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Image Processing Techniques for Detection of Leaf Disease

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Abstract— 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. The term disease is usually used only for destruction of live plants. This paper provides various methods used to study of leaf disease detection using image processing. The methods studies are for increasing throughput and reduction subjectiveness arising from human experts in detecting the leaf disease[1].digital image processing is a technique used for enhancement of the image. To improve agricultural products automatic detection of symptoms is beneficial.

Keyword— Leaf disease, Image processing.

I. INTRODUCTION

India is an agricultural country. Farmers have wide range of diversity to select suitable fruit and vegetable crop. Research work develops the advance computing system to identify the diseases using infected images of various leaf spots. Images are captured by digital camera mobile and processed using image growing, then the part of the leaf sport has been used for the classification purpose of the train and test. The technique evolved into the system is both Image processing techniques and advance computing techniques.

Image Analysis Can Be Applied For The Following Purposes:

1. To detect diseased leaf, stem, fruit.
2. To quantify affected area by disease.
3. To find the boundaries of the affected area.
4. To determine the color of the affected area.
5. To determine size & shape of leaf.
6. To identify the Object correctly.

Etc.

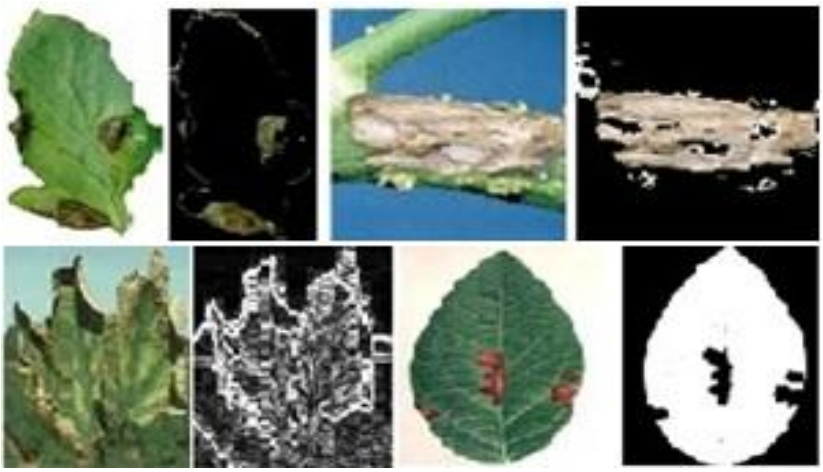

Fig. 1. Image analysis.

Disease management is a challenging task. Mostly diseases are seen on the leaves or stems of the plant. Precise quantification of these visually observed diseases, pests, traits has not studied yet because of the complexity of visual patterns. Hence there has been increasing demand for more specific and sophisticated image pattern understanding [1].

Various Types Of Leaf Spot Deseases:

- Bacterial
- Fungal
- Viral

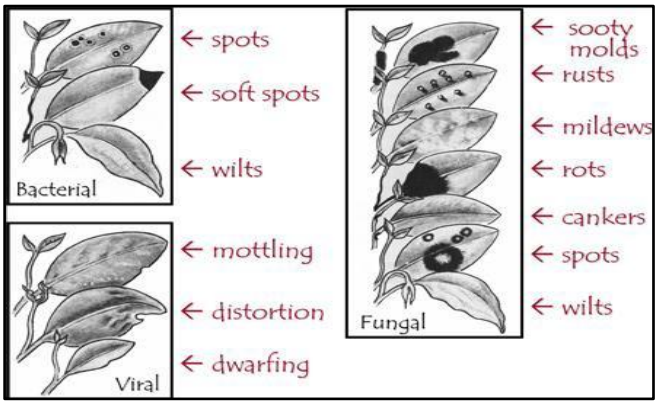

Fig. 2. Various types of diseases

Most leaf diseases are caused by fungi, bacteria and viruses. Fungi are identified primarily from their morphology, with emphasis placed on their reproductive structures. Bacteria are considered more primitive than fungi and generally have simpler life cycles. With few exceptions, bacteria exist as single cells and increase in numbers by dividing into two cells during a process called binary fission viruses are extremely tiny particles consisting of protein and genetic material with no associated protein [9]. In biological science, sometimes thousands of images are generated in a single experiment. There images can be required for further studies like classifying lesion, scoring quantitative traits, calculating area eaten by insects, etc. Almost all of these tasks are processed manually or with distinct software packages. It is not only tremendous amount of work but also suffers from two major issues: excessive processing time and subjectiveness rising from different individuals. Hence to conduct high throughput experiments, plant biologist need efficient computer software to automatically extract and analyze significant content. Here image processing plays important role [1]. This paper provides a survey to study in different image processing techniques used for studding leaf diseases.

II. LITERATURE REVIEW

Some papers are describing to detecting leaf disease using various methods suggesting the various implementation ways as illustrated and discussed here.

