Spontaneous Maculation of Plant Leaf Infirmity Using Image Processing

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***Abstract*-Leaf spots are round blemishes found on the leaves of many species of plants, mostly caused by parasitic fungi or bacteria. A typical spot is "zona", meaning it has a definite edge and often has a darker border. When lots of spots are present, they can grow together and become blight or a blotch. Fungal spots are usually round or free-form in shape. In most cases, leaf spots are considered to be only a cosmetic problem, but they can have economic effects on nurseries or in floriculture. Recognition of plant leaf diseases along some automatic methods is useful as it decrease a huge effort of observing in large farms, and at initial phase itself it identify the signs of diseases. Plant leaf disease detection and identification includes the stages like image acquisition, image pre-processing, Image segmentation, feature extraction and classification. Here we proposed Convolution neural network for classification.**

***Keywords*- image pre-processing, image segmentation, feature extraction, convolution neural network classification.**

I. INTRODUCTION

Image processing is a processing of images using mathematical operations by using any form of signal processing for which the input is an image, a series of images or a video such as a photographer video frame or image frame the output of the image processing may be either an image or a set of characteristics or parameters related to the image. Image processing usually refers to digital image processing but optical and analog image processing may also possible.

Leaf is an organ of a vascular plant and is the principal lateral appendage of the stem. Leaves are collectively referred to as foliage as in "autumn foliage. Leaf spot is a commonly used descriptor for identifying many different plant diseases.

Leaf diseases are caused by fungi and bacteria. Fungi are the most common parasites causing plant disease. Bacteria are single-celled microscopic organisms.. When a fungal or bacteria attack to a living plant, disease occurs in the leaves. Leaf Blights are diseases its covers larger areas than leaf spots and more irregularly shaped.

In our propose system the leaf diseases are detected by using convolution neural network. The detection of leaf diseases can be done by using pre-processing, feature extraction, convolutional neural network, and canny edge detection classifier. The main concept of this paper is to detect leaves are diseased or non diseased.

II. LITERTURE SURVEY

"Classification of cotton leaf spot diseases using image processing edge detection techniques" [10] The major diseases occur in the cotton plant is foliar. This can be detected by using mobile captured symptoms of cotton leaf spot images and categorize the diseases using HPCCDD proposed algorithm. This work is based on image RGB feature ranging techniques used to identify the diseases in which the captured images are processed for enhancement first then for colour image segmentation is carried out to get detect disease spot and also by using extracted edge features classifier diseases spot can also be detected.

"A method for blood vessel segmentation in retinal images using morphological reconstruction" [6] in this system they extracted Green channel image using CLAHE (Contrast limited adaptive histogram equalization).Segmentation is done by morphological, it is nothing but to identify the image structures. Morphological reconstruction consists of marker image, a mask and a structuring element. from the segmented output we can identify the vessels has some break in it, It can be filled with morphological filling operations. Themorphological filling operations get together from background and foreground pixels. The concept is to evaluated and tested on the CHASE_DBI and finding the accuracy level.

"A modern approach for plant leaf disease classification with depends on leaf image processing" [4] it can be detected by using image acquision, pre-processor, segmentations and finally classifier. In this they use different image classification technique.

"Edge detection in medical ultrasound images using adjusted canny edge detection algorithm" [7] It is mainly used for non-invasive and non-ionizing diagnostics method. In this canny algorithm is used, to remove speckle noise median filter is used.

"Diabetic retinopathy detection using deep convolutional neural networks" [3] It can be diagnosis the diabetes automatically by using deep convolutional neural network.

"Detection and classification of leaf diseases using k-means based segmentation and neural networks based classification"

[1] it is detected by k-means segmentation and by neural networks classification.

"Image processing methods for quantitatively detecting soybean rust from multispectral images" [4] The detection of rust in the plant leaf and also detecting the amount of disease spread in the plant leaf .the details are collected from the greenhouse of research institute.

III. PROPOSED SYSTEM

Agriculture is the backbone of India. Agriculture was a key development in the rise of sedentary human civilization, where by farming of domesticated species created food surpluses that nurtured the development of civilization. Cultivation of land production is our nation economy extremely depends.

