# AGRICULTURAL PLANT LEAF DISEASE DETECTION USING CLUSTERING TECHNIQUES

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***Abstract*** **—The detection of plant leaf is a very important factor to prevent serious outbreak. Automatic detection of plant disease is essential research topic. Most plant diseases are caused by fungi, bacteria, and viruses. 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 clustering process. The developed processing scheme consists of four main steps, first a color transformation structure for the input RGB image is created, and this RGB is converted to HSI because RGB is for color generation and his for color descriptor. Then green pixels are masked and removed using specific threshold value, then the image is segmented and the useful segments are extracted, finally the texture statistics is computed from the SGDM (Spatial Gray-level dependence) Matrices, finally the presence of diseases on the plant leaf is evaluated.**

***Keywords*** **— HIS, Segmentation, Color Co-occurrence Matrix, Texture, Plant Leaf Diseases, Clustering.**



## I. INTRODUCTION

The main eye observation of experts is adopted in practice for detection and identification of plant diseases. Automatic detection of plant diseases in an important research topic as it may prove benefits in monitoring large fields of crops, and thus automatically detect the diseases from the symptoms that appear on the plant leaves.

This enables machine vision that is to provide image based automatic inspection, process control and robot guidance. Comparatively, visual identification is labor intensive, less accurate By SGDM.

Images are captured by digital camera mobile and processed using image rowing, and 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 [11]:

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.

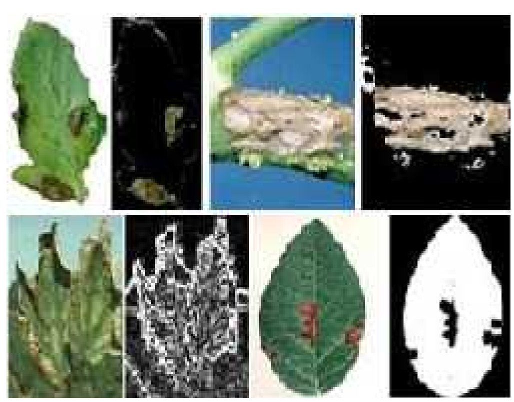


Fig.1. Image analysis.

## II. LITERATURE REVIEW

Figure 1 the basic procedure of the proposed vision-based detection algorithm in this paper. First, the images of various leaves are going to acquire using a digital camera. Then clustering process is applied to the acquired images to extract useful features that are necessary for further analysis.

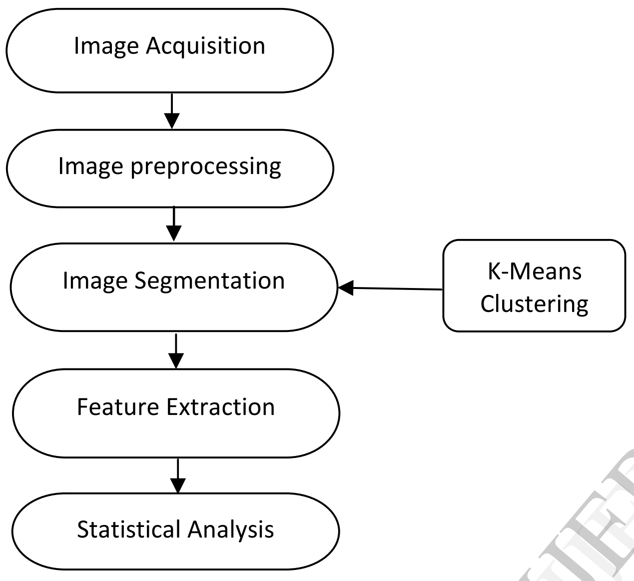



Fig.2. The basic procedure of the proposed approach

1. Identifying the infected object based upon k-means clustering [10].
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
4. Classifies the plant leaves into infected and not-infected classes.
5. After that, the image at hand is segmented using K-Means clustering technique.

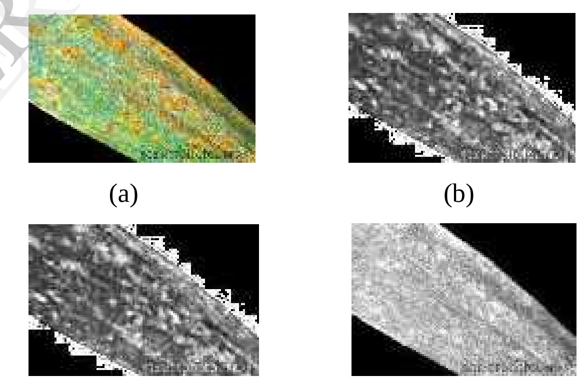


## III. PROPOSED APPROACH

The step-by-step procedure of the proposed system:

1. RGB image acquisition.
2. Convert the input image from RGB to HSV.
3. Masking the green-pixels.
4. Removal of masked green pixels.
5. Segment the components.
6. Obtain the useful segments.
7. Computing the features using Color-co-occurrence methodology.
8. Evaluation of texture statistics.

*A. Color Transformation Structure:* Firstly, the RGB images of leaves are acquired. Then RGB images are converted into Hue Saturation Value (HSV) color space representation. RGB is an ideal for color generation. But HSV model is an ideal tool for color perception [7].



(a) (b) (c) (d)

*B. Masking and removing green pixels:* Masking means setting the pixel value in an image to zero or some other background value. In this step, we identify the mostly green colored pixels.

*C. Segmentation:* From the above steps, the infected portion of the leaf is extracted. The infected region is then segmented into a number of patches of equal size. In this approach patch size of 32X32 is taken [1].

*D. Texture Features:* Properties of Spatial Gray-level Dependence Matrices (SGDM) like Contrast, Energy, Local homogeneity, and correlation are computed for the Hue content of the image as given in following Eqns.

*E. K-means Clustering:* It is an iterative in which items are moved among sets of cluster images until the desired set is reached.

The cluster mean of $K_I = \{t_{i1}, t_{i2, \ldots\ldots\ldots}, t_{im}\}$ is defined as

$$M_i = 1/m \sum_{j=1}^{m} t_{ij}$$

*F. Contrast:* Returns a measure of the intensity contrast between a pixel and its neighbor over the whole image.

Range = [0 (size (SGDM,1)-1)^2] Contrast is 0 for a constant image.

$$Contrast = \sum_{i,j=0}^{N-1} (i,j)2\, C(i,j) \tag{1}$$

Energy = Returns the sum of squared elements in the SGDM Range = [0 1] Energy is 1 for a constant image.

$$\text{Energy} = \sum_{i,j=0}^{N-1} C(i,j)^2 \tag{2}$$

Homogeneity= Returns a value that measures the closeness of the distribution of elements in the SGDM to the SGDM diagonal. Range = [0 1] Homogeneity is 1 for a diagonal SGDM.

$$\text{Homogeneity} = \sum_{i,j=0}^{N-1} C(i.j)/(1+(i-j)2 \tag{3}$$

## IV.CONCLUSION

In this paper application of texture statistics for detecting the plant leaf disease has been explained. Firstly by color transformation structure RGB is converted into HSV space because HSV is a good color descriptor. Masking and removing of green pixels with pre-computed threshold level. Then in the next step segmentation is performed using 32X32 patch size and obtained useful clustering segments. These segments are used for texture analysis by color co-occurrence matrix. Finally the texture parameters are compared to normal leaf. The extension of this work will focus on developing K-means algorithms and NN's in order to increase the recognition rate of classification process.



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