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Segmentation of Disease in Betel Leaf Using Image Processing

B.Monesh[1], M.Gana Prabha[2], S.Anjutha[3], X.Gladish Kirubai[4], A.Stephan Sagayaraj[5]

UG scholar, Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India[1,2,3,4]

Assistant Professor, Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tirupur, Tamil Nadu, India[5]

ABSTRACT: The betel (piper betel) is a vine belonging to peperaceae family. It is called as betel quid or paan. Betel leaf is widely used in India. About 20-30 million of people consumes betel vine in all over the world. The betel vine is affected by three diseases during cultivation. The diseases of betel vine are foot rot, leaf rot and powdery mildew. The main objective of this project is to identify the disease priory and to prevent the disease from its growing stage. Different stages of healthy and diseased betel vine are collect using high resolution digital camera. The leaves are analyse processing which gives a standard pattern of digital images. The classifier identifies whether the leaf is affected are not.

KEYWORDS: Betel leaf, pattern recognition, classifier, discriminative cluster Segmentation.

1. INTRODUCTION

Betel leaf is amazing analgesic that offers relieves from pain. It used as antiseptic and medicine. These is mainly affected by three diseases foot rot, leaf rot, and powdery mildew [1][2]. The diseases is in the leaf is detected by using segmentation, feature extraction and classifier.

The impulse noise is the most common noise in image processing. The Median filter is used to remove the noise in betel leaf [5]. Image segmentation is a process of partitioning the image into multiple segments. The neighboured local minima is divided and segments the fore ground by using the high intensity gradient [9][10]. In affected betel vine image, the HOG feature is extracted. It includes extraction of gradient value, histogram generation and normalization [11]. The minimal distance classifier is used to detect the leaf is affected or not and to detect the type of the disease in betel leaf [12].

II. METHODOLOGY

The collected betel vine leaf is arranged. The image is pre-processed. Image segmentation is process of segment the fore ground of the betel vine leaf. The HOG features is extracted and applied to a classifier for detection of diseases in betel vine. The technical methods carried to differentiate the types of diseases in betel vine leaf. The flow chart describes the proposes work.

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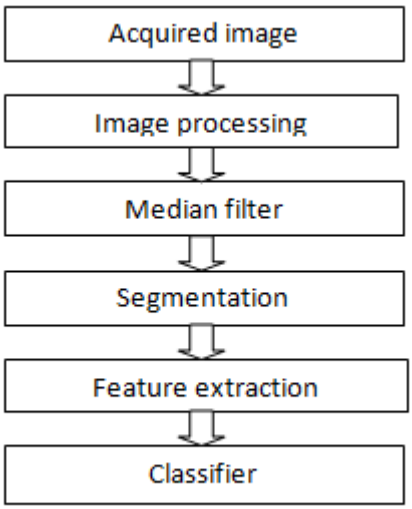

III. ACQUIRED IMAGE

The image of acquired leaf is taken in agricultural farm. The image is taken in resolution 612*612. The images of healthy and diseased leaves are collected for processing. About 150 images of both healthy and diseased betel leaves are collected. Shown in fig 1.


a.


b.

Foot rot Leaf rot


c.

Powdery mildew

Fig-1 Samples of betel leaves

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IV. IMAGE PREPROCESSING

The filtering removes presence of noise and process the image efficiently. It is used to improve the quality of image. The median filter is used to remove noise.

V. MEDIAN FILTER

It is done by sorting all the pixel values from the window into numerical order, and replacing it by middle pixel value. Here the PSNR value is very high and no enhancement is sufficient. It degrades a noise in image and gives noiseless image. Edge detection is efficiently done by median filter.

VI. SEGMENTATION

Segmentation deals with the process of fragmentation the image into homogeneous meaningful parts, regions or sub images. It is first important step in many images processing application like image analysis, image description image visualization and object based image compression. The algorithm used in this is discriminative clustering based segmentation. It is a hybrid technique. It is popular image segmentation technique for gray scale images.

Discriminative clustering gives efficient result. It divides the image region. The processed image is given as input to segmentation. The Edge detection is done by sobel operator [10]. From image the gradient magnitude is calculated. The morphological reconstruction is determine by regional maxima of opening-closing the flow is shown in fig .

