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Identification and Classification of Plant Leaf Diseases

R.Meena,N. Kohila, S.Kowsalya, R.Murugeshwari, S.Haribabu

Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tirupur,

Tamil Nadu, India

ABSTRACT: India is an agriculture based country where approx 70% population depend on agriculture. Now days the plant disease detection is very important because agriculture is the backbone of the county like India. We get various raw materials from agriculture and especially crops, which serve as a staple food for people. Farmer is not aware what type of disease plant having and how to prevent them from these diseases.

In this project we are going to process our input image by using computer software, the image will be collected from the farmer. Disease detection involves the steps like taking picture of affected area for image acquisition, image pre-processing, image segmentation, feature extraction and classification. The images are threshold to particular values after that detected image threshold are masked over the original image .The image is clustered based on the features using k-means clustering, GLCM algorithm would generate the features from the images.

KEYWORDS: leaf disease, svm, glcm, segmentaion

I. INTRODUCTION

An image contains important information that can be retrieved by using some computational method. Image segmentation is a task for partitioning an image into smaller parts that are more meaningful. Interestingly, it can be stated as identification and classification of some region of interest. The segmentation is performed based on some common properties of the objects present in an image like color, texture and, shape etc. Image segmentation is a preprocessing step for image processing generally performed by using two methods (i) Traditional compromise of fuzzy logic, neural network, and genetic algorithm. Soft computing having the capability to deal with uncertainty has been most widely used for image segmentation nowadays. Soft computing methods are designed to simulate human intelligence by learning from their skills to perform some complex task automatically. The Soft Computing (SC) methods is a group of methods mainly Fuzzy Logic (FL), Neural Network (NN), and Genetic Algorithm (GA) and Swarm Intelligence methods like Particle swarm optimization (PSO), Bacterial foraging optimization (BFO) etc. They serve as a backbone to sustain the environment. Plants do suffer from diseases, which affects the normal growth of plants. . The existing method for the identification and classification of diseases from a plant is done with the help of human intervention. Experts through naked eye make observations about the diseases of a plant by continuous monitoring of plants over a large period of time. Most of the time, these existing approaches of disease identifications are time-consuming and cumbersome.

II. METHODOLOGY AND RESULTS

PROPOSED SYSTEM

Image acquisition is the first method of digital image processing and it is described as capturing the image through digital camera or from the samples that are stored in database for further MATLAB operations. The main purpose of image pre-processing is to improve the quality of an image containing unwanted distortions or to enhance some image features for further processing. This method includes various techniques such as changing image size, filtering of noise, image conversion, enhancing image. K-means clustering method partitions the images into clusters in such a way that at least one part of cluster contains an image with major area of affected part. GLCM has been used

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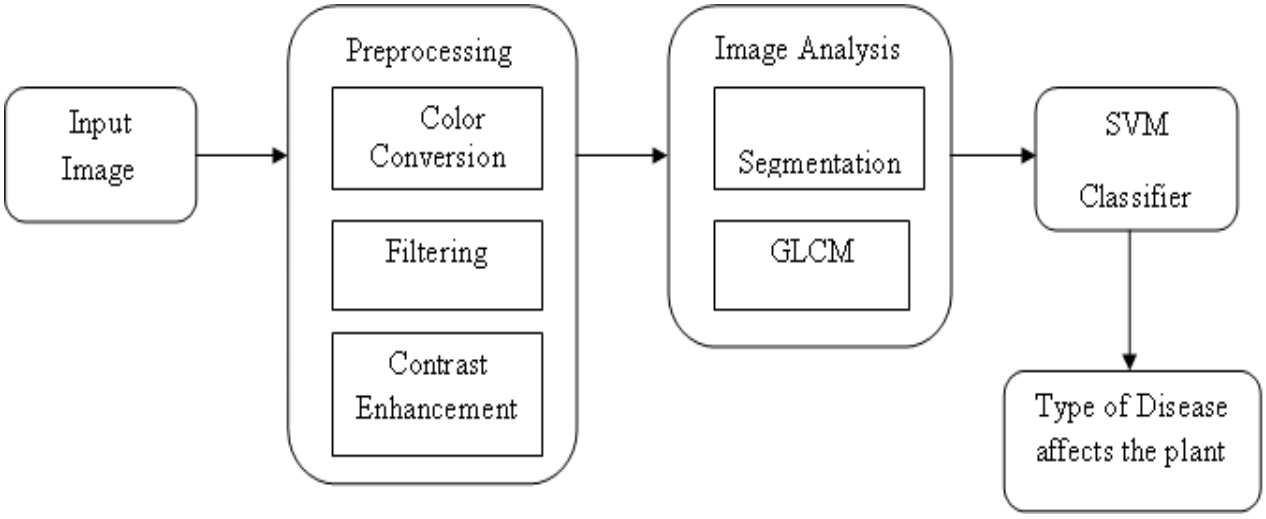
extensively in the field of image processing. It has been for texture analysis in gray scale as well as color texture recognition. Clustering value of a pixel captures the structure of local brightness variations in atmosphere and SVM Classifier is used to classify the result.

