

Lemon Disease Detection using Image Processing

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Abstract— In India, Fruit disease detection is done using naked eye by an expert and the charges of an expert is too high so that farmer cannot afford an expert. This system will help to reduce the cost as well as time. In the proposed system, Image of fruit is pre-process then the feature extracted and then classification is done. The result of proposed system displays the name of disease name. This system will help the farmer to increase the cultivation of lemon fruit.

Key words: SVM, K-Mean Clustering, Segmentation, Disease Detection

I. INTRODUCTION

India is farming country and about 80 % people of country dependent on the agriculture. The farmers have the wide area for farming of various crops and selecting suitable pesticide for growing plant. Diseases on the fruit indicate a reduction in quantity and the quality of the fruits. Normally farmers observe the diseases of fruit from visually but this observation is not correct every time because of less knowledge of diseases of fruit. But an expert in agriculture can easily detect disease and can say about health of the plant. Experts are not available in early stage of plant diseases and the fee of an expert in agriculture is high so that the farmers cannot afford the professional in agriculture. If the farmers are able to diagnose the plant disease in starting phase then the quantity and the quality of the fruits can increase. So, an automatic fruit disease detection system is needed to diagnose the disease in early stages.

II. DISEASE DETECTION PROCESS

The disease detection system operates on the images. The farmer gives input to the system as the infected fruit image for disease detection of fruit.

A. Image Acquisition:

Image acquisition is collecting data set of the disease infected images. Some of the images are collected from any digital camera and some of the images are collected from internet also. For this data base, lemon images are collected and the system will be tested for disease detection.

B. Image Pre-Processing:

The image pre-processing is applied on the collected image data set. Image pre-processing is used to convert the image in appropriate form on which the disease detection system provides fast processing. It also performs histogram equalization on image to distribute the intensities to increase the quality of the image. Image pre-processing includes many processes:-

- Filter image
- Crop image
- Resize image

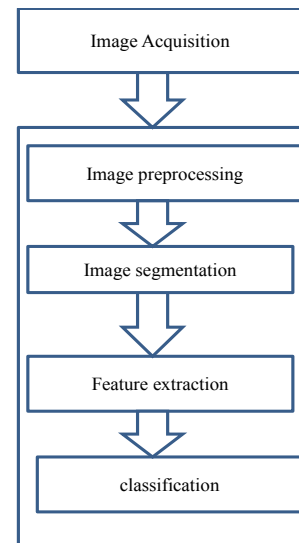


Fig. 1: Disease Detection Process

C. Image Segmentation:

It is the method of dividing an image into many meaningful parts. Segmentation of images is done to change the representation or simplify the image in easier form. Image segmentation can be done by using otsu method, k-means clustering etc.

1) K-Means Clustering:

It is used to create cluster of same pixels of an images. It converts n number of pixels into k number of cluster. K-means clustering method is used to segment the training data set based on the feature.

2) Algorithm for K-Means Clustering

- Initialize the cluster k
- Randomly select centroid.
- Squared Euclidean distance calculated from each image to each cluster and every cluster assigned to closest cluster.
- For every cluster, new centroid will be computed.
- The distance from every image to every cluster is calculated, images are allotted to the cluster with smallest distance.
- The process will continue until the images are in cluster.

3) Otsu Threshold Method:

It is used to convert the grey level image to binary image. This method assumes that there are only two types of pixels black and white. Otsu threshold method sets a threshold level, pixel value above threshold is called white and the below threshold value is called black pixel.

D. Feature Extraction:

The feature extraction gives very good result for identification of disease from image. The feature extraction is used in many applications of image processing. The feature extraction is used to reduce the large input data to small data

so that it will take less time to process data but In extracted the feature must have important data to be process. The feature extraction can be done by using morphology, colour, edge, texture etc.

E. Classification:

It is used to identify the images and it is done by using support vector machine (SVM). SVM perform supervised learning for classification. It marked the images to one of the two categories. An SVM training algorithm makes a model that assigns new example into one categories or other.

