A Survey on the Agricultural Plant Leaf Diagnosis Using Fuzzy Classifier

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Abstract- *Vegetables play a major role in Indian agriculture. Disease detection is the key to prevent the losses in the yield and quantity of agriculture. In India agriculture contributes about 17% of total Indian GDP.Health monitoring on leaf is very critical manually. Images are the important source of data and information in this paper. In the current study, a new segmentation algorithm was developed and texture features for leaf recognition. This paper discuss the method for the detection of diseases using leaf images and the system is proposed to identify and classify the diseases in leaf using the image processing techniques starting from image acquisition, preprocessing, testing, and training. These retrieved features stored in the database help to categorize the leaf disease using fuzzy classifier.*

Keywords- Leaf disease detection, image processing techniques,K-Means clustering algorithm, Fuzzy Classifier.

I. INTRODUCTION

Now days, a new concept of smart farming has been introduced where the field conditions are controlled and monitored using the self operating systems. Leaf enjoys a pre-eminent status among all cash crop in a country and is principal raw material for flourishing food manufacturing industry. It also provide live hood to about 65 million people and is an important agricultural commodity providing remunerative income to millions of farmer in developed as well as in developing country. About 60% of grape are cultivated in India is under rain feed condition. Water stressed seed or plant will cause poor growth leading to low yield as well as expose to disease Due to disease on plant there is loss of 10-30 % of crop. Farmers do the naked eye observation and judge the diseases by their experience. But this is not accurate and proper way. Sometimes farmers need to call the experts for detecting the diseases but this also time consuming way. Most of the disease on plant is on their leaves and on stem of plant. The diseases are classified into viral, bacterial, fungal,diseases due to insects, rust, nematodes etc. on plant. Early detection of diseases is a major challenge in horticulture/agriculture science. Many disease produce symptoms which are the main tools for field diagnosis of diseases showing external symptoms out of a series of reactions that take place between host and pathogen.

Figure 1:Input leaf images

II. LITERATURE REVIEW

Various techniques of image processing and pattern recognition have been developed for detection of diseases occurring on plant leaves, stems, lesion etc. by the researchers. The sooner disease appears on the leaf it should be detected, identified and corresponding measures should be taken to avoid loss. Hence a fast, accurate and less expensive system should be developed. The researchers have adopted various methods for detection and identification of disease accurately. One such system uses thresholding and back propagation network. Input is grape leaf image on which thresholding is performed to mask green pixels. Using K-means clustering segmented disease portion is obtained. Then ANN is used for classification [1].The other method uses PCA and ANN.PCA is used to reduce the dimensions of the feature data. to reduce the no. of neurons in input layer and to increase speed of NN[2].Sometimes threshold cannot be fixed and object in the spot image cannot be located. Hence authors proposed LTSRG-algorithm for segmentation of image [3]. In cucumber leaf disease diagnosis, spectrum based algorithms are used [4].In the classification of rubber tree disease a device called spectrometer is used that measures the light intensity in

electromagnetic spectrum. For the analysis SPSS is used [5].In citrus canker disease detection uses three level system. Global descriptor detects diseased lesion. To identify disease from similar disease based regions zone based local descriptor is used In last stage two level hierarchical detection structure identifies canker lesion [6]. For identification of disease on plant and stems first segmentation is carried using K-means clustering. Feature extraction is done by CCM method. Identification is done by using BPNN[7].

III. PROPOSED SYSTEM

Image Acquisition

In the proposed method collected the images from the dataset like pomegranate leaf Image Database Consortium. The dataset contains two types of images such as disease affected leaf images and healthy leaf images.

Enhancement

Enhancement technique enhances the contrast of images. The contrast enhancement can be helpful to remove the noise, which is present in the image.

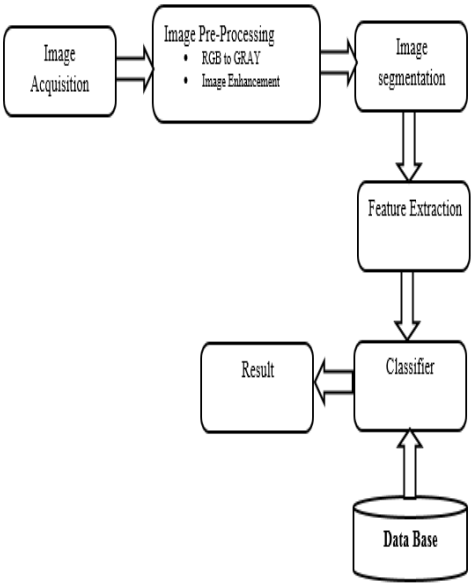

Figure 2: Flow of system

Segmentation

Segmentation means it subdivides the image region into small regions. In our proposed method we have used k-means clustering algorithm for the segmentation.K-means clustering algorithm is used for classification of object based on a set of features into number of classes.

