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# DETECTION AND MEASUREMENT OF PADDY LEAF DISEASE SYMPTOMS USING IMAGE PROCESSING

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*Abstract— An application of detecting the plant diseases and providing the necessary suggestions for the disease has been implemented. Hence the proposed objective was implemented on three different types of crops namely Paddy, Sugarcane and Cotton. The diseases specific to these plants were considered for testing of the algorithm. The experimental results indicate the proposed approach can recognize the diseases with a little computational effort. By this method, the plant diseases can be identified at the initial stage itself and the pest control tools can be used to solve pest problems while minimizing risks to people and the environment. In this system, for diagnosing paddy disease of Blast, brown spot and narrow brown spot. It involves several techniques such as image acquisition, image segmentation, preprocessing feature extraction and image classification.*

*Keywords— Blast, image segmentation, narrow brown spot, feature extraction*

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## I. INTRODUCTION

This document is a template. An electronic copy can be downloaded from the conference website. For questions on paper guidelines, please contact the conference publications committee as indicated on the conference website. Information about final paper submission is available from the conference website. Plant disease problems can be classified into two types as, disorder and disease. Plant disorder is in the form of disruption or distraction of the normal states of the plant or parts that are affected by the soil problems, environmental stresses, or other physical effects. In the plant disorders the disease cannot be transferred from an affected plant to the unaffected plant. A plant disease is an occurrence of the change for the worse of the normal functioning of the plant or the part that can be affected by the disease causing agents such as fungi, bacteria, viruses, nematodes. Some of the plant diseases can be act of extending over wider parts of the plant from the affected plant to the unaffected plant.

The techniques that are involved in the identification of the paddy diseases are acquisition of image, preprocessing of image, segmentation of image, feature extraction, classification. Initially, to read the image, the different types of format images like jpeg, jpg, gif, bmp can be used. Performing the several task. In preprocessing, RGB images are converted into gray image using the color conversion. To increase the contrast are used various contrast enhancement techniques like histogram equalization and contrast adjustment. In segmentation, partitions of the image of the distinct regions that each pixel containing the similar attributes are used in the image. Techniques like k-means, FCM, PCA, PSO, and MPSO are processed. Classification is a method for identifying the images. All the classification algorithms are based on the assumption that the image depicts one or more features. There are different types of classification features like SVM, artificial neural network (ANN), fuzzy classification. This feature extraction uses different types of feature values like texture feature, structure feature and geometric feature.

Detection of leaf spot disease using following techniques such as image acquisition, image pre-processing, disease spot segmentation, feature extraction and disease classification were carried out by various workers [3]-[4]. [5] Proposed methodology like K-mean clustering, texture and color analysis for plant disease detection in *Malus domestica*. The authors [2] reviewed various symptoms and diseases of banana leaves. Algorithms were used for the detection of disease. They also explained the importance of pattern classification for disease identification. [6] Made study on the disease severity of leaf using image processing techniques. They used feature extraction such as threshold and triangular threshold methods. Identification of diseased leaf of blast and brown spot of rice using image processing techniques were carried out by [7]. They used zooming algorithm, SOM neural network for disease detection. The authors [8] made investigation on Early scorch, Ashen mould, Late scorch, Cottony mold and Ting whiteness diseases of plants using KMeans clustering, Back propagation algorithm and CCM. [9] Made study on chilly diseases using image processing techniques which involves morphological processing, color clustering, LABVIEW IMAQ Vision. Leaf disease detection of orchid leaf such as Black leaf spot and Sun scorch was carried out by [10]. They applied border segmentation and pattern classification techniques for detection of diseased leaf.

Brown spot caused by fungus *Helminthosporium oryzae*. They are initially small, circular, and dark brown to purple-brown. Fully developed lesions are circular to oval with a light brown to gray center, surrounded by a reddish brown margin caused by the toxin produced by the fungi. Lesions on leaf sheaths are similar to those on the leaves. Infected glumes and panicle branches have dark brown to black oval spots or discoloration on the entire surface. To confirm, check if spots are circular, brownish, and have a gray center surrounded by a reddish margin. Management strategies such as improving soil fertility, apply required fertilizers, use resistant varieties, use fungicides, pre-soak seeds in cold water for eight hours.

## II. RELATED WORK

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### **PAPER [1]: Texture Analysis for Diagnosing Paddy Disease**

The paper proposes the development a diagnosis system to recognize the paddy diseases, which are Blast Disease (BD), Brown-Spot Disease (BSD), and Narrow Brown- Spot Disease (NBSD). This paper concentrates on extracting paddy features through off-line image. The methodology involves converting the

RGB images into a binary image using variable, global and automatic threshold based on Otsu method. A morphological algorithm is used to remove noises by using region filling technique. Then image characteristics consisting of lesion percentage, lesion type, boundary color, spot color, and broken paddy leaf color are extracted from paddy leaf images. Consequently, by employing production rule technique, the paddy diseases are recognized about 87.5 percent of accuracy rates.

