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Grape Leaf Disease Detection Using K-means Clustering Algorithm

Rupali Patil[1], Sayali Udgave[2],Supriya More[3], Dhanashri Nemishte[4]Monika Kasture[5]

[123] *BE, Department of Computer Science And Engineering, Sau,Sushila Danchand Ghodawat Charitable Trust's Sanjay Ghodawat Group of Institutions , Maharashtra, India*

Abstract ***This paper present survey on different classification techniques that can be used for plant leaf disease classification. A classification technique deals with classifying each pattern in one of the distinct classes. A classification is a technique where leaf is classified based on its different morphological features. There are so many classification techniques such as k-mean clustering, Support Vector Machine. Selecting a classification method is always a difficult task because the quality of result can vary for different input data. Plant leaf disease classifications have wide applications in various fields such as in biological research, in Agriculture etc. Plant disease detection is emerging field in India as agriculture is important sector in Economy and Social life. Earlier unscientific methods were in existence. Gradually with technical and scientific advancement, more reliable methods through lowest turnaround time are developed and proposed for early detection of plant disease. Such techniques are widely used and proved beneficial to farmers as detection of plant disease is possible with minimal time span and corrective actions are carried out at appropriate time. The detection of plant disease is significantly based on type of family plants and same is carried out in two phases as segmentation and classification.***

Key Words: **k-mean clustering, Segmentation, preprocessing, feature extraction.**

1.INTRODUCTION

Agriculture is not only to feed ever growing population but it's also important source of energy . Plant diseases affect both quality and quantity of crops in agriculture production. Plant disease diagnosis is very essential in earlier stage in order to prevent and control them. The naked eye observation of experts is the main approach adopted in for detection and identification of plant diseases. But the naked eye observation is time consuming, expensive and take lots of efforts.

To remove drawbacks in existing system many system have been proposed to overcome those drawbacks by using different techniques. In the next section this paper tries to present those proposed systems in meaningful way. The management of crops required close inspection especially for management of disease infected crop that can affect the quality and quantity of crop. Image processing is an best technique for agricultural application. Image processing can detect an pest's attack from the image of plant. The detection and classification of plant diseases are important task to increase plant productivity. There are various techniques emerged to detect the plant disease such as thresholding, region growing, clustering, Edge based detection etc. To detect plant disease the image should go through some process like pre-processing, segmentation, feature extraction and classification processes. The pre-processing is an improvement process of image data to suppresses unwanted distortion or enhances some image features important for further processing [1]. The segmentation process is to partition an image into meaningful regions and it is vital process through which image features are extracted. There are various features of an image such as grey level, color, texture, shape, depth, motion, etc. Classification process is used to classify the given input data into number of classes and groups. It classifies the data based upon selected features [2].

Ajay A.Gurjar,Viraj A.Gulhane describes Eigen feature regularization and extraction technique by this detection of three diseases can be done. This system is having more accuracy, than that of the other feature detection techniques. With this method about 90% of detection of Red spot i.e. fungal disease is detected [2].

Dheeb Al Bashish& et al.proposed image processing based work is consists of the following main steps : In the first step the acquired images are segmented using the K-means techniques. In [4], diagnosis system for grape leaf diseases is proposed. The proposed system is composed of three main parts: Firstly Segmentation, secondly grape leaf disease feature extraction and finally grape leaf disease classification In [6], Tushar H Jaware & et al. developed a Fast and accurate method for detection and classification of plant diseases. The proposed algorithm is tested on main five diseases on the plants; they are: Early Scorch, Cottony mold, Ashen Mold, Late scorch, tiny whiteness. Initially the RGB image is acquired then a color transformation structure for the acquired RGB leaf image is created. After that color values in RGB converted to the space specified in the color transformation structure.

In the next step, the segmentation is done by using K-means clustering technique. After that the mostly green pixels are masked. Further the pixels with zero green, red and blue values and the pixels on the boundaries of the infected object were completely removed. Then the infected cluster was converted into HIS format from RGB format. In the next step, for each pixel map of the image for only HIS images the SGDM matrices were generated. Finally the extracted feature was recognized .

2. CLASSIFICATION TECHNIQUES

There are some methods that describing detection the plant leaves diseases by using automatic detection and classification of diseases. The most popular approaches for classification are K-means and fuzzy algorithm which based on their clustering efficiency. Fuzzy clustering algorithm is clustering algorithm that is widely applied wide range of problems connected with feature analysis, clustering and classify design. Fuzzy clustering techniques are mainly based fuzzy behavior and they provide a technique which is producing a clustering [10]. Another popular method is K-means that basically partitioning method applied to analyze and treat observation of data as object based on location and distance between various data points. Partitioning the object into manual cluster(K)is done by it in such a way that object within each cluster remain as close to each other but far from object in other cluster. Plant disease spots are different in color. The color transform of RGB image is used for better segmentation of disease spots. RGB color feature segmentation is consist with disease spots. The proposed approach is composed of four steps such as segmentation, feature extraction and classification & solution. The image segmentation uses the K-means clustering technique. The features objects are extracted from the segmented image and that segmented images are classified based on a (hue saturation value) Machine (HSV). The input image of grape leaf is complex at background. The preprocessing is used to improve image data suppress unwanted distortion . Then, segmentation is done through K-means clustering technique. The diseased portion is identified by using segmentation. K-means clustering is used for segmentation and is also used for classification of features.