III. LITERATURE SURVEY

Blasco J. et al. [2003] discussed segmentation method that was appropriate and gives fast processing speed for the apple fruit disease detection. This system needs a training and system trained on the basis of the colour of apple. Result showed in this paper is very effective because the infected area of apple is detected. But in this system has some disadvantage also that some of time system cannot classify the colour difference.

Unay D. et al. [2011] proposed a system that was fully automatic grading system that was based on bi-coloured apple by using machine vision. In the proposed system, first image was segmented and some of the feature was extracted after that using classifier, system classified the apple that is the infected or not.

Wang H. et al. [2012] discussed plant disease detection system which detects the disease based on the feature extracted by using the colour feature texture feature and shape of disease image. Extracted feature is used to reduce the size of image so that processing time would reduce and system will give the good result.

Sannakki S. et al. [2013] proposed a system which is used to detect the disease of grape leaf disease using computer vision. In the proposed system, first image was segmented and some of the feature was extracted after that using classifier, system classified the apple that is the the infected or not. Segmentation is done by using k-mean clustering and classification is done using neural network.

Bhange M. et al. [2015] proposed a pomegranate disease detection system based on image processing. this system works for a specific disease which is bacterial blight disease. First of all, the image is pre-processed and then the feature is extracted based on three parameter, that are CCV, colour and morphology and then training and testing are done. The result of system shows 82% accuracy.

Khirade S. et al. [2015] discussed various methods for segment disease part of plant image. He also discussed the feature extraction technique and some classification method to extract the feature and of plant and for testing of the infected plant. for classification ANN and SVM can be used.

IV. RESULT AND DISCUSSION

In figure 2, test images of lemon fruit were taken which is the infected by various diseases. Some of the test images were taken by camera and some of the images from internet.

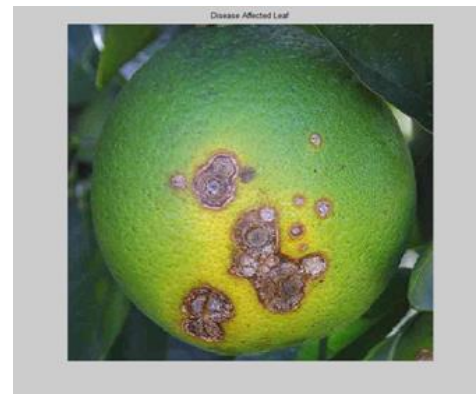


Fig. 2: Test image

Clustering is done in three parts on basis of RGB color. figure3 shows the result of test images by k-mean clustering. Test images are segmented and cluster by using k-mean clustering. Clustering technique divide a image in three parts for better analysis and result from images.

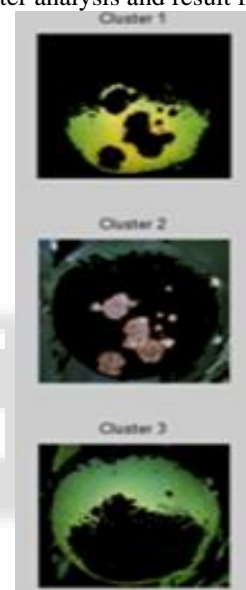


Fig. 3: K-mean clustering

Classification is used to identify the images and it is done by using support vector machine (SVM). The First system has to train by using SVM by taking some of the training images data set. After the training SVM will compare the test image with training image and the name of disease as a result will be displayed. In figure4, showing the name of disease as the result of test images.

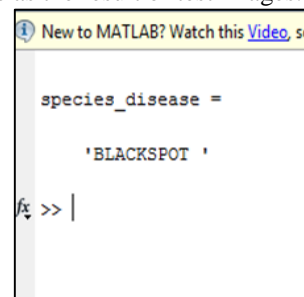


Fig. 4: Disease In Test Image

A. Conclusion

In this paper, The image of lemon fruit were taken which is the infected from anthranose and black spot diseases. Some of the test images were taken by the camera and some of the images from the internet. Firstly, image is pre-process then

the feature extracted and then classification is done. The result of proposed system displays the name of disease name. This system will help farmer to increase the cultivation of lemon fruit.

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