Grape Leaf Disease Detection using Image Processing

Miss. Shweta S. Kothavale[1] Prof. Mr. S. R. Barbade[2]
[1]PG Student [2]Associate Professor
[1,2]Department of Electronics Engineering
[1,2]Solapur University, Walchand Institute of Technology, Solapur, India

Abstract— Identification of the grape leaf disease is the main goal to prevent the losses in the yield and quality of agricultural product. Disease detection on grape leaf is very critical for sustainable agriculture. It is very difficult to continuous monitor the grape disease manually. It requires the excessive processing time, tremendous amount of work, and some expertize in the grape leaf diseases. To detect the grape disease we need fast automatic process so we use image processing technique. This paper presents mainly four stages, viz image acquisition, histogram equalization, GLCM feature and SVM classification. This paper is proposed to benefit in the detection and classification of grape leaf disease using support vector machine (SVM) technique.

Key words: Image Processing, Image Acquisition, Histogram Equalization, GLCM Feature, SVM Classification

I. INTRODUCTION

In INDIA 70% of population depends on agriculture. Grapes plant is one of largely produced crop in agriculture field. Grape leaf disease reduces quality and quantity of agricultural product, digital image processing and analyzing techniques, adopted in practice for detection and classification of grape leaf disease. In general the modern agriculture is now aiming at producing the maximum amount of yield with the less requirement of energy and time so we can use modern image processing techniques. Agriculture products need proper quality control to gain more products. There are many diseases of grapes such as Downy mildew, powdery mildew, rust, black rot etc which affects on grape leaf. Many times there is confusion to diagnosis disease because of some similarities in the grapes leaf. They reduce the quality as well as quantity of grapes. So, it is difficult to diagnose it accurately and effectively by using traditional grape leaf disease diagnosis method. That is mainly dependent on continuous monitoring of the field by a expert having superior knowledge about the grapes leaf and its corresponding diseases. Appointing such a expert would may more costly. Continuous monitoring with naked-eye observation is not possible to farmer. So we can use some techniques of image processing.

In this paper we develop an algorithm as well as some image processing techniques that will automatically classify the grape leaf disease. The proposed system will help to detect the grape leaf disease detection automatically. The section II gives a brief idea about the work that has been carried out previously. Section III will explain the overview of the proposed work.

II. LITERATURE REVIEW

A.Meunkaewjinda proposed system is automatic plant disease diagnosis using multiple artificial intelligent techniques. His system used three main parts such as grape color segmentation, grape leaf disease segmentation and classification of disease. From his experiments it has been concluded that color recognition is feasible from grape images using back propagation neural network.Then the grape leaf segmentation is performed and the output of segmentation is feed to support vector machines for classification. Ramakrishnan.M developed framework for disease detection and classification by using back propagaton algorithm. The pre-processing will detect the color generation and color descriptor, segmentation using color co-occurrence matrix, some features are extracted and finally the leaf will be classify using BPN. Pranjali B. padol used K-means clustering algorithm for segmentation and support vector machine (SVM) is used as a classification.

Dandawate proposed various methods for detection and classification of diseases of grape plant using opposite colour local binary pattern (OC-LBP) feature and machine learning for automated decision support system. S. Dubey proposed system is specific to apple fruit diseases. From his experiment it has been concluded that the proposed technique cannot be used for other fruit diseases. The classification technique is based on a Multiclass Support Vector Machine.

After studying all these mentioned methods we can conclude that these methods are designed only for some kinds of images. So, there is a need to develop a system that will work on whole image. In the proposed system feature extraction and classification is done on the entire image. GLCM method is used for feature extraction Support Vector Machine is used for the classification.

III. METHODOLOGY

The following section describes various stages of grape leaf disease detection techniques such as image acquisition, image pre-processing, image segmentation, feature extraction, classification and final result. Below figure (1) shows the overview of the system.

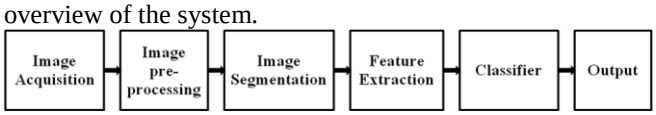

Fig. 1: Overview of the system

A. Image Acquisition

In this step the sample images are collected to train the system. The database is generated by capturing the images directly from the farm using different mobile cameras with different resolutions. Images are used for both training and testing the system. The standard jpg format is used to store these images. Collected images include the affected as well as healthy leaves. All the collected database images are in RGB (Red, Green and Blue) form.

