

II. LITERATURE SURVEY

Some author are describing to detecting leaf disease using various methods suggesting the various implementation ways as illustrated and discussed here. In this author consists of two phases to identify the affected part of the disease. Initially Edge detection based Image segmentation is done, and finally image analysis and classification of diseases. This work the input images using the RGB pixel counting values features used and identify disease wise and next using homogenization techniques Sobel and Canny using edge detection to identify the affected parts of the leaf spot to recognize the diseases boundary is white lighting and then result is recognition of the diseases as output. In this detection of leaf diseases has been used method is threefold: 1) identifying the infected object based upon k-means clustering; 2) extracting the features set of the infected objects using color co-occurrence methodology for texture analysis; 3) detecting and classifying the type of disease using NNs, moreover, the presented scheme classifies the plant leaves into infected and not-infected classes. In this a comparison of the effect of CIELAB, HSI and YCb Cr color space in the process of disease spot detection is done. All these color models are compared and finally a component of CIELAB color model is used. In this Support vector machines are a set of related supervised learning method used for classification and regression. The detection accuracy is improved by SVM classifier. The process of image segmentation was analyzed and leaf region was segmented by using Otsu method. In the HSI color system, H component was chosen to segment disease spot to reduce the disturbance of illumination changes and the vein. Then disease spot regions were segmented by using Sobel operator to examine disease spot edges. Finally plant diseases are graded by calculating the quotient of disease spot and leaf areas. This wills two techniques for feature extraction comparison of two techniques. Otsu Threshold: thresholding creates binary image from grey level ones by turning all pixels below some threshold to zero and all pixels about that threshold to one. K-Means clustering is an unsupervised learning task where one seeks to identify a finite set of categories termed clusters to describe the data. This describes the segmentation consist in image conversion to HSV color space and fuzzy c-means clustering in hue-saturation space to distinguish several pixel classes. These classes are then merged at the interactive stage into two final classes, where one of them determines the searched diseased areas. This presents a color image segmentation method which divides colour space into clusters. Here also compare the efficiency of available algorithm for segmentation of gray as well as noisy images. Unlike k-means algorithm, k-medoids is not sensitive to dirty data and abnormal data. The k-medoids algorithm is suitable for noisy images. It is seen that, the segmented images are highly dependent on the number of segments or centroids. From above literature survey found that the methods are used by different researchers for leaf disease detection & analyses are following:

1. Homogenization techniques Sobel and Canny edge detection segmentation, HPCCDD Algorithm.
2. Otsu segmentation, K-Means clustering & Neural Network.
3. Applying Otsu threshold on CIELAB, HSI and YCbCr color space.
4. Color transformation, segmentation, computing texture features & Support vector machines for developing classification and regression.
5. Otsu segmentation, Sobel operation & grading method.

III. SYSTEM DESCRIPTION

3.1 Histogram Equalization

Histogram equalization is one of the image enhancement techniques. This method distributes the intensities of the images. Through this distribution, increases contrast of the areas from local contrast to higher contrast. Histogram equalization is used to improve the interpretability, visibility and

quality of the image. Histogram equalization creates an output image with a uniform histogram. The cumulative distribution function is used to distribute the intensity values of the images. This function finds out the transformation T that maps input image grayscale values to transformed image grayscale values.

