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# Detection and Measurement of Paddy Leaf Diseases using SVM Classifier

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**ABSTRACT:**

One of the staple meals consumed worldwide is rice.However, a number of paddy illnesses are a hindrance to rice production. Leaf disease is one of the main ailments that affectpaddy. Due to the lack of access to experts, rice leaf diseases are typically exceedingly time-consuming and arduous for farmers in distant places to discover. Despite the fact that experts are available in various fields, disease identification is currently done using the naked eye, which occasionally results in incorrect recognition. These issues can be reduced with automation. This study provides an automated approach for identifying three prevalent paddy leaf diseases Brown spot, Leaf blast, and bacterial blight this study, an automated approach for the identification of three prevalent paddy leaf diseases Brown spot, Leaf blast, and bacterial blight is provided. Depending on the severity of the diseases, pesticidesand/or fertilizers are also suggested.

The impacted area is separated from the paddy leaf image using K-means clustering. These disorders are classified based on visual content (color, texture, and shape). Support Vector Machine (SVM) classifier can identify the type of paddy leaf disease. Following identification, preventative treatment is recommended to assist individuals and organizations involved in agriculture in combating these diseases.

**KEYWORDS :**

SVM Classifier, K-mean Clustering, Image processing, Disease detection, Rice Leaf Diseases

## I. INTRODUCTION:

Indian is the nation where agriculture provides the greatest amount of financial advantage. To meet consumer demand, farmers culture a variety of crops. In India and throughout the world, rice is a staple food. It is afflicted with several illnesses at different phases of cultivation. Farmer Gathers a wide range of plants based on the inherent conditionof the area and their necessities. For quite a while, farmer faces a number of issues, including catastrophic event, a water deficit, plant diseases, etc.

Research on crop disease detection has been conducted utilizing a variety of machine learning methods, including support vector machines (SVMs) and artificial neural networks, in an effort to alleviate the agony of farmers and increase the precision of the process.The proposed system for order to detect plant diseases entails two stages: image processing and SVM classifier. Image processing involves pre-processing methods like cropping, resizing, fuzzy histogram equalization, and feature extraction. A set of color and texture features is then applied to improve the knowledge base that needs to serve as training data for the support vector machine classifier.

## II. LITERATURE SURVEY:

The "**Paddy Disease Detection System Using Image Processing**" project, which is currently in development, is briefly reviewed, explained, and discussed in this chapter. There are three sections in this chapter. The overview of Paddy is discussed in the first section. The definition, paddy disease type, paddy symptoms, and paddy management are the subsections. The second section examines various earlier systems that applied similar strategies and tactics. The third portion covers an examination of the system's technique and methodology.

An overview of approaches for detecting, measuring, and classifying plant diseases from digital photographs in the

visible spectrum is presented by **"Arnalbarbedo& Jayme Garcia".** Although disease symptoms might appear anywhere on a plant, only approaches that focus on the outwardly evident symptoms in leaves and stems were taken into consideration. There were two main motives for doing this: To keep the paper's length to a minimum and also because methods for working with roots, seeds, and fruits have certain unique characteristics that'd call for a focused survey.

Detection, severity measurement, and categorization are the three categories into which the chosen suggestions are separated. **"Shenweizheng&wcyachun"**, since the current grading of plant diseases is mainly based on eyeballing, a new method is developed based on computer image processing. All influencing factors that existed in the process of image segmentation were analyzed and the leaf region was segmented by using the Otsu method. In the HSI color system, the H component was chosen to segment disease spots to reduce the disturbance of illumination changes and the vein. Then, disease spot regions were segmented by using the Sobel operator to examine disease spot edges. Finally, plant diseases are graded by calculating the quotient of disease spots and leaf areas. Researches indicate that this method to grade plant leaf spot diseases is fast and accurate.

## III. PROPOSED SYSTEM:

The proposed system is developed with seven phases which include input leaf images, per-processing, image segmentation, diseases detection, feature extraction, feature selection, and classification