In large farm area plant leaf disease can be recognize easily and automatically by using this process. In plants due to affected leaves or fungal or bacteria the leaves may get damages or the disease may spread all over the leaves in the plant. This can be detected by using pre-processor, image segmentation, features extraction and classifications. In this process Gaussian filter is used to reduce the noises in the images. The time taken to proceed the result is less. The figure .1 explains the block diagram of the automatic detection of plant leaf disease using image processing. It includes the blocks are,

a. Input data set
b. Pre-Processor
c. Feature extraction(Morphological)
d. Feature matching
e. Convolutional neural network classifier
f. Classifier output

Convolutional layer is the core building block of a CNN. The network exploit spatially local correlation by enforcing a local correlation by enforcing a local connectivity pattern between neurons of adjacent layers. Each neurons is connected to only a small region of the input volume.

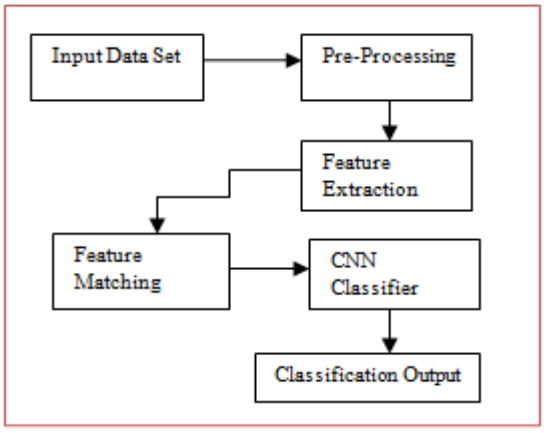

Figure:1- Flow of System

A. Input Data Set:

In this block the images of leafs are collected with the help of mobile camera and all the images are gathered in the folder. In that database a folder is created, the disease affected leaves, the insects bitted leaves and also the healthy leaves are collected in it.The leaves collected folder can be differentiated by the name identification.

B. Pre-Processor:

In image processing pre-processor is a common term which is used to suppress unwanted distortions. This techniques are apply on the leaves images for better result in next processor. In this process segmentation is done by using Canny Edge Detection algorithm. This is nothing but the process of segmenting the leaf images and also detect the boundaries of the leafs. By using this analyses of leaf image can be done easily. The canny algorithm calculates the boundary in the leaf images.

C. Feature Extraction:

In machine learning, pattern recognition and in image processing, feature extraction. Dimensionality reduction is related to feature extraction. There are many techniques can be used in dimensionality, some of them are listed kernel PCA, Partial least square, Indepent component analysis, nonlinear dimensionality reduction etc. The data's that is the images that were captured by mobile camera in the folder is transferred into a set of features. The extracted features are known as mean, standard deviation, entropy, RMS, variance, smoothness, kurios etc.,.

D. Feature Matching:

In both feature extraction and matching morphological algorithm is used. It is nothing but the constructing an image from small components or for removing features from an image without altering the shape of the objects in the image. Its applications is segmenting, removing shadows from images, identifying languages scripts and finding the connected paths in a network.

E. Convolutional Neural Network Classifier:

In machine learning a convolutional neural network (CNN or ConvNet) is a type of feed forward artificial neural network. It is inspired by a biological processes and are variations of multilayer perceptron's designed to use minimal amounts of pre-processing.it is also known as SIFT(Space invariant artificial neural network).The neurons inside a layer are only connected to a small region of the layer before it, called a receptive field. Distinct types of layers, both locally and completely are stacked to form a CNN architecture.

SIFT include a local or global pooling layers which combine the outputs of neurons clusters. It is the operations of small regions of input is introduced to reduce the number of free

parameters and improve generalizations. It is arranged in 3 dimensions.

For example, in CIFAR-1 images are only of size 32×32×3 which means 32wide,32high,3color channels.So,a single fully connected neuron in a first hidden layer of a regular neural network have 32*32*3=3072.

F. Classification Output:

In final classifier output a image is send for further process as in figure:1..A image is segmented, extracted and by using convolutional neural network the affected regions is calculated. The classification result area is calculated using CNN classifier. The affected area is calculated by using (1-(A1/A2) formula.

IV. RESULTS AND DISCUSSION

Figure:2 shows the main guide of the process that is pre-processor, feature extraction, convolutional neural network. Figure:3 shows the morphological process. Figure:4 shows the segmentations and features. Figure:5 shows the classification result that is the detection disease names. Figure:6 shows the affected regions in the leaf images. Figure:7 shows the final output that is the accuracy level.