[2] In this paper 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 is performed using our proposed Homogeneous Pixel Counting Technique for Cotton Diseases Detection (HPCCDD) Algorithm. The goal of this research work is identify the disease affected part of cotton leaf sport by using the image analysis technique. This work find out the computer systems which analyze 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. [3] in this paper 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 details, a color transformation structure for the RGB leaf image is created, and then, a device-independent color space transformation for the color transformation structure is applied in next step. After that, the image at hand is segmented using K-Means clustering technique. This all step are determined the infected object(s) and identify the mostly green colored pixels. After that, based on specified and varying threshold value that is computed for these pixels using Otsu's method, these mostly green pixels are masked as follows: if the green component of pixels component of pixel intensities is less than the pre-computed threshold value, the red, green and blue components of the pixel is assigned to a value of zero. This is done in sense that these pixels have no valuable weight to the disease identification and classification step, and most probably those pixels represent healthy areas in the leave. The pixels with zeros red, green and blue values and the pixels on the boundaries of the infected cluster were completely removed. Next in the infected cluster was then converted from RGB format to HIS format and SGDM matrices the texture statistics for each image were generated. The texture features for the segmented infected object in this phase are calculated. Finally, the recognition process was performed to the extracted features through a pre-trained neural network. [4] In this paper a comparison of the effect of CIELAB, HSI and YCbCr color space in the process of disease spot detection is done. Median filter is used for image smoothing. Finally threshold can be calculated by applying Otsu method on color component to detect the disease spot. In Method 1: disease sports are segmented by applying Otsu threshold on RGB image. In Method 2: RGB image is first converted into YCbCr color space using color transform formula. Then median filter is used for image smoothing. Disease spots are detected by applying Otsu threshold on 'Cr' component of filtered YCbCr color space. In Method 3: this is similar to method 2. Only difference is that in place of YCbCr color space RGB image is transformed into HSI color space and disease spot are detected by applying Otsu threshold on 'H' component of filtered HSI color space. In Method 4; again same process is repeated using CIELAB color space. Disease spots are segmented by applying Otsu threshold on 'A' component of filtered LAB color space. All these color models are compared and finally 'A' component of CIELAB color model is used.

[5] In this paper four main steps are first a color transformation structure for the input RGB image is created, and then the green pixels are masked and removed using specific threshold value followed by segmentation process, computing the texture features using color co-occurrence method for the useful segments, finally the extracted feature are passed through the classifier. 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 two class problem is then extended to multiclass problem where the detected leaf diseases are then classified into various categories. By this method, the plant diseases can be identified at initial stage itself and the pest control tools can be used to solve pest problems while minimizing risks to people and the environment.

[6] 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.

[7] This paper wills two techniques for feature extraction and comparison of two techniques. Otsu Threshold: thresholding creates binary image from gray 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.

[8] This paper 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.

III. SUMMARY OF LITRATURE SURVEY:

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.
6. Fuzzy c-means clustering in hue-saturation space
7. Image clipping, filtering & threshoulding.
8. Comparison of two techniques: Otsu threshold and K-Means clustering

IV. CONCLUSION

This paper provides the survey of different techniques for leaf disease detection. There is main characteristics of disease detection are speed and accuracy. Hence there is working on development of automatic, efficient, fast and accurate which is use for detection disease on unhealthy leaf. Work can be extended for development of hybrid algorithms & neural networks in order to increase the recognition rate of final classification process. Further to needed to compute amount of disease present on leaf.

REFERENCES

[1]. Jayamala K. Patil, Raj Kumar, "Advances In Image Processing For Detection of Plant Diseases" JABAR, vol. 2(2), pp. 135-141, June-2011.

[2]. P.Revathi, M.Hemalatha, "Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques" ISBN, pp 169-173, 2012 IEEE.

[3]. H. Al-Hiary, S. Bani-Ahmad, M. Reyalat, M. Braik and Z. ALRahamneh, "Fast and Accurate Detection and Classification of Plant Diseases" IJCA, vol. 17(1), pp. 31-38, March 2011, IEEE-2010.

[4]. Piyush Chaudhary, Anand K. Chaudhari, Dr. A. N. Cheeran and Sharda Godara, "Color Transform Based Approach for Disease Spot Detection on Plant Leaf", IJCST, 3(6), pp. 65-70 June 2012.

[5]. S. Arivazhagan, R. Newlin Shebiah, S. Ananthi, S. Vishnu Varthini, "Detection of unhealthy region of plant leaves and classification of plant leaf diseases using texture features", CIGR, vol. 15(1), pp. 211-217, March 2013.

[6]. Shen Weizheng, Wu Yachun, Chen zhanliang, Wei Hongda, "Grading Method of Leaf Spot Disease Based on Image Processing" ICCSS, pp. 491-494, 2008 IEEE.

[7]. Mrunalini R. Badnakhe, Prashant R. Deshmukh, "Infected Leaf Analysis and Comparison by Otsu Threshold and k-Means Clustering" IJARCSSE, vol. 2(3), pp. 449-452, 2012.

[8]. Joanna Sekulska-Nalewajko, Jaroslaw Goclawski, "A semi-automatic method for the discrimination of diseased regions in detached leaf images using fuzzy c-means clustering". Polyana-Svalyava (zakarpattya), Ukraine: pp.172-175, 2011 IEEE.

[9]. Prof. Sanjay B. Dhaygude, Mr.Nitin P.Kumbhar, "Agricultural plant Leaf Disease Detection Using Image Processing" IJAREEIE, vol. 2(1), pp. 599-602, January 2013.

[10]. Dheed Al Hiary, S. Bani-Ahmad, M. Braik, "A Framework for Detection and Classification of Plant Leaf and Stem Diseases", pp. 113-118, 2010 IEEE.