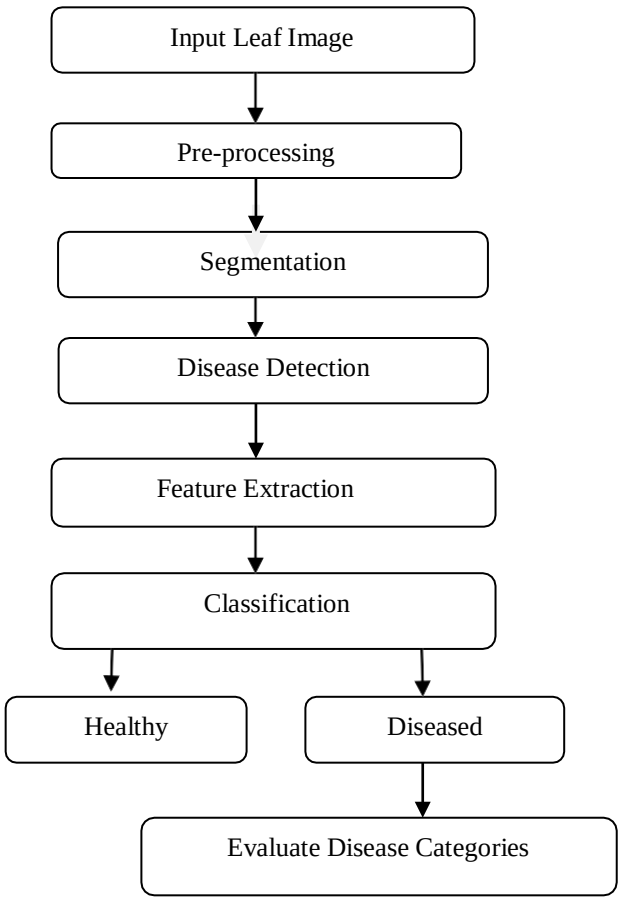



**Fig 1:** Flowchart of SVM System The dataset is developed once the paddy leaf photos are collection fro, the agricultural field. At the pre-processing stage, the image dimensions are decreased and the background is eliminated. The next phase is image segmentation, where the normal portion and the sick region are separated using the K-mean clustering algorithm. The DNN JOA technique is then utilized to classify illnesses. After conducting the classification, feedback is delivered to the segmentation phase if the classification method is unsatisfactory in order to pinpoint the stability of the established approach

A supervised learning approach termed a support vector machine (SVM) is utilized for a variety of classification and regression issues, including signal processing in medical applications, natural language processing, speech, and picture recognition, and signal processing in signal processing.

## IV. METHODOLOGY AND ALGORITMS:

**Implementation of SVM Algorithm:**

This method is used to identify blasts, brown spots, and narrow brown spots in leaves. It involves techniques such as image acquisition, image segmentation, pre-processing, feature extraction and image classification.

**Step 1: Image Acquisition**

Every vision system's first stage is image acquisition. Using several mobile cameras with various resolutions, sample photos of the leaves are taken or gathered, which are then utilized to train the processing system. These test photos are kept in a common format. Using digital cameras or cell phones with pixel sizes of 768*1024 for crisp photos, RGB Color photographs of the leaf are recorded. Each of the digitized photos is 225 KB in size. These pictures have been reduced in size to 109*310 pixel pictures. The mat lab image processing library is used to save images in BMP format.

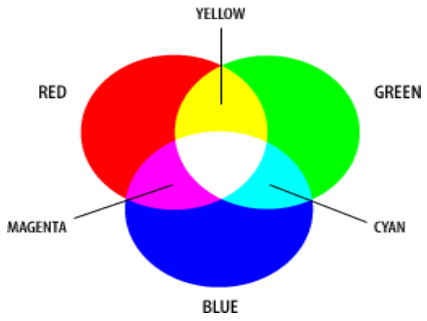



**Fig 2:** RBG Color

**Step 2: Image Pre-processing:**

Image enhancement is a part of the picture pre-processing process. The utilized leaf picture has a size of 109*310 pixels. The RGB photos are converted into grey-scale scale images to ensure great accuracy. Using techniques like histogram equalization and contrast modification, one may boost contrast. From the input photos, an occurrence matrix is created using the probability distribution

**Step 3: Image Segmentation:**

T he primary objective of segmentation is to obtain

relevant and practical information about a specific feature from the image. In the current study, a picture is segmented according to category using a histogram-based technique and thresholding. An image's pixels are all combined to create a histogram at this step, which may be used to measure either color or intensity. Such as finding the pixel location's most- frequent color the histogram may also be used to analyze each individual pixel so that the information obtained is put to use. With this method, binary frames may be generated from a grayscale image using thresholding.

**Step 4: Feature Extraction:**

Feature extraction is the process of removing the pertinent data from the input picture. Feature extraction is the process of converting the input data into a collection of feature data. Images of leaves can have a variety of properties, including color, texture, form, and edges. To obtain good outcomes and accuracy, the texture and color properties ofleaves in context are retrieved. GLCM Features Use Techniques for image analysis is used to extract the picture's contrast, correlation, and homogeneity.