The k-means clustering algorithm is applied to classify the objects into K number of classes according to set of features. The classification is done by minimizing sum of square of distances between data objects and the corresponding cluster. Image is converted from RGB Color Space to L*a*b* Color Space in which the L*a*b* space consists of a luminosity layer 'L*', chromaticity-layer 'a*' and 'b*'. All of the color information is in the 'a*' and 'b*' layers and colors are classified using K-Means clustering in 'a*b*' space. From the results of K-means, labelling of each pixel in the image is done also segmented images are generated which contain diseases. In this experiment we used segmentation technique so input image is partitioned into three clusters for good segmentation result. The carrot image segmentation with three clusters formed by K-means clustering method.

BASIC STEPS:

Start
Step1. enhanced image.
Step 2. Resize the image.
Step 3. Apply k-means clustering operation.
    Step 3.1. Find the centroid of the pixels.
    Step 3.2. Divide the pixels into cluster.
    Step 3.3. Represent the clustered image.
Step 4. Segmented output.
Stop

Gray level co-occurrence matrix Features

Feature extraction is very important and essential step to extract region of interest. In our proposed method the basicfeatures are mean, standard deviation, entropy, IDM,RMS,variance, smoothness, skewness, kurtosis, contrast, correlation, energy and homogeneity are calculated and considered as feature values. Then we have created the feature vector for these values. The segmented method shows different values for images.

In feature extraction desired feature vectors such as color, texture, morphology and structure are extracted. Feature extraction is method for involving number of resources required to describe a large set of data accurately. Statistical texture features are obtained by Gray level co-occurrence matrix (GLCM) formula for texture analysis and texture features are calculated from statistical distribution of observed intensity combinations at the specified position relative to others.

Numbers of gray levels are important in GLCM also statistics are categorized into order of first, second & higher for number of intensity points in each combination.Different

statistical texture features of GLCM are energy, sum entropy, covariance, information measure of correlation, entropy,contrast and inverse difference and difference entropy.

Classification of disease

Fuzzy approach for classification of image pixels into three classes: contour, regular or texture points to classify disease. Exploiting the processing capabilities of a neural network, fuzzy classification rules are derived by learning from data and applied to classify pixels in grey-level images. To derive a proper set of training data,the spatial properties of the image features and a multi-scaled representation of images are considered.The fuzzy rule base which presented the best tradeoff between interpretability and accuracy capabilities. The neuro-fuzzy network that models the fuzzy classification system has a three-layer feed-forward architecture.

IV. RESULT ANALYSIS

Figure 4:Original image

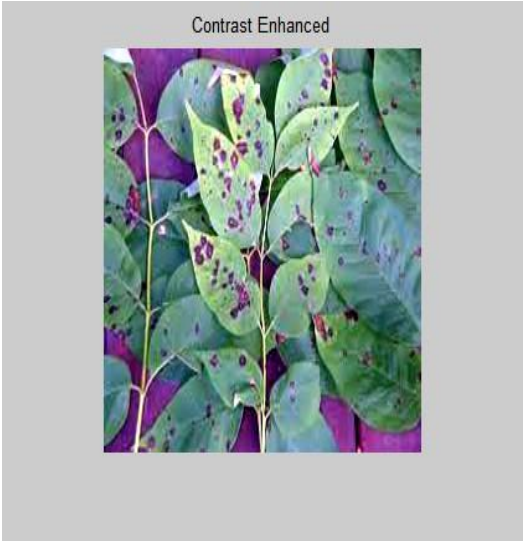

Figure 5: Enhanced image

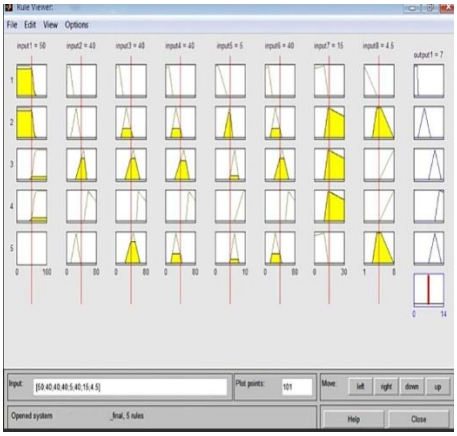

Figure 6: Output

V.CONCLUSION

The goal to identify leaf diseases was accomplished. The developed system is used for leaf disease identification, there is a need for the development of high-quality classification methods and accurate feature extraction, which is very significant to execute the system in actual operating environment. The accurate detection and classification of the disease in a particular plant is very important for the successful cultivation and this can be done using image processing. This paper also discussed some feature extraction using texture and classification techniques to extract the features and can also detect the affected area,perimeter,eccentricity,entropy,etc.,K-Means algorithm is used for segmentation and classification is done by fuzzy classifier to identify the condition of the leaf.

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