A system for diagnosing paddy diseases, including BD, BSD and NBSD mainly based on Matlab application has been developed in this study. The image processing techniques were used to establish the classification system. Five characteristics of lesion percentage, lesion type, boundary color, spot color, and broken paddy leaf color were tested for the classification task. The ratio of height and width of the lesion spot provided a unique shape characteristic for determine type of the lesion.

Three thresholding methods have been applied to get the best result in diagnosing seventy-two images. The best accuracy of three methods that used variable threshold is about 86%. It because the intensity values are different for each images, thus global threshold value and automatic threshold using Otsu method are unable to perform segmentation task accurately.

#### **PAPER [2] Digital image processing techniques for detecting, quantifying and classifying plant diseases**

The wide-ranging variety of applications on the subject of counting objects in digital images makes it difficult for someone to prospect all possible useful ideas present in the literature, which can cause potential solutions for problematic issues to be missed. Disease symptoms can manifest in any part of the plant, only methods that explore visible symptoms in leaves and stems were considered.

This was done for two main reasons: to limit the length of the paper and because methods dealing with roots, seeds and fruits have some peculiarities that would warrant a specific survey. The selected proposals are divided into three classes according to their objective: detection, severity quantification, and classification. Each of those classes, in turn, are subdivided according to the main technical solution used in the algorithm. This paper is expected to be useful to researchers working both on vegetable pathology and pattern recognition, providing a comprehensive and accessible overview of this important field of research.

#### **PAPER[3]:Grading Method of Leaf Spot Disease Based on Image Processing**

A new method is developed based on computer image processing. All influencing factors existed in the process of image segmentation was analyzed and leaf region was segmented by using Otsu method. In the HSI color system, H component was chosen to segment disease spot to reduce the disturbance of illumination changes and the vein. Then disease spot regions were segmented by using Sobel operator to examine disease spot edges. Finally plant diseases are graded by calculating the quotient of disease spot and leaf areas. Researches indicate that this method to grade plant leaf spot diseases is fast and accurate. Therefore, the result is usually subjective and it is impossible to measure the disease extent precisely. Although grid paper method can be used to improve the accuracy, it is seldom used in practice due to cumbersome operation process and time-consuming. Whether the image is segmented correctly or not determines the success or failure of the study. With the use of Otsu leaves are segmented. The white background is more suitable for image segmentation proved by experiments. Because of the variability of lesion symptoms, threshold segmentation is not suitable for use. This paper presents to segment lesion accurately by using Sobel operator to extract lesion edge and operations as region fill, morphology open operation in the H component.

**PAPER [4]: Detection And Measurement of Paddy Leaf Disease Symptoms using Image Processing**

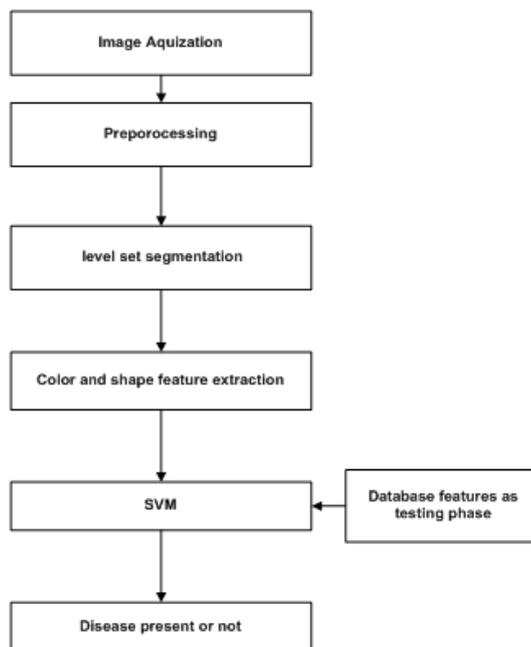
The objective of this paper is to recognize the paddy diseases. Some of the paddy disease is Blast Disease (BD), Brown spot Disease (BPD), Narrow Brown spot disease (NBSD), which stops the growth and protection of the paddy. Disease can infect paddy at different stages of growth and all parts of the plants as the leaf neck and the node. The list of the paddy disease can be caused by bacteria, fungus etc.