3. TECHNIQUE OF SEGMENTATION AND FEATURE EXTRACTION

The following section describes various segmentation and feature extraction techniques for detection of plant diseases. The segmentation based on K-means technique is a partition clustering technique used to partition n number of observations into k clusters .In this technique, k is the number of clusters in the segmented image and colors present in an image are used for the clustering. The main advantage of segmentation based K-means clustering technique is that it works on local information and global information of image. K-means clustering algorithm is easy to implement and fast, robust and flexible [8]. The proposed flow architecture from literature survey integrated with innovative idea is shown in following Figure[2]. . The flow architecture have several steps i.e. first, the infected plant image goes through the image pre-processing phase for enhancing and removing noise from image. Second, the pre-processed image passed to the segmentation for partitioning into clusters. For segmentation, K-means clustering technique is fast, flexible and easy to implement than others. From segmented image extracts the features of image such as color feature, shape feature. Color feature is used to simplify the object extraction and identification. For that various color models are used such as RGB, HSI, HSV[9]. The texture feature is a feature that classifies the segmented regions and also defines the characteristics of regions. Shape is a feature that interprets various facts of objects+. Finally, classifier is used for classification and recognition of plant diseases.

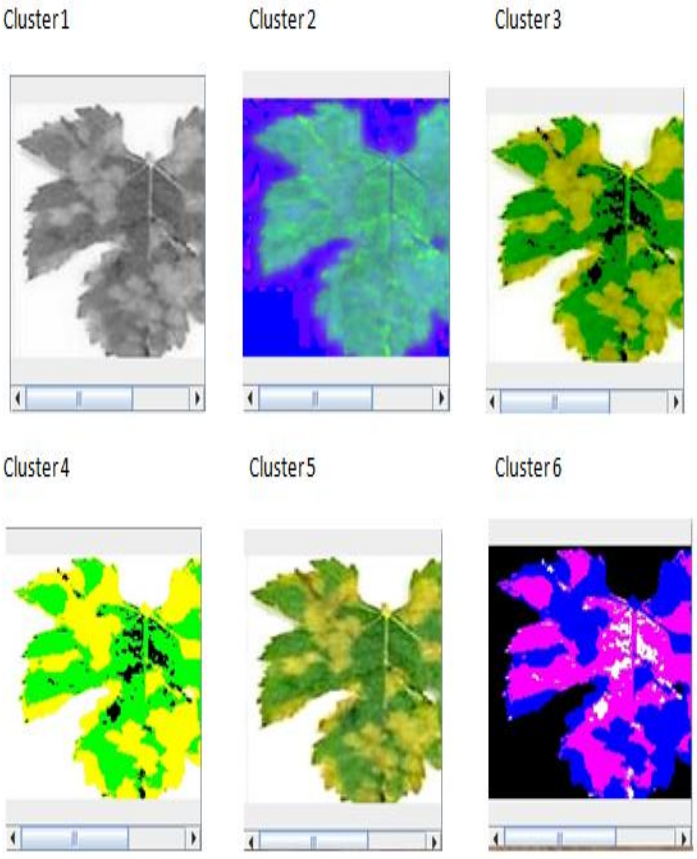

Fig 1: six cluster formed by K-Means clustering

4. System Design

4.1 System Structure

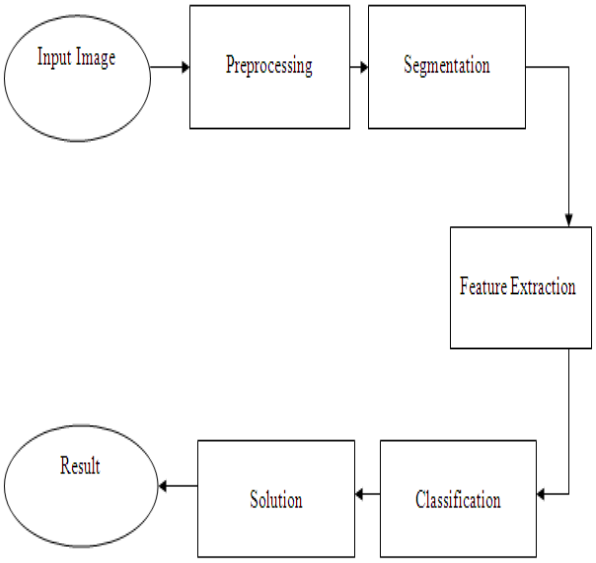

Fig.2:System design

Above figure shows the basic procedure of grape leaf disease classification.

