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## PLANT DISEASE DETECTION USING DIGITAL IMAGE PROCESSING AND GSM

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### Abstract:

In India, 70% of its people are in the Agriculture sector. The remaining 30% of people are an inseparable part of this field. Because from agriculture, we get various raw materials and especially crops, which serve as a staple food for people. But The crops and plantations get destroyed mainly due to two major reasons, first reason is destruction by natural calamities such as flood, earthquake, drought, famine, etc. and second reason is the destruction by the pathogens. 98% of the destruction is caused by the pathogens and 2% of the destruction happens due to natural calamities. So the need for the plant disease detection was felt. The traditional methods were inaccurate and not effective. So various researches in this field lead to inclusion of image processing for accurate detection of disease by using plant leaf. various spots, patterns on plant leaf are useful in detecting the disease. Further advancement was use of digital image processing for more accurate results. On referring various reputed IEEE ,international conference and international journal papers regarding this field ,it was found that none of these suggest remedy for curing the plant disease.

**Keywords:** Natural calamities, Pathogens, digital image processing, remedy.

### I. INTRODUCTION

In India, Farmers have a great diversity of crops. Various pathogens are present in the environment which severely affect the crops and the soil in which the plant is planted, thereby affecting the production of crops .Various disease are observed on the plants and crops .the main identification of the affected plant or crop are its leaves. The various coloured spots and patterns on the leaf are very useful in detecting the disease. The past scenario for plant disease detection

involved direct eye observation, remembering the particular set of disease as per the climate, season etc. These methods were indeed inaccurate and very time consuming. The current methods of plant disease detection involved various laboratory tests, skilled people, well equipped laboratories etc. These things are not available everywhere especially in remote areas. The method which I am implementing insures the automatic

detection of crops. The very first implementation of plant disease detection using image processing was done by shen weizheng, wu yachun, Chen zhanliang and Wei hongda in their paper [9]. The method which I am implementing makes use of digital image processing for plant disease detection and GSM for transmitting the name of the pesticide to the Farmer's mobile phone. Purpose of the Project: The traditional methods were inaccurate and not effective. So various researches in this field lead to inclusion of image processing for accurate detection of disease by using plant leaf. Various spots, patterns on plant leaf are useful in detecting the disease. Further advancement was use of digital image processing for more results that are accurate. On referring various reputed IEEE,

## II. LITERATURE REVIEW

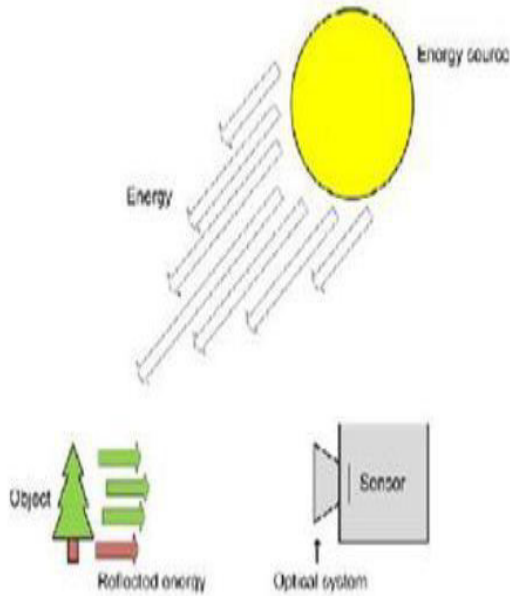
Let's have a brief overview of the various papers, which I have referred for implementation of my project. The usage of image processing technology for plant disease degree grading eliminates the subjectivity of traditional classification methods and human-induced errors. Thus the estimation credibility is improved and accurate data are provided for disease studies. The method is also convenient, which simply needs computers, digital cameras with the Combination of necessary software programs to realize for the disease batch grading. [9] The accurate detection and classification of the plant disease is very important for the successful cultivation of the crop and this can be done by using image processing. The basic steps for disease detection using image processing include image acquisition, image pre

processing, feature extraction, detection and classification of plant disease [1]. Enhanced images have high quality and clarity than the original image. Colour image have primary colors red, green and blue. It is difficult to implement the application using RGB because of its range. Hence they convert RGB to grey images [3]. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops and at very early stage itself detects the symptoms of the disease. They have presented a survey on various classification techniques [2]. Abdul hallis et al in their paper, have used MATLAB for feature extraction and image recognition. Here digital camera is used for image capturing [4]. Mrunalini and Prashant. R.Deshmukh Compares Otsu threshold and the K means clustering algorithm for infected leaf analysis. The clarity of k means clustering is more accurate than other method [5]. J.K.Patil in his paper describes the possible approach for extraction of low level image features like color and texture [6]. Anand kulkarni in his paper discusses the Gabor filter and ANN for feature extraction and classification respectively [7]. Haiguang Wang in his paper stresses on the principal component analysis. PCA could reduce the dimensions of the obtained data under the premise of retaining the total data information, reduce the nod .of neurons in the input layer and increase the speed of neural networks [8].

## III. STEPS FOR PLANT DISEASE DETECTION 1] IMAGE ACQUISITION:-

The images of the plant leaf can be acquired using two ways. First way is to capture

image using the external camera, here we have used iball web camera and second way is to get the image from the email etc. The input image is converted to color space.



