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# Crop Disease Detection System

**Aman Jaiswal[1], Riju Jindal[2], Anuja gupta[3], Ayush Kumar Verma[4]**

*[1,4]B.tech, Dept. of ECE, Raj Kumar Goel Institute of Technology, Ghaziabad, Uttar Pradesh, India*
*[2]Asst. Professor, Dept. of ECE, Raj Kumar Goel Institute of Technology, Ghaziabad, Uttar Pradesh, India*
*[3]Asst. Professor, Dept. of ECE, Hi tech Institute of Engineering and Technology, Ghaziabad, Uttar Pradesh, India*

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**Abstract-** *To spot the plant diseases at an untimely phase is not yet explored. The main problem is to decrease the usage of pesticides in the agricultural field and to increase the quality and quantity of the production rate. Our project is used to explore the leaf disease prediction at an appropriate time to take action. We used an enhanced k-mean clustering algorithm to predict the infected area of the leaves. A color-based segmentation model is used to segment the infected region and placing it into its relevant classes. Experimental analyses were done on sample images in terms of your time complexity and therefore the area of infected region. Plant diseases can be detected by using an image processing technique. Disease detection involves numerous steps like image acquisition, image pre-processing, image segmentation, feature extraction, and classification. Our project is employed to detect the plant diseases and supply solutions to get over the disease. It shows the affected a part of the leaf in percentage. We planned to design our project with a graphical user interface (GUI) and voice navigation system, so a person with lesser expertise in software should also be able to use it easily.*

***Key Words***: **Image processing, k-mean clustering algorithm, Disease Detection, Support Vector Machine (SVM), MATLAB, Image Segmentation, Data Mining, Feature extraction.**

## 1. INTRODUCTION

India is eminent for Agriculture meaning most of the people are engaged in the agriculture industry. The agriculture industry act as a big role within the economic sectors. Due to the exponential inclination of the population, the climatic conditions also cause plant disease. The management of perpetual leaf requires a close monitoring system especially for the diseases that affect production and post-harvest life. The knowledge of image processing with data mining technologies helps us in following purposes:

(i) Recognizing infected leaf and stem
(ii) Measure the affected area
(iii) Finding the shape of the infected region
(iv) Determine the color of infected region
(v) And also influence the size and shape of the leaf.

The user is to select a particular diseased region in a leaf and the cropped image is sent for processing the plant diseases, at an untimely phase using the Multi SVM algorithm.
Specifically, we concentrate on predicting the disease such as – Alternaria alternate, Anthracnose, Cercospora, bacterial blight, and leaf spot. It would be useful for identifying different diseases on crops. It provides various methods used to study crop 2 diseases/traits using image processing and data mining. Also, the infected area and affected percentage is additionally measured. Back Propagation concept is employed for weight adjustment of coaching database. Crop cultivation plays an essential role in the agricultural field. Presently, the loss of food is especially thanks to infected crops, which reflexively reduces the assembly rate. To identify the plant diseases at an untimely phase isn't yet explored. The main challenge is to reduce the usage of pesticides in the agricultural field and to increase the quality and quantity of the production rate. Our project is used to explore the leaf disease prediction at an untimely action. We used an enhanced k-mean clustering algorithm to predict the infected area of the leaves. A color-based segmentation model is used to segment the infected region, and placing it into its relevant classes. Experimental analyses were done on sample images in terms of your time complexity and therefore the area of infected region. Plant diseases are often detected by image processing techniques.

## 2. PROPOSED SYSTEM

Our project is to detect the plant diseases and provide the solutions to recover from the leaf diseases. We planned to design our project with a voice navigation system so that a person with lesser expertise in software should also be able to use it easily. In our proposed system we are providing an answer to get over the leaf diseases and also show the affected a part of the leaf by image processing technique. The existing system can only identify the sort of diseases which affect the leaf. We will provide a result within a small amount of time and guide you throughout the project. We briefly explain the experimental analysis of our methodology. Samples of images are collected that comprised of different plant diseases like Alternaria Alternata, Anthracnose, Bacterial Blight, Cercospora leaf spot, and Healthy Leaves. Different number of images is collected for every disease that was classified into database images and input images. The primary attributes of the image rely upon the form and texture oriented features.

### 2.1 PLANT DISEASES - FUNDAMENTALS

In the field of crop production, plant disease is an important factor that degrades the eminence and quantity of the plants. The common approach applied in plant diseases is the classification and detection model.

### 2.1.1 BACTERIAL DISEASES

A bacterial disease is usually referred to as the "Bacterial leaf spot". It starts as the small, yellow-green lesions on young leaves which usually seen as deformed and twisted, or as dark, watersoaked, greasy - appearing lesions on older foliage. Bacterial blight is caused by Xanthomonas. It causes wilting of seedlings and yellowing and drying of leaves.