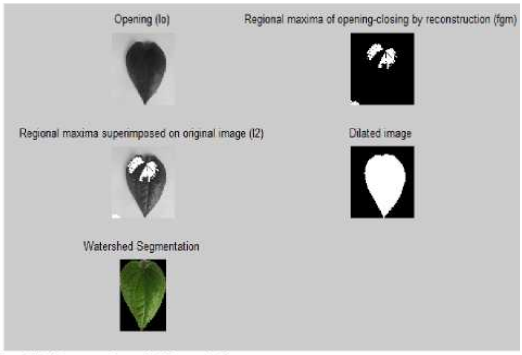

Fig-5 Watershed Algorithm

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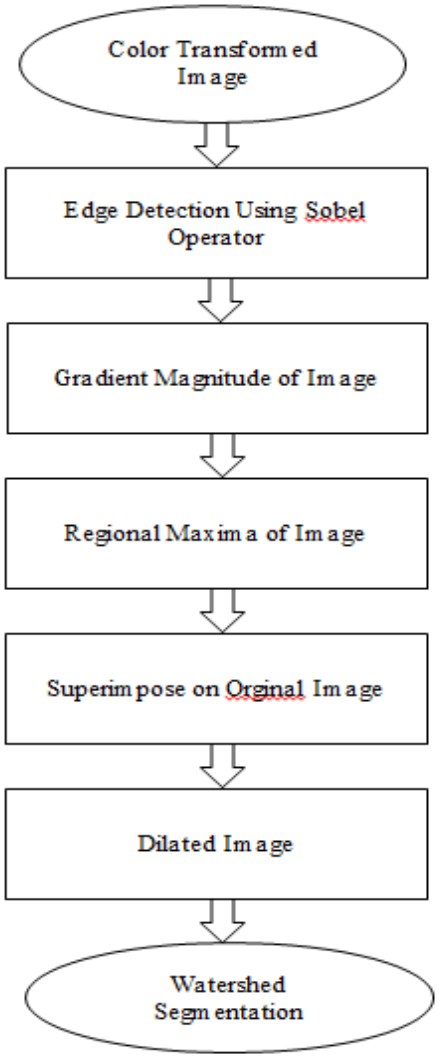

6.1 DISCRIMINATIVE CLUSTERING:

This framework is based on positive definite kernels. Since k dimensional features are all histogram. Consider a joint n*n positive semi definite kernel matrix. K based on the X^2 distance, with entries

$$\boldsymbol{K_{lm}} = \exp\left(-\boldsymbol{\lambda_h}\sum_{d=1}^{k}\frac{\left(x_d^l - x_d^m\right)^2}{x_d^l + x_d^m}\right)$$

Where $\lambda_h > 0$. In the experiments, we use $\lambda_h = 0.1$. Note that we do not use the positions p^j to share information through images in order to be robust to object location. Considering a positive definite kernel such as the one used in Eq. (3.8) is equivalent to mapping each of our n k-dimensional vectors x^j , j=1,…..,n into a high dimensional Hilbert space $\mathcal{F}$through a feature map Φ, so that

$\boldsymbol{K_{ml} = \Phi(x^m)^T\Phi(x^l).}$

Kernel methods then aim at teach a classifier which

$\frac{1}{n}\sum_{j=1}^{n} l\left(y_j, f^T\Phi(x^j) + b\right) + \lambda_k\|f\|^2$(3.9)

In Fig.4. The watershed algorithm is shown in Fig.

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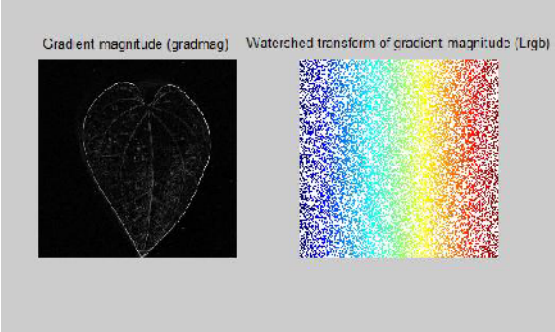

Fig-4 Watershed Transform of Gradient magnitude

Input

segmented output

VII. FEATURE EXTRACTION

The HOG feature is extracted [11]. It is obtained by oriented histograms of edge inter region. These features used for classification and object recognition. The betel leaf is segmented into small cells for gradient calculation. Pixel direction of HOG is calculated by each cell. The block is obtained by calculating a measure of contrast normalization of local histogram and using this value to normalize all the cells within the block for improves the accuracy. By using the gradient values the features of betel vine leaf is obtained. The extraction of HOG features

TABLE- 1 GLCM value of diseased betel leaf

	Fig 1	Fig 2	Fig 3
Auto correlation	**6.365**	**8.365**	**8.462**
contrast	**2.7934**	**3.245**	**3.892**
correlation	**0.1100**	**0.1200**	**0.1224**
energy	**12.15**	**16.15**	**20.15**
entractly	**5.24**	**8.98**	**13.32**

7.1 GRADIENT COMPUTATION:

The extraction of HOG features extraction of betel leaf in first order differential computed by the following equation.

$G_y(ij) = f(i\ j + 1) - f(i, j - 1)$

Where f(i,j) means luminance at (i, j).

By the expression the magnitude m and direction o of computed gradients are computed.

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7.2 HISTOGRAM GENERATION:

The value of m and 0 are obtained and histograms are generated as follows.
*Determine 0(i,j) belongs to which class.
*By determine step 1 class value is increased.
*operation repeated for all gradients belong to the cell.
By means to reduce the effect of aliasing, the neighbouring classes values are increased. The n indicates a class number which 0(i,j) belong to.

7.3 HISTOGRAM NORMALIZATION

The large histogram is obtained by combining all generated histogram. The illumination and contrast are reduced. This project is normalized by
Where vk is vector.

VIII. CONCLUSION

The structured method is to detect the diseases affected in betel vine. It is briefly classified. The diseases foot rot, leaf rot and powdery mildew are detected using image processing. It is used to detect the disease affected or not and which stage is it is as accurate and in short period. In discriminative clustering the fore ground of the leaf is segmented from its back ground as sharply. The GLCM values are obtained by HOG techniques. Here the classifier is not used. In future, the classifier is used.

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