Plant disease problems can be classified into two types as, disorder and disease. Plant disorder is in the form of disruption or distraction of the normal states of the plant or parts that are affected by the soil problems, environmental stresses, or other physical effects. In the plant disorders the disease cannot be transferred from an affected plant to the unaffected plant. A plant disease is an occurrence of the change for the worse of the normal functioning of the plant or the part that can be affected by the disease causing agents such as fungi, bacteria, viruses, nematodes. Some of the plant diseases can be act of extending over wider parts of the plant from the affected plant to the unaffected plant. The methodology was designed to remove the noise automatic, error by human and minimizing the time taken to menstruate the affect of paddy leaf disease. And it also increases the accuracy. In this paper it survey, k-means techniques for paddy leaf detection and identification .A system for identifying the paddy diseases like Blast,

Brown spot and Narrow brown spot are detected. It is mainly based on the mat lab application using k-means algorithm. This paper evaluates the techniques in digital image processing for detecting, diagnosing, recognizing of crop leaf diseases k-means clustering algorithm is used for automatically the disease for more accuracy.

**III.METHODOLOGY**

All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified. In this system, for diagnosing paddy disease of Blast, brown spot and narrow brown spot. It involves several techniques such as image acquisition, image segmentation, preprocessing feature extraction and image classification.



**Figure: Proposed Block Diagram**

#### **A. Image acquisition**

The RGB Color images of paddy crop leaf are captured using digital camera, with the pixel size 768\*1024 for the clear image. The digitized images are 225KB size of each image. Those images are cropped into smaller images with the dimensions of 109\*310 pixels. Images are stored in BMP format by using mat lab image processing library.

#### **B. Image preprocessing**

Image preprocessing task involves the image enhancement. dimension of the Paddy leaf image comprising 109\*310 pixels are used. In order to achieve high accuracy, the RGB images are converted into gray scale images. To increase the contrast using various contrast enhancement techniques like histogram equalization, contrast adjustment. Occurrence matrix is generated from the input images according to the probability distribution.

#### **C. Image segmentation**

In image segmentation, the noises of the image that affect the image quality are detected. Level set segmentation applied to remove the noise and unnecessary spots. The binary image with noise is converted into free of noise image. The noise free images are the filtered images. Then the filtered image is converted into enhanced image using level set segmentation which give high quality image for detecting the leaf disease.

#### **D. Feature extraction**

As the paddy leaf disease consists of several types of disease blast, brown spot and narrow brown spot that had different lesion shape and lesion color.

##### Shape feature extraction

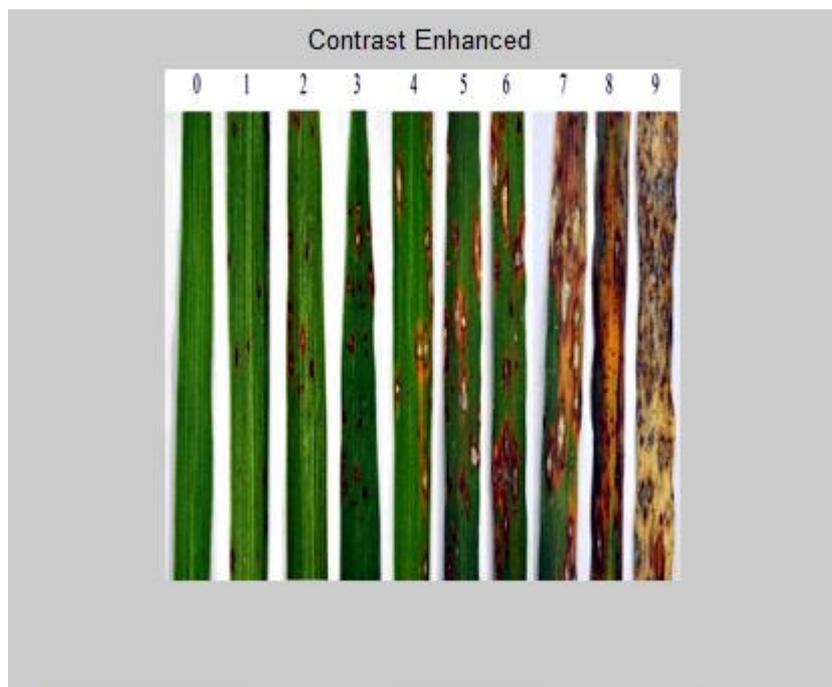
Shape is one of the important parameter of the image. Breadth and length of the image are significant characteristic to describe the shape. A simple approach is to measure the breadth and height of the image is to measure the count of the object pixel.

Color feature extraction Color plays an important role in image processing. Digital image processing produce quantitative color measurement that are useful for the work of inquiring the lesion for early diagnosis. The pixel in the color images are commonly represented in RGB format, where RGB are RED GREEN BLUE values respectively from the color images capturing device.

