

Plant Disease Detection using Digital Image Processing

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Abstract— In this project we had used image processing and neural network. Digital image processing is the use of computer algorithms to perform image processing on digital images. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. The neural network is theoretical concept comes from the neurons from brain which transmit data in the form of nodes and forming a network of data which give a great accuracy.

Key words: Leaf Disease, Image Processing, CIELAB Color Model, SGDM Matrix, Color Co-occurrence Method, k-Medoids, Neural Network

I. INTRODUCTION

India is a cultivated country based on farming and agriculture. Images of leaves are taken from digital camera, smart phones and processed using image growing, then the part of the leaf sport has been used for the classifying purpose of the train and test of disease. Here we have placed multiple pictures related to the defective plant leaves into the database. As we need accurate result, we have to enter more amount of sample pictures as much as possible. Then the neural network training is started before that we have to use the image processing image feature extraction to extract data in faster way for that here is the process.

A. Image Analysis is useful for:

- 1) For identifying contaminated leaf, stem, fruit.
- 2) For measuring affected area by disease.
- 3) For finding the boundaries of the affected area.
- 4) For finding out the color of the affected area.
- 5) For determining size & shape of leaf.
- 6) For identifying the Object correctly. Etc.

B. Different Types of Leaf Spot Diseases:

Bacteria, Fungal, Viral Fungi are identified primarily from their morphology, with emphasis placed on their reproductive structures. Bacteria are measured more primitive than fungi and generally have simpler life cycles.

II. LITERATURE REVIEW

This paper consists of two phases to identify the affected part of the disease and to find its remedy. Initially Edge detection based Image segmentation is done, and finally image analysis and classification of diseases. We have set of image in form of database in different folder for different disease, if we want more accurate data we need more database and with variation. Then the neural network training is started before that we have to use the image processing image feature extraction to extract data in faster way for that here is the process.

- 1) Original image
- 2) Gaussian smoothing
- 3) Conversion to YCbCr
- 4) Conversion to grayscale

A. Original Image:

An image is group of pixel in the form of rows and columns that is called resolution.

The image can be of any format that is RGB, grayscale, YCbCr, HSV there are many format which help us to do this kind of image processing. A default image consist of RGB values i.e, Red Green Blue format.

Red (0-255)
Green (0-255)
Blue (0-255)

B. Gaussian smoothing:

In image processing, a Gaussian blur (also known as Gaussian smoothing) is the result of blurring an image by a Gaussian function.

C. Conversion in YCbCr:

YCbCr is color model space like RGB but it has it own Graph of color this Conversion is necessary to highlight the important part of the image.

D. Conversion to Grayscale:

The latest image processing applications such as medical image processing, satellite image processing, and molecular image processing uses various image processing techniques. Conversion of color image to grayscale image is one of the image processing applications used in different fields effectively.

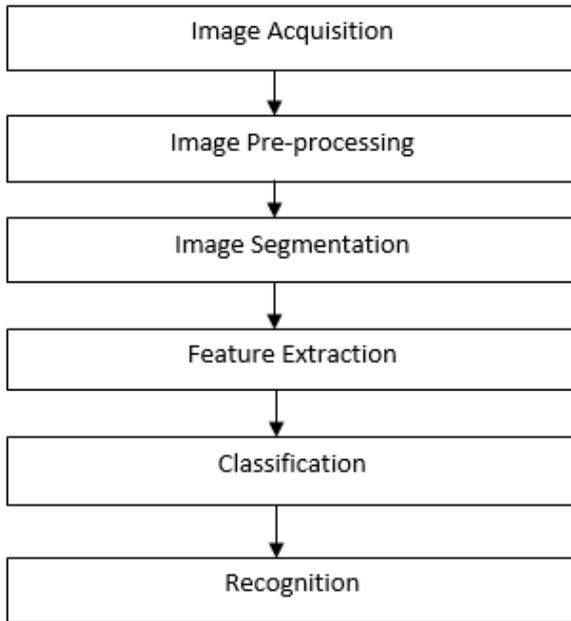
The rgb is 3 channel image having its own 0-255 color ranger but in grayscale there is only one -channel that from 0-255 which reduce the workload on the neural training to collect data from its and hence we can now do the further calculation.