ADVANTAGES

- Best suited for different illuminant condition
- The captured leaf image parameters were compared with the parameters of healthy leaf and disease was detected. According to disease pesticide control was done.

SOFTWAREREQUIREMENTS

- TOOL : MATLAB 2014a
- TOOL BOX : Image Processing Tool Box
- MATLAB



INPUT IMAGE:

The RGB color model is an additive color model in which red, green and blue light are added together in various ways to reproduce a broad array of colors. The name of the model comes from the initials of the three additive primary colors, red, green and blue.

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GRAY IMAGE:

In photography and computing, a grayscale or grey scale digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest. In photography and computing, a grayscale or grey scale digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this sort, also known as black-and-white, are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest.

Grayscale images are distinct from one-bit bi-tonal black-and-white images, which in the context of computer imaging are images with only two colors, black and white (also called bi-level or binary images). Grayscale images have many shades of gray in between.

Grayscale images are often the result of measuring the intensity of light at each pixel in a single band of the electromagnetic spectrum (e.g. infrared, visible light, ultraviolet, etc.), and in such cases they are monochromatic proper when only a given frequency is captured. But also they can be synthesized from a full color image; see the section about converting to grayscale.

MEDIAN FILTER:

The median filter is a nonlinear digital filtering technique, often used to remove noise from an image or signal. Such noise reduction is a typical pre-processing step to improve the results of later processing (for example, edge detection on an image). Median filtering is very widely used in digital image processing because, under certain conditions, it preserves edges while removing noise, also having applications in signal processing. The main idea of the median filter is to run through the signal entry by entry, replacing each entry with the median of neighboring entries. The pattern of neighbors is called the "window", which slides, entry by entry, over the entire signal. For 1D signals, the most obvious window is just the first few preceding and following entries, whereas for 2D (or higher-dimensional) signals such as images, more complex window patterns are possible (such as "box" or "cross" patterns). Note that if the window has an odd number of entries, then the median is simple to define: it is just the middle value after all the entries in the window are sorted numerically. For an even number of entries, there is more than one possible median.

Requirement: the filter must be physically realizable/causal (this requirement can be dropped, resulting in a non-causal solution)

- Performance criterion: minimum mean-square error (MMSE).

ADAPTIVE HISTOGRAM
AEQUALIZATION:

Adaptive histogram equalization (AHE) is a computer image processing technique used to improve contrast in images. It differs from ordinary histogram equalization in the respect that the adaptive method computes several histograms,

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each corresponding to a distinct section of the image, and uses them to redistribute the lightness values of the image. It is therefore suitable for improving the local contrast
and enhancing the definitions of edges in each region of an image.

However, AHE has a tendency to over amplify noise in relatively homogeneous regions of an image. A variant of adaptive histogram equalization called contrast limited adaptive histogram equalization (CLAHE) prevents this by limiting the amplification.
Ordinary histogram equalization uses the same transformation derived from the image histogram to transform all pixels. This works well when the distribution of pixel values is similar throughout the image. However, when the image contains regions that are significantly lighter or darker than most of the image, the contrast in those regions will not be sufficiently enhanced.

Adaptive histogram equalization (AHE) improves on this by transforming each pixel with a transformation function derived from a neighborhood region. It was first developed for use in aircraft cockpit displays. In its simplest form, each pixel is transformed based on the histogram of a square surrounding the pixel, as in the figure below. The derivation of the transformation functions from the histograms is exactly the same as for ordinary histogram equalization: The transformation function is proportional to the cumulative distribution function (CDF) of pixel values in the neighborhood.