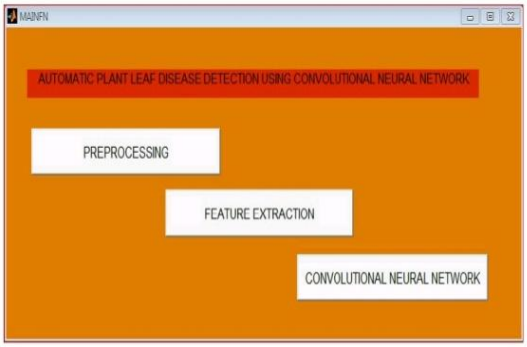

Figure:2- Main GUI

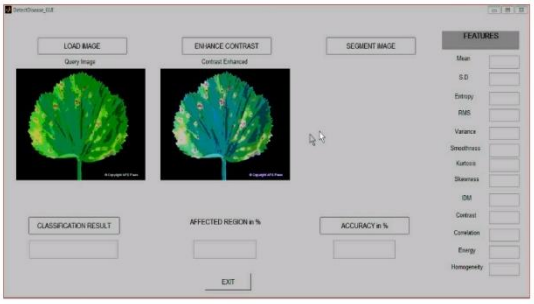

Figure:3- Enhance Contrast

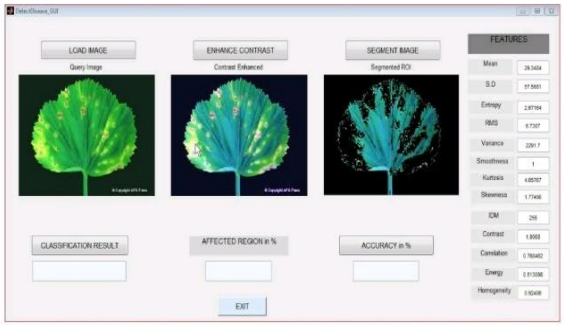

Figure:4-Segment Image and Features

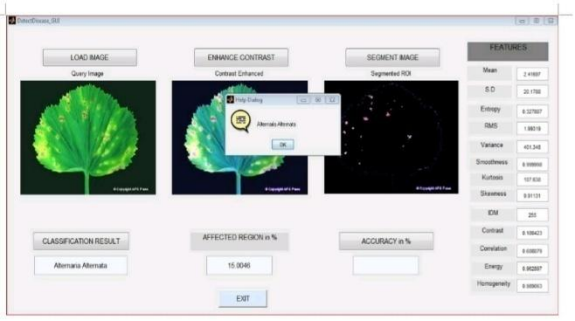

Figure:5- Classification Result

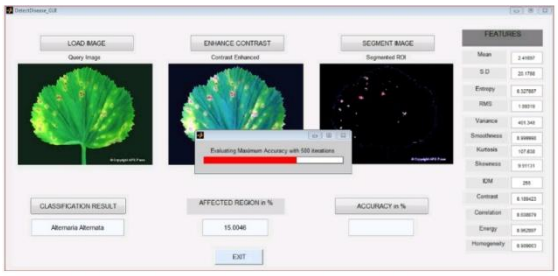

Figure:6- Find Accuracy

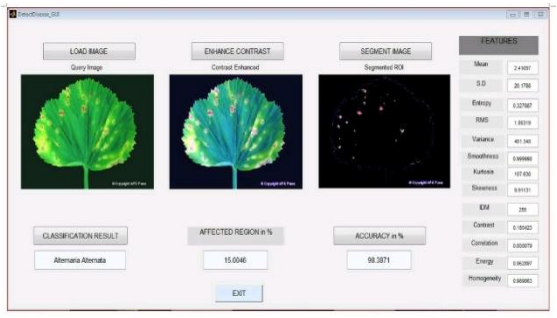

Figure:7- Final Output

Here they calculated the leaves affected region, accuracy level. These are calculated by the features of Mean, Standard Deviation, Entropy, RMS, Variances, Smoothness, Krsis, Skewness, IDM, Contrast, Correlation, Energy, Homogeneity.

V. CONCLUSION

This system focus on detection of plant leaf disease automatically by using CNN classifier. It detects the affected regions and also the accuracy level in the leaf image. The affected area is calculated by using 1-(A1/A2).Canny edge detection is used for segmentation. This method is very much useful to the farmers to increase their crop yield.

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