Plant Disease Identification For Modern Agriculture

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Abstract- *India is a cultivating country and about 61.5% of the population depends on agriculture. The agricultural production growing over the past 30 years, India stepped into the ranks of the top five countries in key agriculture products. Farmers have a great diversity to find the variety of disease in plants and to choose the suitable pesticides. Disease on plants leads to great reduction in the growth and cultivation. Monitoring the health of the plants plays an important role in cultivation. In earlier days, monitoring and identifying the diseases in plants were done manually by the experts. As the technology improves, automatic detection of plant diseases is done easily just by observing the changes and symptoms on the plants. Leaf plays a major role in every plant's health. Hence detection of disease is mostly done in plant leaves. Image processing is the easiest technique that is used in detection of plant diseases. This is used to segment the affected area in leaves and to identify the type of diseases.*

Keywords- Image acquisition, image pre-processing, segmentations, diseased leaf.

I. INTRODUCTION

Though industry has been playing a vital role in Indian economy, the contribution of the agriculture to the Indian economy still cannot be denied. Agriculture is one of the largest sectors of our Indian economy, in terms of generating employment as well as for the provision for the food for the ever increasing population. Even though the contribution of agriculture to the GDP is vividly vast, it suffers from serious problems out of which the frequent failure of the crops is the one of the biggest problems and therefore is of utmost importance. The green plants provide most of the world's molecular oxygen and are the basis of most of the earth's ecological systems. As diseases of the plants are inevitable, detecting diseases in plants assumes importance. The disease in plant may be due to biotic (fungi, bacteria, viruses/viroids, nematodes) or a biotic reason (temperature, moisture, nutrition, toxicity, cultural). Plant diseases vary in how much trouble they cause, depending on a variety of conditions, including the susceptibility of the plant and the organism's disease cycle.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Paper	Methodology	Future work
1. Detection of plant leaf diseases using image segmentation and soft computing techniques.	Fuzzy logic and self org maps.	Training data need to be linearly separable to determine optimal parameters.
2. Fast and Accurate Detection and classification of plant diseases.	K-means clustering and Neural Network's (NNs).	Developing hybrid algorithms and automatically estimating the severity of the detected disease.
3. Leaf Disease Severity Measurement Using Image processing.	Triangle threshold segmentation method.	Nil.
4. Detection of unhealthy region of plant leaves using image processing and Genetic Algorithms.	Color co-occurrence method and disease detection by genetic algorithm.	Improve recognition rate of classification process.
5. Identification of Leaf diseases in pepper plants using Soft computing techniques.	Soft computing techniques: Fuzzy logic and NNs.	Identifying the presence of diseases by observing the visual symptoms seen on the leaves of the plant.
6. Review Paper on Identification of Plant Diseases Using Image Processing Technique.	Classify plant diseases from digital images in the visible spectrum.	Calculating dimensions of the disease spot by classifying the diseases.

III. TYPES OF PLANT DISEASES

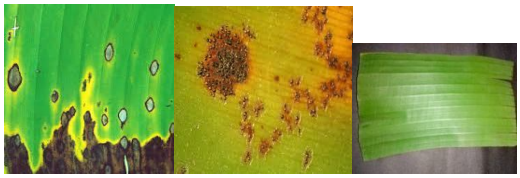
A. Image analysis can be applied for the following purposes

1. To detect diseased leaf.
2. To quantify the affected area.
3. To identify the disease affected.
4. To quantify the affected area.

B. Various types of diseases

1) Banana leaf

1. Streckle.
2. Sigatoka



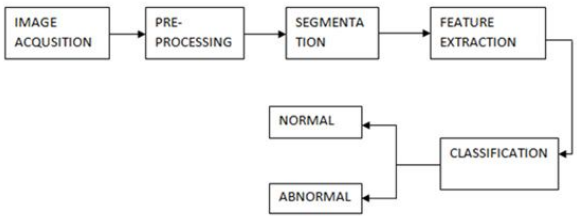
2) Chilly leaf:

1. Bacterial disease.
2. Cercospora leaf spot.

3) Sapota leaf:

1. Leaf spot.
2. Algal spot.

IV. BLOCK DIAGRAM



1) Image Acquisition

The action of retrieving an image from some source, usually a hardware-based source is known as image acquisition. It is usually used in image processing. Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, no processing is possible.

2) Pre-processing

The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing.

The four categories of image processing are:
1. Pixel brightness transformation.