Pixels near the image boundary have to be treated specially, because their neighborhood would not lie completely within the image. This applies for example to the pixels to the left or above the blue pixel in the figure. This can be solved by extending the image by mirroring pixel lines and columns with respect to the image boundary. Simply copying the pixel lines on the border is not appropriate, as it would lead to a highly peaked neighborhood histogram.

FEATURE EXTRACTION:

In machine learning, pattern recognition and in image processing, feature extraction starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps, and in some cases leading to better human interpretations. Feature extraction is related to dimensionality reduction.

When the input data to an algorithm is too large to be processed and it is suspected to be redundant (e.g. the same measurement in both feet and meters, or the repetitiveness of images presented as pixels), then it can be transformed into a reduced set of features (also named a feature vector). Determining a subset of the initial features is called feature selection. The selected features are expected to contain the relevant information from the input data, so that the desired task can be performed by using this reduced representation instead of the complete initial data.

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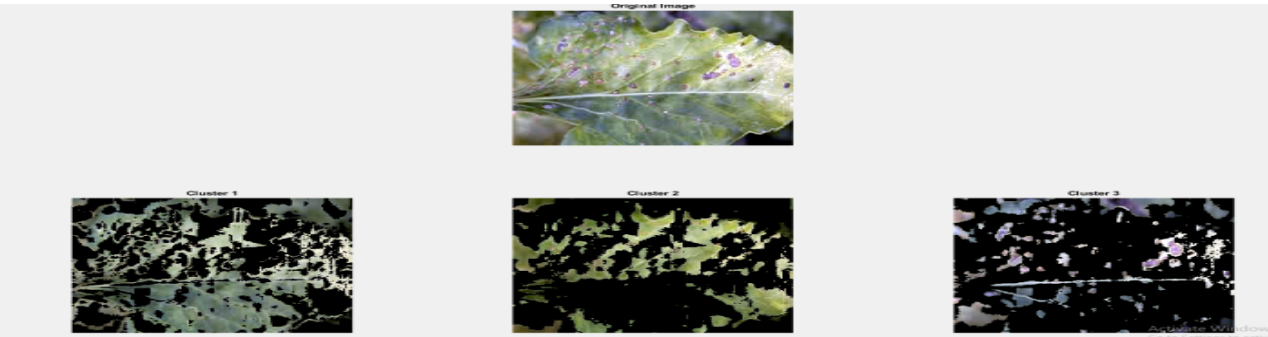
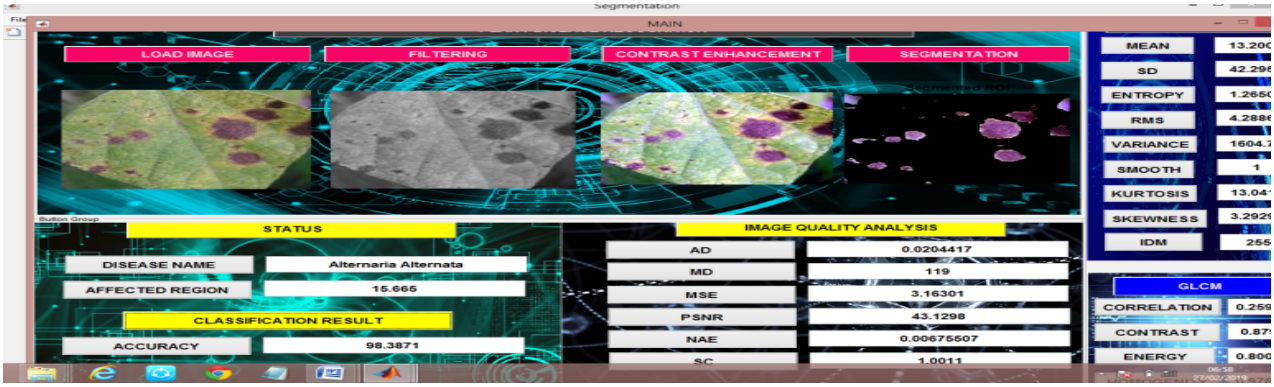


III. RESULT



Disease name:alterinara alternata
Affected region:15.66
Accuracy result:95.367

IV. CONCLUSION

In this project, the finding of plant disease is made by means of skin leaf techniques detection by means of intensity computation, thresholding and features extraction. The diseases are classified as true or false exudates with the help of SVM classifier and were able to distinguish between four different types of grading level with an average accuracy of 95.367%. As an extension of our work, it is suggested to optimize the features selected and the foremost features with different classifier techniques can be compared and analyzed.

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