**Step 5: Classification of Rice plant disease**

The categorization method is applied to both the testing and training processes. The system's last phase is this. Comparative analysis is done between the characteristics retrieved from training and testing leaves. Following that, the photos are categorized using the matching characteristics. Hence, to classify leaf illness, the Support Vector Machine approach is applied. SVM is a hyper plane-based binary classifier. This hyper plane is a line that splits a plane into two sections, with one class on either side. The goal training vectoris present in one class, which is labeled as „+1“, and thetraining vector is present in the other class, which is labeled as „-1“. SVM finds a hyper plane using this labeled training vector that then optimizes the margin of separation.

**Step 6: Identification of Rice Disease:**

By using multi-class SVM and K-means clustering, illnesses on rice leaves may be identified. Using an SVM classifier, the illness is classified, and PSO data optimizationis used to increase the detection accuracy.

## Architecture of SVM Algorithm:

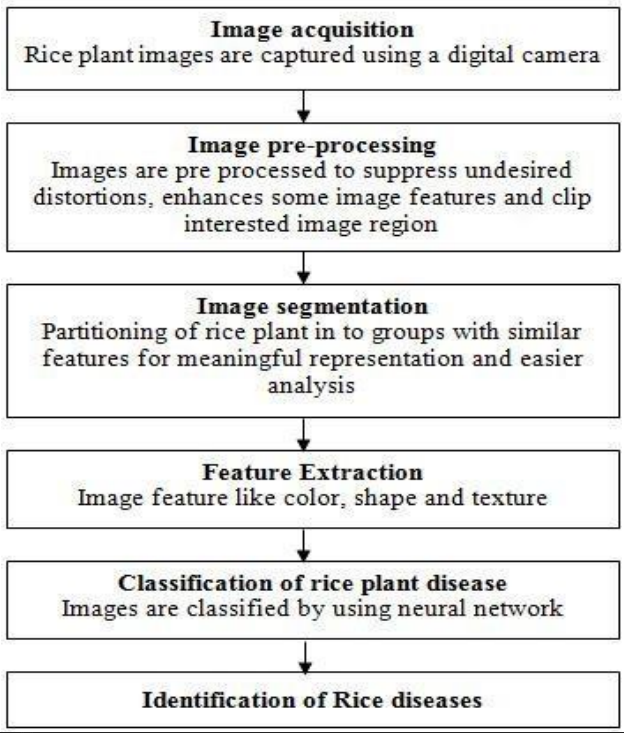



**Fig 3:** Architecture of SVM System

The architecture of Detection and Measurement of Paddy Leaf Diseases illustrates how algorithms are used to analyze images and provide users with correct results.

The project's step-by-step procedure is illustrated below:

**Step 1**: After setting up the necessary thing in MATLAB, need to run the code, which we name as main_gui.m

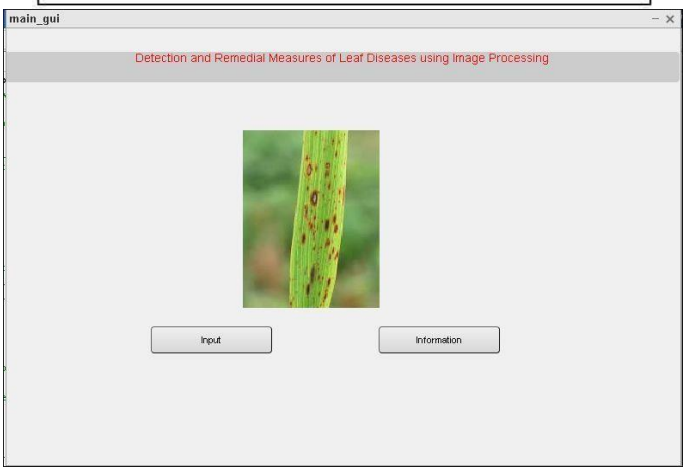
**Step 2:** Once code is executed a console main_gui.fig get pop up on the screen which contains two buttons-Input button and the Information button.

**Step 3**: Choose the user-uploaded image and the paddy leaf image.

**Step 4:** Then the selected image gets displayed on the console.

**Step 5:** Now if we click the information button, it gives information like whether the leaf image is healthy or diseased.

**Step 6:** If healthy it displays as healthy. So, we need not process on it.




**Step 7:** If it is diseased, it displays the disease name, its symptoms and remedies needed to cure it.

Apart from these if we run the code named main.m we can know the internal image processing operation on the input image.

Fig 4 : Leaf image uploaded

## V. EXPERIMENTAL RESULTS:

The project display shown in the above figure requires us to submit a photo of a plant leaf to determine whether it has a disease by clicking the button to load an image from oursystem. Following image upload, the result indicates whether the leaf image has illnesses or not. The first step in processing an image includes pre-processing, scaling, and color extraction.

