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A SURVEY ON COTTON LEAVES DISEASES DETECTION USING IMAGE PROCESSING TECHNIQUES

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ABSTRACT

This paper provides survey on cotton leaf disease detection using image processing techniques. Disease in cotton crops causes significant reduction in quantity and quality of the agricultural product. Identification of symptoms of disease by naked eye is difficult for farmer. Crop protection especially in large farms is done by using computerized image processing technique that can detect diseased leaf using color information of leaves. This paper presents an approach for careful detection of diseases, diagnosis and timely handling to prevent the crops from heavy losses. The diseases on the cotton are critical issue which makes the sharp decrease in the production of cotton. So for the study of interest is the leaf rather than whole cotton plant because about 85-95 % of diseases occurred on the cotton leaves like Alternaria, Cercospora and Red Leaf Spot.

Keywords- *leaf disease, k-means clustering, ROC, Image Processing.*

I. INTRODUCTION

Developing countries like India the economy is greatly depend on agriculture. The quantity and quality of agricultural product is reduced due to plant disease. Plant disease is caused by micro-organism like fungi and bacteria .the lifecycle of micro-organism is unable to predict .some disease do not have visibility during early stage it only appear that final stage. The prediction of plant disease by naked eye is used in practice but results are subjective and disease extent is not precisely measured. Nowadays automatic detection of plant disease is an important research topic and thus automatically detects the diseases from the symptoms that appear on the plant leaves. Depending on the applications, many image processing technique has been introduced to solve the problems by pattern recognition and some automatic classification tools.

II. LITERATURE SURVEY

The various approaches for detecting the disease in plant leaf using image processing technique is described in this section.

Pawanp.warne et.al. [1]: describes the approach to prevent the crops from heavy loss by careful detection of diseases. In this paper, Study of diseases on the cotton leaf can robustly studied by using the image processing toolbox and also the diagnosis by using MATLAB helps us to suggest necessary remedy for that disease arises on the leaf of cotton plant. We know that perception of the human eye is not so much stronger that he can differ minute variation in the infected part of image because that minute variation pattern of color can be a different disease present on the leaf of cotton. MATLAB software can provide the exactly differentiate the variation of color present on these leaves and depending upon that variation the further compare with database stored image features related to the color. This paper provides a method to detect cotton leaves diseases using image processing technique. Firstly, K-mean clustering algorithm is used for segmentation which classifies objects based on set of features into K no. of classes where feature extraction is color feature variance used for matching the train image features from database images and finally recognition is performed using Neural-network. The recognition accuracy for K-Mean Clustering method using Euclidean distance is 89.56% and the execution time for K-Mean Clustering method using Euclidean

distance is 436.95 second and also thresholding is done by a dynamically range [0,1] depending on color intensity from leaves image. We conclude that disease detection using K-Mean Clustering method using Euclidean distance is the best methods to disease detection on cotton leaves. It achieves best validation performance is 0.090178 at epoch 35. Best result is obtained in the plot of True Positive Rate Vs False Positive Rate for Training ROC, Validation ROC, Test ROC and All ROC which describe with the help of five different disease classes. It is analyzed that after K-mean thresholding is applied for increasing the correct classification result which show graphical result with removing complete green color from test image and only quantified area is obtained. Finally, neural network is used for recognizer where, initialization the images from the database that are highly correlated to the test image, which is given by user. It is used to analyze the cotton diseases which will be useful to farmers.

S. R. Deokar et.al.,[2]: The proposed leaf recognition system is implemented for recognition of leaf image. The concept of propose leaf recognition system can be useful for many those are find difficulties to recognize correct leaf. The leaf recognition system is developed by using feature point extraction and artificial neural network. For feature extraction, feature point extraction method is use, and for classification feed forward neural network is use. The proposed leaf recognition system implements the two feature point extraction method that is 28 and 60 feature extraction. The 28 feature point extraction method provides the better result than the 60 feature point extraction. The performance of leaf recognition system is evaluated on the basis of three comparison, for 28 feature point extraction the recognition rate obtained on different data set is better than 60 feature point extraction, the time require for feature point extraction and training is comparatively less than that of 60 feature point extraction because to extract the 60 point system require more time than 28 feature point extraction and 56 hidden layer providing better recognition rate than that 28, 56 hidden layer. Hence the 28 feature point extraction method is very efficient technique for proposed leaf recognition system.

Piyush Chaudhary et.al.,[3]: Leaf area is an important part of plant to analyze the growth and predict the yield. Grid count method and gravimetric method are generally used for leaf area measurement. But these methods are laborious and time consuming when applied on large number of leaves. An image processing based algorithm is implemented for leaf area measurement. The system requires a digital camera, a PC, $2cm \times 2cm$ black square object and a white sheet. Images are collected in JPEG format. Images are color transformed into CIELAB color space to wipe out the noise. Threshold is calculated on „L" component of CIELAB color space by OTSU"s method. Segmented binary image is inverted in color and holes in leaf region are filled using region filling technique. Finally leaf area is measured by pixel number statistic. The results are compared with measurements of grid count method Experiments were carried upon 70 leaves of different species. Experimental results show that following this method leaf area is measured accurately. Average accuracy of this algorithm is above 99% which is confirmed by comparing the results with measurements of grid count method. Future to this it is needed to compute disease severity percentage on plant leaf and integrate both results for actual prediction of yield loss and plant growth.

SmitaNaikwadi&et.al.,[4]describes the approach that has different steps. In first step, mostly green colored pixels are identified. Next, based on specific threshold values green pixels are masked. Otsu's method computes threshold value to mask the green pixels. The other additional step is that the pixels in the image which has zero RGB values and infected cluster (object) pixels at boundary were completely removed. This is the robust technique for the detection of plant leaves diseases. The precision of this technique for classifying diseases is between 83% and 94%.

Premalatha.V, &et.al.[5] The simulation results showed that the proposed algorithm performs better with spatial FCM for segmentation of Cotton leaf image & PNN for classification of disease in cotton plant. The spatial FCM provides the more accurate clustered results. (SFCM) when compared to other clustering techniques. Spatial FCM is a powerful method for noisy image segmentation and works for both single and multiple featured data with spatial information.

Mr. Sachin B. Jagtap& et.al Describes a system consists of four stages; the first stage is the image enhancement, which includes, histogram analysis, HSI enhancement and intensity adjustment. Fuzzy c-means algorithm is used for segmentation of captured image. Color, shape of spot, size is three features used to extract features from leaf. Then classification is based on back propagation based neural networks.

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III. CONCLUSION

This paper presents a survey on different method for cotton plant leaf disease detection using image processing technique. There are many methods in automated or computer vision for disease detection and classification but still there is lack in this research topic. All the disease cannot be identified using single method .The future work is to develop a method for processing an image that acquire with different background.

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