## 2. IMAGE PRE-PROCESSING:-

To remove the noise in the image, different pre processing techniques are considered such as image clipping for obtaining the concerned area by cropping; image smoothing is done to reduce in the obtained image by using the smoothing filter. Image enhancement is done to increase the contrast.

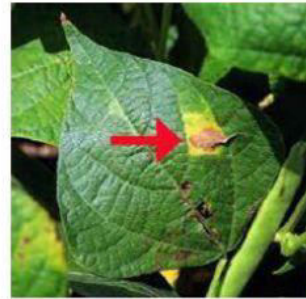


Figure.1. Image Cropping Example.



Figure.2. Image Smoothing



Figure.3. enhanced image of leaf.

## 3. IMAGE SEGMENTATION:-

Segmentation means partitioning of images into various part of the same feature or having some similarity. The segmentation can be done using Otsu's method, K means clustering, converting RGB to HSI model etc. The K means clustering is used for classification of the object based on a set of the features into K no. of classes. The classification of the object is done by minimizing the sum of the square of the

distance between the object and the corresponding cluster.

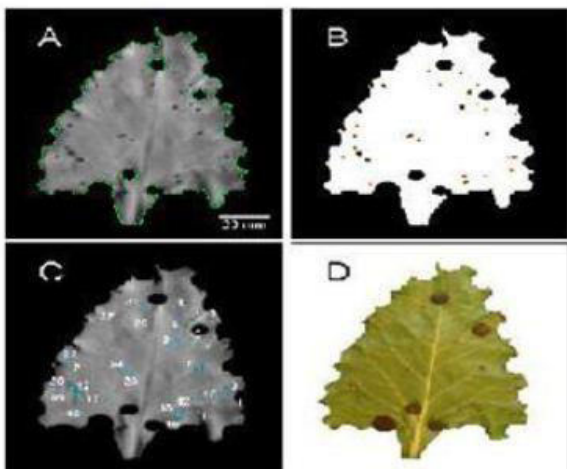


Figure.4. k means clustering applied to affected leaf

#### 4. FEATURE EXTRACTION:-

Feature extraction plays an important role for identification of an object. In many application of image processing, feature extraction is used. The features which can be used in plant disease detection. In paper [3], Monica jhuria et al considers color, texture and Morphology as a feature for disease detection. They have found that morphological result gives better result than the other features. Texture means how the color is distributed in the image, the roughness, hardness of the image. It can also be used for the detection of infected plant areas. Colour, texture, morphology, etc. are the features which can be used in plant disease detection. In my project for feature extraction, I have converted the image to grey scale. The image which is in the color space is converted into grey image using,  $F(x) = 0.2989 * R + 0.5876 * G + 0.114 * B$

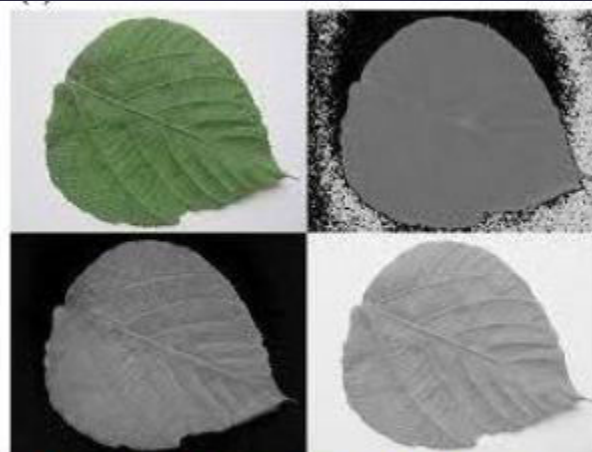


Figure.5. feature extraction of affected leaf

#### 5. CLASSIFICATION:-

For the classification and the detection, I have used SVM (support vector machine) with .mat file. The SVM is the supervised learning model with associated learning algorithm that analyzes data used for classification and regression analysis. A SVM constructs a hyper plane or a set of hyper planes in a high or infinite dimensional space which can be used for classification, regression or other tasks. Intuitively, a good separation is achieved by the hyper plane that has the largest distance to the nearest training-data point of any class (so-called functional margin), since in general the larger the margin the lower the generalization error of the classifier. The .mat file store the various features of the affected leaf

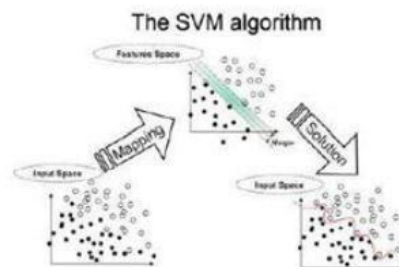


Figure.6.Support Vector Machine

## 6. TRANSMISSION:-

After detection of the disease and its corresponding pesticide, the name of the pesticide will be sent to farmer's mobile through GSM.



## V. CONCLUSION:-

The accurate detection and classification of the plant disease is very important for the successful cultivation of the crops, this can be done using digital image processing. In this project, the detection as well as the remedy for curing it is achieved. This project utilizes GSM so as to send the message to every kind of mobile handset. This project utilizes various image processing techniques which provide accurate results.

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