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Review on Multi Classifier Based Disease Recoganization of Cotton Leaves

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ABSTRACT: Task of Diagnosis of plant disease is to identify the disease in the leaf or fruit or vegetable. Yearly About 42% of the world's agriculture harvest is destroyed by disease and pest. If plant diseases are correctly identified early then losses of harvest can be minimized and specific treatments can be applied on it. Manual identification of disease in the plant is time consuming process. Even the result is also not accurate .So by using image processing techniques we can obtain fast, automatic and accurate solution. This automatic identification can be done by using like Image Acquisition, Image Pre- processing, image segmentation, Feature extraction and classification using multiple classification algorithms These are nothing but the methods of image processing.

KEYWORDS: Plant disease, image processing, KNN, SVM, NBC, etc

I. INTRODUCTION

India is an agricultural country . Agriculture sector provides livelihood to percent of the total population of country. Many of the industries are depend on agriculture sector for their raw-material and production for example sugar factory, cotton and jute textile industries, food industries, pharmaceutical industry or many more. Industries need good quality of material. So that Research sector are trying to increase the productivity and quality of agriculture. The main reason behind the decrease in the quality of the agricultural product is plant diseases.

Disease is an impairment of health or a condition of abnormal functioning. Plant diseases are caused by bacteria, viruses and fungi. The occurrence of plant diseases also depend on environmental condition. Disease requires careful diagnosis and handling at right time to protect the plant from heavy losses. Disease can be found in different parts of the plant like fruit, leaves, vegetable, and stem. Farmers require constant monitoring of experts which might be prohibitively expensive and time consuming. Depending on the applications, many systems have been proposed to solve or at least to reduce the problems, by making use of image processing and some automatic classification tools.

Structuring of remaining paper is as follows. Section II provide methods used for plant disease detection. Section III focuses on related work for plant disease detection. Section IV concludes the paper.

II. RELATED WORK

Tejal et. al [1] Propose a system for disease identification and grading. They done their work on pomegranate leaf and fruit and detect bacterial blight disease. To remove the shadow, which causes during image acquisition, morphology technique has been used as pre-processing. For segmentation K-means clustering method has been used. After segmentation AT (Total Area of leaf or fruit) and AD (Total disease area) are calculated. Using AT and AD PI (percent-infection) is calculated, Using PI grade of the disease is determined. For disease identification they consider two characteristics as for the leaf they checked diseased spot on leaf is bordered by yellow margin if yes then it signifies that leaf is infected by bacterial blight and for the fruit first black spots are identified and if crack passing through that black spot it signifies that fruit is infected by bacterial blight. By using proposed system they achieve precise, accurate and acceptable result.

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Revathi and Hemalatha [2] give a Homogeneous pixel counting technique for cotton disease detection (HPCCDD). By using canny and sobel edge detection homogenous techniques segmentation is done while proposed HPCCDD algorithm has been used for analysis and classification. By using proposed algorithm 98.1% accuracy has been achieved.

Gavhale et. al [3] proposed a method for citrus leaf disease detection. In pre-processing step image enhancement and color space conversion have been done. In feature extraction method GLCM texture feature and color texture feature are extracted while for classification SVM classifier has been used.

Monika et. al [4] Give a system for disease detection and fruit grading. For feature extraction three feature vectors have been used, namely, color, texture and morphology in which morphology give better result. For the classification artificial neural network has been used. For the fruit grading two methods are used spread of disease and automated calculation of mango weight. In spread of disease method percent infection is calculated by using K–means clustering and in second method by using number of pixel weight is calculated and as per the weight quality of the fruit is decided.

Ratnasari et. al [5] proposed a system for sugarcane leaf disease detection. Proposed system has been verified only on three diseases, namely, rust spot, ring spot and yellow spot. Total 30 testing data are taken in which 9 images with rust disease, 7 images with ring spot disease, and 14 images with yellow spot disease. In feature extraction combination of color and texture feature has been used while for classification SVM classifier is used. In SVM classifier four kinds of kernel are tested, namely, linear, quadratic, radial basis function, and polynomial with 3rd order in which linear kernel give better result than other. But because of limitation of segmentation method only 80% accuracy has been achieved.

Devi and Ginardi [6] proposed a system for identification of sugarcane rust disease. First normal and diseased images are collected and pre-processed. After that feature extraction has been done by using different feature extraction method in which individual and combination of different methods both are analyzed. The combination of texture and color feature gives a better result while for classification SVM classifier is used. In SVM classifier four kinds of kernel are tested, namely, linear, quadratic, radial basis function, and polynomial with 3rd order in which polynomial with 3rd order give a better result than other. 98.5% accuracy has been achieved.

Asho and Vinod [7] proposed a system for quality evaluation of fruits which is based on neural network. In proposed system test has been done on apple fruit. Total 65 data has been taken for testing in which 20 images are from healthy fruit and 45 images are form diseased fruit. YCbCr color space method has been used for the segmentation. Various features are extracted in feature extraction method. Probabilistic Neural Network has been used as a classifier.