III. OBJECTIVES OF RESEARCH

The major objectives of this research are follows:

- 1) To collect image data sets of various common leaves diseases.
- 2) To identifying infected area based upon clustering algorithm.
- 3) To evaluate the color co-occurrence method, for disease detection in leaves.
- 4) To develop NNs strategies classification of leaves based on the features obtained from the color co-occurrence method.

IV. BLOCK DIAGRAM



A. Image Acquisition and Preprocessing:

First, the images of various leaves are going to acquire by a digital camera. The digital images are acquired from the location referring different sites. Other way is collect the images from agriculture research units. The images which have input are always not satisfactory regardless of what image acquisition devices are adopted. There are three steps included in preprocessing phase: clipping, smoothing and enhancement. Noises which may be brought from the process of image collection and lots of information which may be easily leaded from the operating and saving to the image would make the quality of image dropped, thereby affects following of disease. So, the image with low quality must be smoothed by filter.

B. Image Segmentation (Region of Interest):

The image will be segmented into different parts according to the region of interest. Image segmentation is to divide the image into same meaningful regions. In this step the images are distributed using k-medoids clustering methods. K-medoids clustering is partitioning based clustering method. Every cluster is represented by one of the objects in the cluster.

C. Extraction of Features and Statistics Analysis:

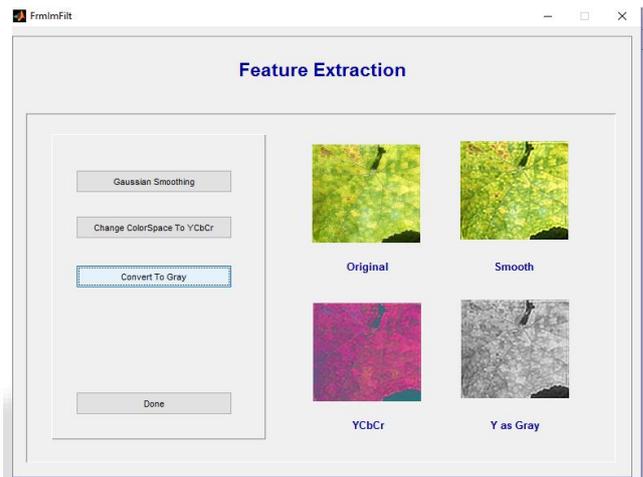
The input data to an algorithm is too large to be processed and it is suspected to be notoriously redundant then the input data will be transformed into a compact representation set of features. The input data Transform into the set of features is called features extraction. If the features extraction is carefully chosen to so expect that the features set will extract the relevant information from the input data in order to perform the desired task .The SGDMs are represented by the function $P(I, j, d, \Theta)$ where I represent the gray level of the location (x, y) at an orientation angle of Θ . The reference Pixel at image position (x, y) is shown as am matrix. All the neighbor from 1 to 8 are numbered in a clockwise direction

Neighbors 1 and 5 are located on the same plant at a distance of 1 and an orientation of 0 degree.

D. Classification based on Classifier:

Neural network is chosen as a classification tool due to its well-known technique as a successful classifier for many real applications. The training and validation processes are among the important steps in developing an accurate process model using neural networks. The dataset for training and validation processes consists of two parts; the training features set which are used to train the NN model; whilst a testing features sets are used to verify the accuracy of the trained using the feed-forward back propagation network.

V. EXPERIMENTAL RESULTS



VI. CONCLUSION AND FUTURE WORK

The main characteristic of disease detection is system can identify the affected part of a leaf spot by using the image processing technique. This program can be used to detect the disease as well as to find the appropriate pesticides needed for remedial. We can use this in order to find and cure the disease before its to late. With the help of digital image processing using various algorithms we can come to the conclusion and detect the disease. This project can be further expanded in terms of medical aspects and farming prospective. As there are numerous numbers of plant and crop diseases spreading these days we can focus on the expansion based on more detailed solution and remedies of the particular disease affected areas with the help of neural networks in order to increase the recognition rate of final classification process. Recognizing the disease is mainly the purpose of the proposed approach. For future research, Work can be extended for development of advanced algorithms Such as other clustering method and Neural Networks in order to improve the recognition rate of the final classification process.

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