The SVM receives the picture after image processing. This image was segmented by SVM using the same characteristics, colors, and shapes as the image region that was altered. The image in the enhanced contrast box is clearer than the actual image. In which we may observe the impacted leaf picture region. The following segment of the image depicts a black and white image with white spots denoting diseased leaf damage and black areas denoting healthy leaf tissue.

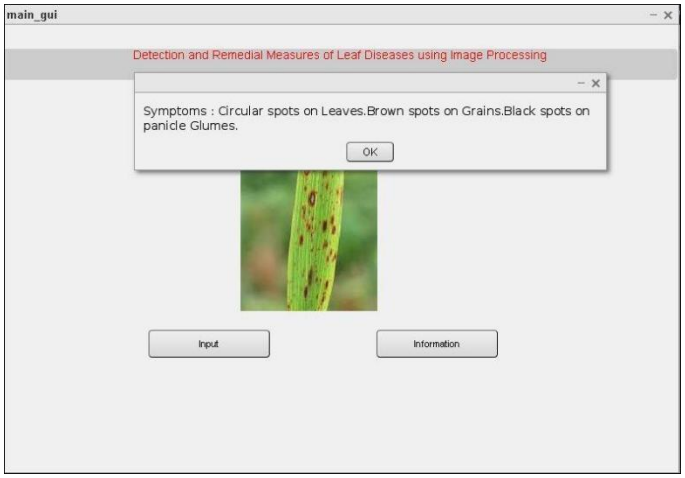



Fig 5 Disease of uploaded image

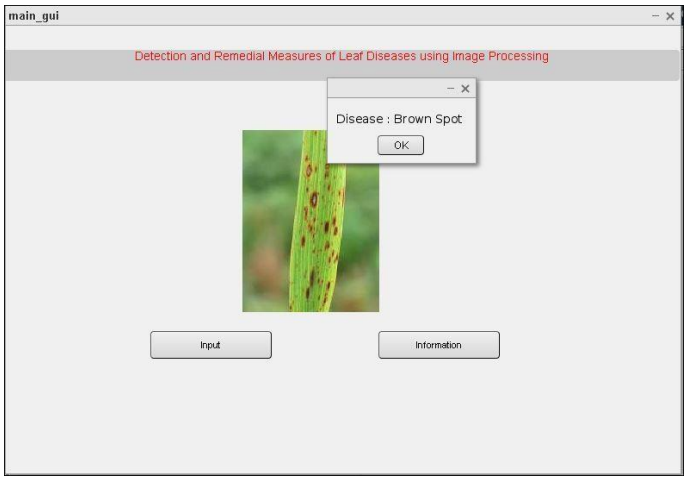



Fig 6 :Remedies of uploaded image

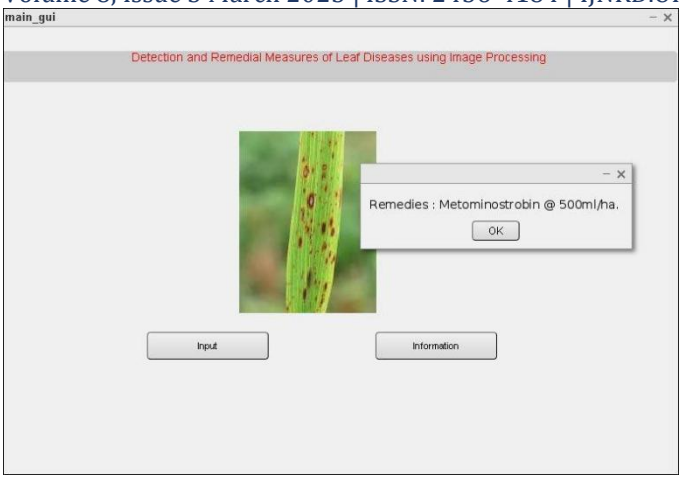



Fig 7 : Symptoms of uploaded image

## VI. CONCLUSION:

In this research, we have put forward a fresh histogram-based idea for spotting damaged leaves. We can determine the difference in intensity between the original leaf and the diseased leaf from the histogram. There is a method for detecting diseases like Blast, Brown spot, and Narrow brown spot. It mostly uses the k-means algorithm from the mat lab programmed. This study assesses digital image processing methods for identifying crop leaf diseases and diagnosing them. For greater accuracy, the k-means clustering technique is employed to automatically detect the disease. As more image samples are generated in accordance, there is more opportunity to spot different simulation mistakes. The key finding of the suggested technique points to a reliable and organized strategy for more precisely determining disease intensity by plant pathology. The preliminary test's findings indicate that disease extraction will produce superior results.

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