Bashish et. al [8] proposed a framework for detection & classification of leaf diseases and stem diseases. Solution of the system tested on five diseases which are: Early scorch, Cottony mold, ashen mold, late scorch, and tiny whiteness. First color transformation is conducted. Then, K-means clustering is used for segmentation. Color Co-occcurrence method has been used for feature extraction in which color and texture feature are considered. Neural network classifier is used for classification which is based on statistical classification.

Rastogi et. al [9] has performed an image processing and machine vision based technology for leaf disease detection and grading. First pre-processing has been done on leaf images then segmentation is applied by using K-means clustering and Euclidean distance technique. In feature extraction GLCM matrix is considered in which contrast, energy, homogeneity, and correlation have been calculated. Artificial neural network has been used for the classification. For grading percentage infection has been calculated by using total leaf area (AT) and diseased area (AD). After calculating the percentage infection grading has been applied by using fuzzy logic.

Narvear and Patil [10] offered novel algorithms which were based on image processing for grape leaf diseases detection. First pre-processing has been done in which RGB image is converted into HSV format. Then feature extraction method has been done by using SGDM method in which five features are calculated like energy, homogeneity, contrast, cluster prominence and cluster shade. Drawback of the proposed system is, they do not applied segmentation because of that powdery mildew and downy mildew are not well classified.

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III. METHODOLOGY

Image acquisition, Image Pre-processing, Image segmentation, Feature extraction and Classification are the main methods for detection in plants . Fig.1 shows the framework of system.

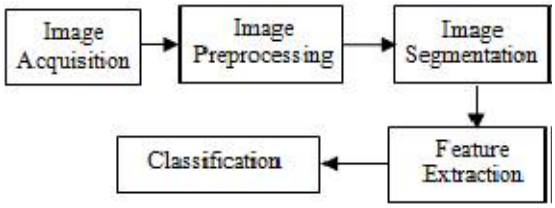

fig 1: Framework for plant disease detection

A. IMAGE ACQUISITION

In image processing, image acquisition is the first step for any vision system which is nothing but the retrieving of an image using some sources. Usually hardware based sources are used for image retrieval like camera and scanner. Types of hardware is very important for image retrieval. The retrieval image is completely unprocessed image. The main goal of this step is to have source of input.

B. IMAGE PRE-PROCESSING:

The aim of Image pre-processing is to improve the image data in which the distortion is present and it identify some new features which are important for processing. It is also known as image restoration .Image pre-processing include image Re-sampling, image enhancement and noise removal. Image Re-sampling, image enhancement and noise removal are included in Image processing. In image re-sampling dimensions of the pixel is change. In image enhancement brightness of the image is increased. In image, noise is the result of errors in image acquisition process which decrease the quality of image so in noise removal process reduction of noise is done.

C. IMAGE SEGMENTATION:

*I*mage segmentation is the process of dividing the image in to number of equal parts .Each part contain each pixel with same value. Another way of doing image segmentation is feature based clustering. Main purpose of image segmentation is to identify the diseased region in the image.

(a) (b)

fig 2:Image Segmentation

D. FEATURE EXTRACTION

Feature Extraction is used to find the features which will used in determining the meaning of actual image. Image features extraction includes color, texture and shape in image processing which is a most common visual feature [3].

Color

Color is the most important feature in disease detection. Because whenever human perceive an image, color is an important part which they perceive . Different color modal are RGB, HSV . HSV (Hue, Saturation and Value) is mostly used modal for detection. In HSV , hue distinguishes color, Saturation is degree of purity of color in image and value describes the brightness or intensity.

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fig 3: Color Extraction

Texture :

Texture feature is mostly used for classification and retrieval of image. Now a days researchers are targeting plant leaf texture as the most important feature in classifying plants [3].

fig 4: Texture Feature Extraction

Shape

Shape feature is the visual feature for disease detection in plant. Shape representations has been divided into two parts:

1. Boundary based representation and
2. Region based representation.

E. Classification

Classification is based on the classifiers , which is the very challenging task in image processing technique. The classification is used to correctly predict the value of a designated discrete class variable, and it gives a vector of predictors or attributes. The classification process which is done based on whether the image is infected or not.

IV. ANALYSIS

Thus we have studied different ways to detect the diseases on different plant . In Future we will work on cotton leaves for detecting different diseases .For classification will use different set of classifiers or their combinations**.**

V. CONCLUSION AND FUTURE WORK

Plant Disease detection is very efficient research field. The purpose of this paper is to present an outline of established method for plant disease detection and study of recent growth. During survey it is identified that the major techniques for detection of plant diseases are: Neural network and SVM for classification and K-means clustering for segmentation. All these techniques are used to analyses the healthy and diseased plants leaves, fruits and stem. As per the review it is clear that these disease detection techniques have an ability to detect plant diseases.

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BIOGRAPHY

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