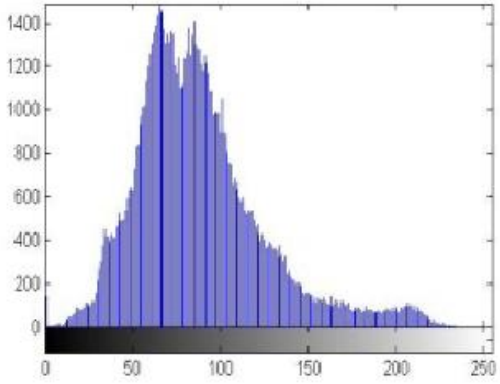


Figure 3.1.1 (a) Original image *(b) Histogram*

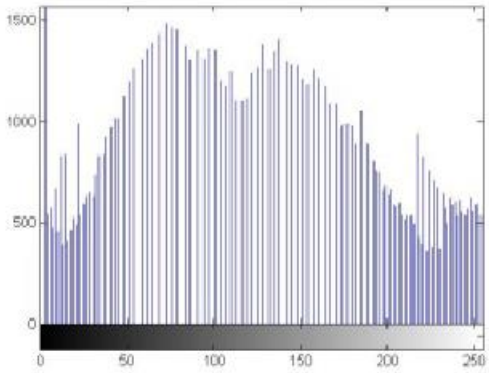
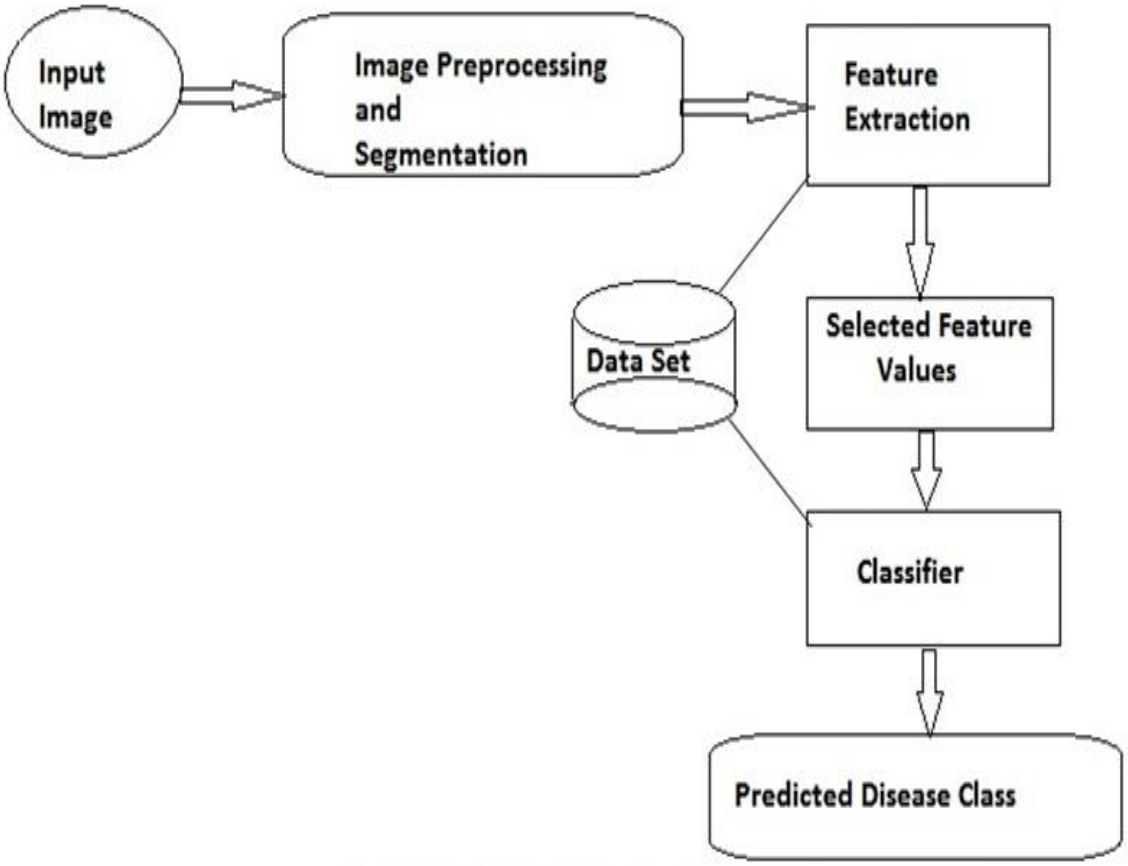


Figure 3.1.2 (a) Equalized image *(b) Equalized Histogram*

3.2 Image Acquisition and Pre-processing:

First, the images of various leaves are going to acquire by a digital camera. The digital images are acquired from the location referring different sites. Other way is collect the images from agriculture research units. The images which have input are always not satisfactory regardless of what image acquisition devices are adopted. If there are noises in the image, the region of curiosity in the image is not clear or other objects interference exists in the image and so on. Different pre-processing methods should be selected for different image applications. There are three steps included in pre-processing phase: clipping, smoothing and enhancement. Noises which may be brought from the process of image collection and lots of information which may be easily leaded from the operating and saving to the image would make the quality of image dropped, thereby affects following of disease. So, the image with low quality must be smoothed by filter. Different kinds of noises exist in an image and variety of noise reduction techniques is available to perform de-noising. Selection of the de-noising algorithm depends on the application.



3.3 Image Segmentation (region of interest):

The image will be segmented into different parts according to the region of interest. Image segmentation is to divide the image into same meaningful regions. Simply to say, image segmentation means to separate the object from background for following processing in an image. In this step the images are segmented using k-medoids clustering methods. K-medoids clustering is partitioning based clustering method. K-medoids or PAM (Partition around medoids): Every cluster is represented by one of the objects in the cluster. K-medoids more robust than k- means in the presence of noise and outlines; because a medoids is less influenced by outlines or other extreme values than a mean.

3.4 Extraction of Features and Statistics Analysis:

The input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant then the input data will be transformed into a compact representation set of features. The input data Transform into the set of features is called features extraction. If the features extraction is carefully chosen to so expect that the features set will extract the relevant information from the input data in order to perform the desired task. The color co-occurrence texture analysis method is developed by the Spatial Grey-level Dependence Matrices (SGDM). The grey Level Co-occurrence Methodology (GLCM) is a statistical way to describe shape by statistically sampling the way certain grey level occurs in relative to other grey levels. These matrices measure the probability that a pixel at one particular grey level will occur at a distinct distance orientation from any pixel given that pixel has a second particular grey level.

3.5 Classification based on classifier:

Neural networks are used in the automatic detection of leaves disease. Neural network is chosen as a classification tool due to its known technique as a successful classifier for many real applications. The training and validation processes are among the important steps in developing an accurate

process model using NNs. The dataset for training and validation processes consists of two parts; the training features set which are used to train the NN model; whilst a testing features sets are used to verify the accuracy of the trained using the feed-forward back propagation network. In the training part, connection weights were always updated until they reached the defined iteration number or suitable error. Hence, the capability of ANN model to respond accurately was assured using the Mean Square Error (MSE) criterion to emphasis the model validity between the target and the network output.

IV. CONCLUSION

Grayscale images are easy to process and implement for various applications because they have better clarity and suited for analysis than RGB images. Histogram equalization is used to enhance the contrast of the images and provides clear image to human eyes. So, these types of images will be used to analysis and diagnosis the plant leaves diseases and determines the diseases level of the plant leaves. There is main characteristics of disease detection is system can identify the affected part of a leaf spot by using the image processing technique. In Color model CIELAB color model is accurately detected disease and results are not affected by background, type of leaf, type of disease spot and camera flash.

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