Image Pre-processing

We convert the input RGB image into HSV(Hue Saturation Value) format using rgb2hsv command. After this transformation we consider only Hue component. We will not consider saturation and intensity component. Because it does not provide any useful information.

$$\text{Hue (H)} = \begin{cases} \emptyset & \text{if } B \le G \\ 360 - \emptyset & \text{if } B > G \end{cases}$$

$$\emptyset = \cos^{-1}\left\{\frac{1/2[(R-G)+(R-B)]}{[(R-G)^2+(R-G)(G-B)]^2}\right\}$$

$$\text{Saturation } (S) = 1 - \frac{3}{R+G+B}[\min(R,G,B)]$$

$$\text{Value (V)} = \frac{1}{3}(R+G+B)$$

Syntax:

Cmap=rgb2hsv(M)

Hsv image=rgb2hsv(rgb_image)

Feature Extraction

In feature extraction ,we extract the features of diseased infected area and classify the disease according to the features. Feature extraction is used to extract texture feature of extracted diseases portion. This is done by calculating HSV (Hue Saturation Value). The color co-occurrence texture analysis method was developed through the use of HSV. HSV is better suited for color recognition because by using HSV has very similar visual perception to human perception so to recognition area of distinct color HSV is better[6].

Hue saturation Value:

HSV **c**olor space is preferred manipulation of Hue and saturation(to shift color or adjust amount of color). To convert RGB colormap to HSV colormap.

Cmap=rgb2hsv(M)

Hsv image=rgb2hsv(rgb_image)

Cmap=rgb2hsv(M) convert an RGB colormap M to an HSV colormap Cmap. Both colormaps are m –by-3 matrix. The element of both colormap are in range 0 to 1[7]. The columns of input matrix M represent intensities of red,green,blue respectively. The columns of output matrix Cmap represent Hue,saturation & Value respectively.

Hsv image=rgb2hsv(rgb_image) converts the RGB image to the equivalent HSV image. RGB is an m-by-n-by-3 image array whose three planes contain the red,green,blue components for the image. HSV is returned as an m-by-n-by-3 image array whose three planes contain the Hue, saturation, value components for the image[7].

5. EXPERIMENTAL RESULT

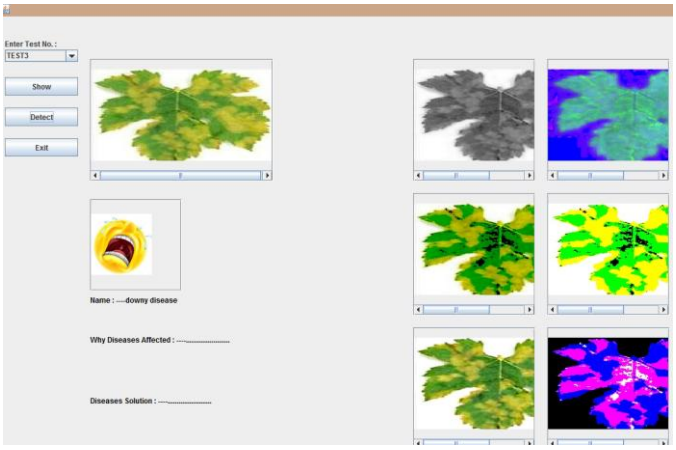

Fig 3:Downy mildew is recognized by the system

6. CONCLUSIONS

The detection of plant disease is one of the important tasks. A plant disease reduces the production of agriculture. Every year the loss due to various diseases is challenging part in agriculture production. Although work is carried out till time

on detection of diseases but proper segmentation of affected part based on type of plant family is still an open problem as a research area.

REFERENCES

[1] Piyush Chaudhary, Anand K. Chaudhari, Dr. A. N. Cheeran and Sharda Godara, "Color Transform Based Approch For Disease Spot Detection on Plant Leaf", International Journal of Computer Science and Telecommunications, 2012, pp. 65-70.

[2] Ms. Rupali S. Zambre, "Classification of Cotton Leaf Spot Disease Using Support Vector Machine", International Journal of Engineering Research and Applications, 2014, pp. 92-97.

[3] P. Revathi and M. Hemalatha, "Advance Computing Enrichment Evaluation of Cotton Leaf Spot Disease Detection Using Image Edge detection", IEEE, 2012.

[4] Shiv Ram Dubey, Anand Singh Jalal, "Detection and Classification of Apple Fruit Diseases using Complete Local Binary Patterns", International Conference on Computer and Communication Technology IEEE, 2012, pp. 346-351.

[5] Sanjeev S. Sannakki, Vijay S Rajpurohit, V. B. Nargund and Pallavi Kulkarni, "Diagnosis and Classification of Grape Leaf Diseases using Neural Networks", International Conference on Computing,

[6]http://stackoverflow.com/questions/30022377/what-should-i-use-hsv-hsb-or-rgb-and-why

[7]http://in.mathworks.com/help/matlab/ref/rgb2hsv.html

[8] Jagadeesh Devdas Pujari, Rajesh Yakkundimath and Abdulmunaf Byadgi, "Grading and Classification of Anthracnose Fungal Disease of Fruits based on Statistical Texture Features", International Journal of Advanced Science and Technology, 2013, pp. 121-129.

[9]www.compression.ru/download/articles/color_space/ch03.pdf

[10] soumi Ghosh and sanjaykumar dubey, "comparative analysis of K-means and Fuzzy C-Means Algoritham", international journal of advanced computer science and application,
Vol.4,No.4.2013