B. Image Pre-processing

To remove unwanted noise which is present in image and some variations in image background with respect to color and intensity, different pre-processing techniques is considered. These types of variations are occured due to

many reasons such as camera settings, variation in light. To overcome such kind of problems, input RGB image is converted to the grayscale intensity image. It converts RGB values to grayscale values by forming a weighted sum of the R, G and B components using equation (1).

Grayscale= 0.2989 * R + 0.5870* G + 0.1140*B-------- (1)

Then all images are resized using resizing techniques for accurate result.

C. Image Segmentation

The main aim of the segmentation is to extract useful information from the image. Segmentation algorithms are based on one of two basic properties of intensity values discontinuity and similarity .First category is to partition an image based on abrupt changes in intensity, such as edges in an image. Second category is based on partitioning an image into regions that are similar according to predefined criteria. Histogram Thresholding approach falls under this category. Histogram are constructed by splitting the range of the data into equal-sized bins (called classes). Then for each bin, the numbers of points from the data set that fall into each bin are counted. Vertical axis: Frequency (i.e., counts for each bin) Horizontal axis: Response variable. In image histograms the pixels form the horizontal axis .In Matlab histograms for images can be constructed using the imhist command.

Thresholding is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images. The simplest thresholding methods replace each pixel in an image with a black pixel if the image intensity I{i,j} is less than some fixed constant T { I{i,j}<T}, or a white pixel if the image intensity is greater than that constant.

D. Feature extraction

The feature extraction is used to extract the information that can be used to find out the significance of the given sample. The performance of the classifier depends totally on the features that are extracted, so a correct choice of features needs to be extract. The main types of features are color and texture which are mostly used in image processing technique.

1) GLCM Features: One of the image examination techniques is the GLCM feature. By using this method we get different features like energy, contrast, correlation and homogeneity.
2) Shape Features: According to the specialist, the important feature for classification is the shape of leaf area. The region and boundary based shape features are extracted in order to analyze the shape of the leaf.
3) Color Feature: This feature is considered for extraction of required leaf region. Hence, for each leaf image the mean color value in RGB color space is obtained.

E. Classification

The classification technique is used to detect the leaf disease. This is the last stage of the system which is considered to be very important. According to the given system Support Vector Machine is used for classification of grape leaf which is normal or affected. SVM is a promising supervised nonlinear classification technique, which already showed good results in the medical diagnostics, optical character recognition, electric load forecasting, and other fields.

IV. CONCLUSION

The purpose of proposed approach will design, develop, and evaluate an automatic system for grape leaf disease detection. It uses standard database images which are obtained from farm. The presented system will perform automated processing, including color correlation, segmentation of the grape leaf, feature extraction and classification. The proposed system will be used for major disease commonly obtained in grapes plant such as downy mildew, black rot, rust etc. are taken into consideration to get the experimental result. Using SVM classifier the proposed system will give good results.

ACKNOWLEDGMENT

I would like to convey my sincere gratitude towards my guide Prof. Mr. S. R. Barbade for their support and useful suggestions which truly helped me in improving the quality of this paper. I take this opportunity to convey my thanks to my teacher for their encouragement and support and also giving his valuable time.

REFERENCES

[1] A. Meunkaewjinda, P.kumsawat, K.Attakitmongcol and Asrikaew, "Grape leaf disease detection from color imagery using hybrid intelligent system" proceedings of ECTi-CON 2008.
[2] Smita Naikwadi, Niket Amoda "Advances in image processing for detection of plant diseases" international journal of application or innovation in engineering & management (lJAiEM) volume 2, issue II, November 2013.
[3] Mr.Pramod s.landge,Sushil A.Patil, Dhanashree S.Khot,Omkar D.Otari,Utkarsha G.Malavkar "Automatic Detection and classification of plant disease through image Processing,. Volume 3, Issue 7, July 2013.
[4] H.AI-Hiary, S. Bani-Ahmad, M. Reyalat, M. Braik and Z. AIRahamneh, Fast and Accurate Detection and Classification of Plant Diseases international Journal of Computer. Application (0975-8887), Volume 17-No.I.March 2011.
[5] Shen Weizheng, Wu Yachun, Chen zhanliang, Wei Hongda. Grading Method of Leaf Spot Disease Based on Image Processing. In the proceedings of CSSE 2008.
[6] J. K. Patil and R. Kumar, "Advances in image processing for detection of plant diseases," Journal of Advanced Bioinformatics Applications and Research, vol. 2, no. 2, pp. 135–141, 2011.
[7] H. Al-Hiary, S. Bani-Ahmad, M. Reyalat, M. Braik, and Z. ALRaham-neh, "Fast and accurate detection and classification of plant diseases," Machine learning, vol. 14, p. 5, 2011.

