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Detection of Agricultural Plant Leaf Diseases Using Image Processing Techniques

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ABSTRACT

Agriculture has become much more than simply a means to feed ever growing populations. It is very important where in major population depends on agriculture in India. That means it feeds great number of people. The plant diseases effect the humans directly or indirectly by health or also economically. Infected plants have fungal leaf spot attacks, Bacterial leaf spot attacks, brown or black water-soaked spots on the foliage, sometimes with a yellow halo, usually uniform in size.

To detect these plant diseases we need a fast automatic way. Diseases are analyzed by different digital image processing techniques. In this paper, we have done survey on different digital image processing techniques to detect the plant diseases.Plants and crops are the most crucial source of energy as they play an important role in both human life and the other lives than exists on the earth. In recent times, plant and crop cultivation in agriculture is being used much more than just feeding the population. In this regard, diagnosing the disease in timely and accurate way is most important. [1] Plant pathology can be detected through several ways. Visible symptoms associated with some diseases cannot be detected always and some of them appear only when it is too late. General approach in this is diagnosing the signs that are not easily visible to humans. Apart from these disadvantages the agriculturist may find it a challenging task if the diagnosis is done for extremely large areas. By use of digital image processing many of these problems can be solved or reduced. [1] Classifiers based on texture, color and functions for shape matching are some of the common methods that have been proposed in the past few years. When some diseases are not

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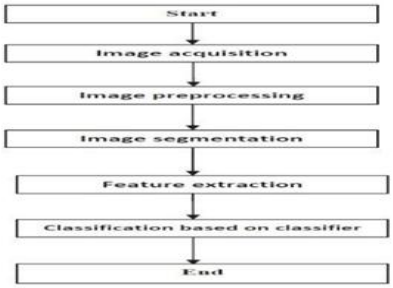
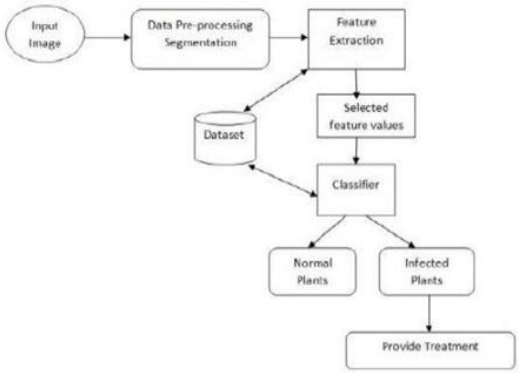
visible to naked eye but actually they are present, then it is difficult to detect it with the naked eye. And when it is visible it will be too late to detect disease and can't help anymore. Detection and recognition of diseases in plants using machine learning is very fruitful in providing symptoms of identifying diseases at its earliest. Plant pathologists can analyze the digital images using digital image processing for diagnosis of plant diseases. Computer processing Systems are developed for agricultural applications, such as detection of leaf diseases, fruits diseases etc





In all these techniques, digital images are collected using a digital camera and image processing techniques are applied on these images to extract useful information that are necessary for further analysis[2]. Digital Image processing is used for the implementation which will take the image as input and then perform some operation on it and then give us the required or expected output. Application of computer vision and image processing techniques certainly assist farmers in all the areas of agriculture activities. Here, user uploads the image of the diseased infected plant which is analyzed and processed. [2]

Image Acquisition

Images of the infected leaves are taken from. The images are taken by the digital camera first. There are samples of normal leaves and the affected leaves .This database has different types of plant diseases, and the images are stored in JPEG format. These images are then read into MATLAB using imread command. [5]

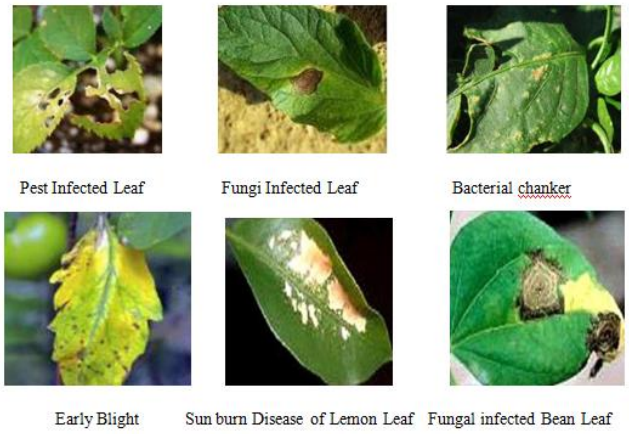


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Image pre processing

First the captured images were classified as affected and unaffected leaves. Distribution of color was the same for unaffected leaves, but for the affected leaves the distribution of color was not uniform. This is because the values of the pixels of the affected leaves were totally different form the pixel values from the normal leaves If noises are present in image, interested region in the image is not clear. In the image clipping, smoothing, enhancement are the three steps included in preprocessing phase. The process of image collection and lots of information may bring noises which make the quality of image dropped. To perform denoising different kinds of reduction technique are applicable. [11]

Image Segmentation

This is one of the critical tasks of Image Analysis. The image is divided into some meaningful region. [2]

Image Feature Extraction

The input data is transformed into set of features. The morphological changes happened due to different diseases were observed. It was noticed that the shape was oval for the brown spots and blast spots were elliptical in shape, and these shapes were distorted according to the severity of the diseases. [5]

Image Classification

Image classification is perhaps the important part of digital image processing. Two types of classifications were done. One is the classification between the unaffected and the affected leaves and another was the classification between the affected leaves. During the classification between the affected and the unaffected leaves probability of occurrences of different gray levels was represented by the histogram in an image. [11]

A peak in the histogram means the high probability of a specific gray level. The probability of a specific gray level is very high for unaffected leaves because the gray level is almost same for all the pixels. But an affected image will have a high probability for at least two different gray levels, one for the affected portion and another is for unaffected portion. So the histogram for an image with single peak means unaffected image and the histogram for an image with two peaks means affected image. [2]

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