2. Geometric transformations.
3. Pre-processing methods that use a local neighborhood of the processed pixel.
4. Image restoration that requires knowledge about the entire image.

If pre processing aims to correct some degradation in the image, the nature of a priori information is important: 1.Knowledge about the nature of the degradation; only very general properties of the degradation are assumed, 2.Knowledge about the properties of the image acquisition device, the nature of noise (usually its spectral characteristics) is sometimes known, 3.Knowledge about objects that are searched for in the image, which may simplify the pre-processing very considerably. If knowledge about objects is not available in advance it can be estimated during the processing.

3) Segmentation

Image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels). The goal of segmentation is to

simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.

A. Fuzzy C Means Segmentation

Fuzzy c-means (FCM) is a method of clustering which allows one piece of data to belong to two or more clusters. This method is frequently used in pattern recognition. Fuzzy c-Means Clustering performs clustering by iteratively searching for a set of fuzzy clusters and the associated cluster centers that represent the structure of the data as best as possible. The algorithm relies on the user to specify the number of clusters present in the set of data to be clustered. Given a number of clusters c, FCMC partitions the data X = {x1,x2,…,xn} into c fuzzy clusters by minimising the within group sum of squared error objective function.

4) Feature Extraction

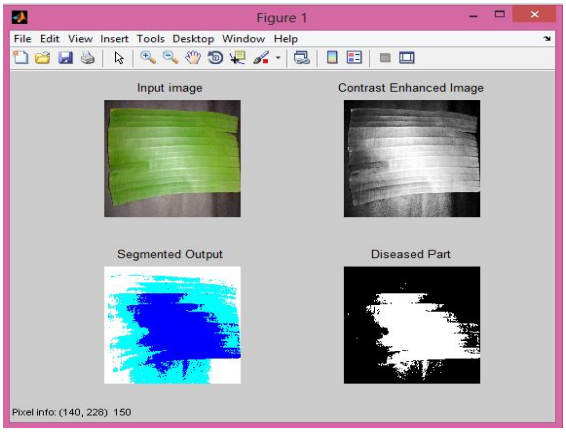
In machine learning, pattern recognition and in image processing, feature extraction starts from an initial set of measured data and builds derived values (features) intended to be informative and non-redundant.

A. Statistical feature

Statistics is the study of the collection, organization, analysis, and interpretation of data. It deals with all aspects of this, including the planning of data collection in terms of the design of surveys and experiments. This is the meaning of statistics. Statistical feature of image contains

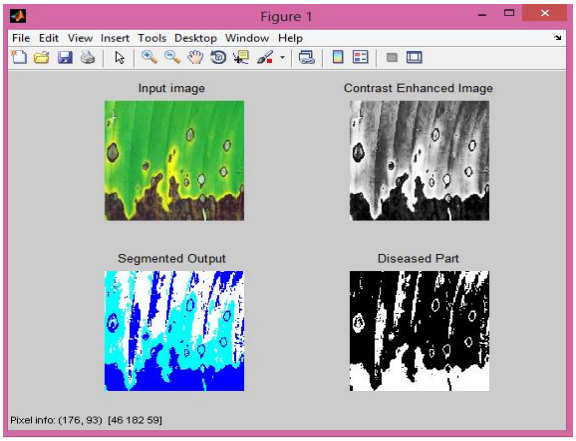
1) Mean
2) Variance
3) Skewness
4) Standard deviation

Non-Infected Leaf Followed By Output Segmented Images:



Output Segmented Image of Sample Non-Infected Leaf

Infected Leaf Followed By Output Segmented Images



Output Segmented Image of Sample Infected Leaf

Plants	*Diseases*	*Accuracy*
Banana leaf	Streckle.	Correctly recognize plant diseases and accuracy is as high as 93.79%.
	Sigatoka	
Chilli leaf	Bacterial disease.	Overall accuracy 95%
	Cercospora leaf spot.	
Sapota leaf	Leaf spot.	96.7% for leaf spot, 86.6% for algal spot.
	Algal spot.	

V. CONCLUSION

For proper and successful cultivation of crops it is necessary to detect diseases accurately. Hence from above discussion it can be seen that image processing techniques have proved useful in all means. This paper provides the detection of leaf disease detection. The main characteristics of leaf disease detection is speed and accuracy in the early stage of the plant growth. The extension of the work will identify various leaf diseases and pests to avoid the diseases in plants.

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