#### **E. Image classification**

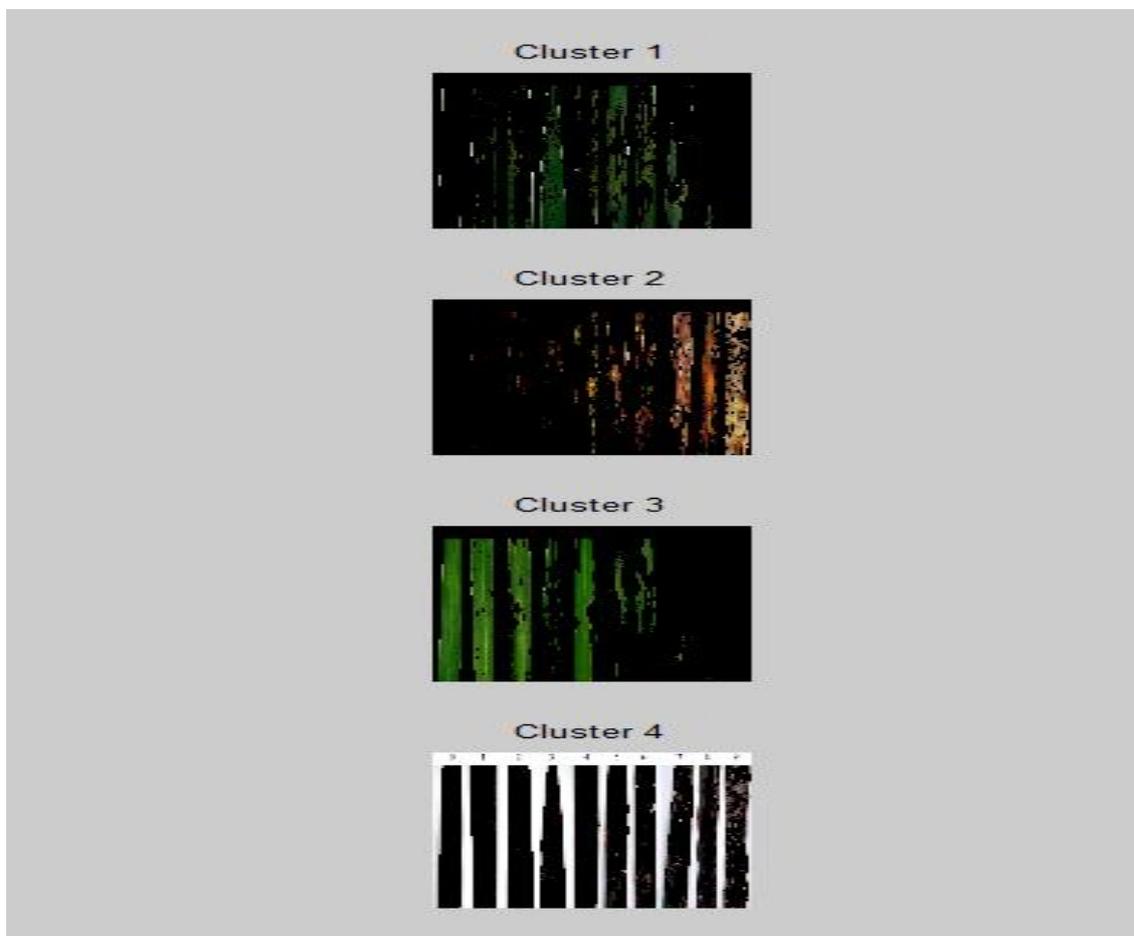
Different types of classification features like SVM, artificial neural network [ANN], fuzzy classification are proceed. Based on lesion type, boundary color, spot color and paddy leaf color, of the leaf paddy disease which is recognized using ANN or fussy logic method. SVM [support vector classification] classification is only classified into two stages as the leaf is defected or not defected. But using ANN and FUZZY classification, It can identify the disease of the paddy plant.

#### IV. RESULTS



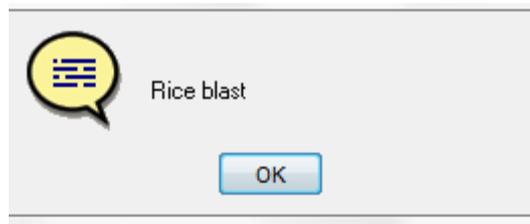
**Figure 7.1 Query Image**

As Shown in Figure 7.1 Input Image Can be selected for leaf disease detection from trained dataset



**Figure 7.2 Segmentation Using KMeans**

Figure 7.2 shows that, segmentation can be done effectively using kmeans segmentation. It divides image into four parts as shown above diagram.



**Figure 7.3 Result**

Finally based on features leaf can be classified among different types of leaf diseases, from selected one it has been clear that it belongs to Rice Blast type.

## V. CONCLUSION

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