### 2.1.2 VIRAL DISEASES

The most common symptoms of virus-infected plants frequently appear on the leaves, but some viruses may cause on the leaves, fruits, and roots. Viral disease is very difficult to analyze. Leaves are seen as wrinkled, curled, and growth may be undersized due to the virus. It give rise to leaf discoloration, stunted growth, reduced tiller numbers, and sterile or partly filled grains. Tungro infects Oryza sativa, some wild rice relatives, and other grassy weeds commonly found in rice paddies.

### 2.1.3 FUNGAL DISEASES

Fungal disease can affect the Contaminated seed, soil, yield, weeds, and spread by wind and water. In the introductory organize it shows up on lower or more seasoned clears out as water-soaked, gray-green spots. Afterward these spots are obscure and at that time white fungal development spread on the undersides. In wool buildup yellow to white streak on the upper surfaces of more seasoned clears out happens. It spreads outward on the leaf surface causing it to show yellow. Sheath blight could be a fungal disease caused by Rhizoctonia solani. Symptoms are usually observed from tillering to exploit stage during a rice crop. It occurs throughout the rice-growing areas in temperate, subtropical, and tropical countries.

## 3. PROPOSED METHODOLOGY

In this section, we explain the plant disease prediction using the k-mean clustering algorithm. This project includes several steps Image Acquisition, Image Pre- Processing, Feature Extraction. It works as follows:

(i) Image Acquisition
(ii) Image Pre-processing
(iii) Image segmentation
(iv) Feature extraction

### 3.1 IMAGE ACQUISITION

The initial process is to gather the info from the general public repository. It takes the image as input for further processing. We have taken the most popular image domains so that we can take any formats like .bmp, .jpg, .gif as input to our process.

### 3.1 IMAGE PRE-PROCESSING

As the images are acquired from the actual field it's going to contain dust, spores, and water spots as noise. The purpose of data pre-processing is to eliminate the noise in the image, to adjust the pixel values. It enhances the quality of the image.

### 3.2 IMAGE SEGMENTATION

Image segmentation is the third step in our proposed method. The segmented images are clustered into different forms using the Otsu classifier and k-mean clustering algorithm. Before clustering the pictures, the RGB color model is transformed into the Lab color model. The advent of Lab color model is to simply cluster the segmented images.

### 3.4 ALGORITHM

The algorithms that work on feature extraction are as:

(i) Linear SVM
(ii) Non-Linear SVM
(iii) Multiclass SVM

### 3.4.1 LINEAR SVM

Linear SVM is a maximum margin hyperplane and margins for an SVM trained with samples from two classes.

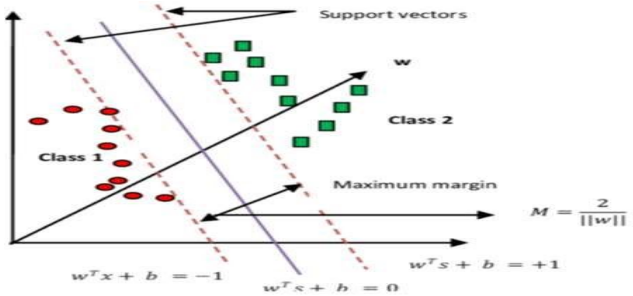


**Figure -1:** Hyperplanes in Linear SVM

### 3.4.1 NON-LINEAR SVM

This allows the algorithm to suit the utmost margin hyperplane during a transformed feature space.

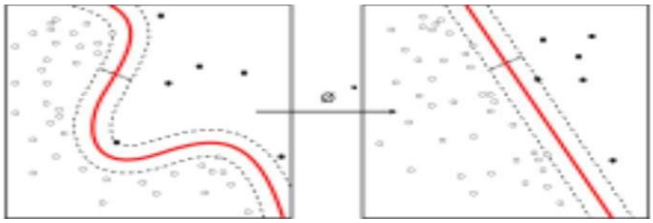

**Figure -2:** Kernel machines used in Nonlinear SVM for comparison

### 3.4.3 Multiclass SVM

Multiclass SVM aims to labels give to instances by using support vector machines, where the labels are drawn from a finite set of several elements. In machine learning, support vector machines are supervised learning models with associated learning algorithms that analyze data and recognize patterns, used for classification and multivariate analysis.

## 4. SYSTEM ARCHITECTURE

The initial process is to select the image. By using the image preprocessing technique, the leaf has got to be diagnosed whether it had been affected or unaffected. Then the image has to be segmented and the name of the disease is to be identified. These provide a solution to overcome the leaf diseases and it also analyzes the overall percentage of the affected leaf and its surrounding region. We have taken the most popular image domains so that we can take any formats like .bmp, .jpg, .gif as input to our process. It enhances the quality of the image. Before clustering the pictures, the RGB color model is transformed into the Lab color model. The advent of Lab color model is to simply cluster the segmented images. Similarly, the feel oriented feature extraction like contrast, correlation, energy, homogeneity and mean. Leaf image is captured and processed to determine the health of each plant.

## 5. RESULTS

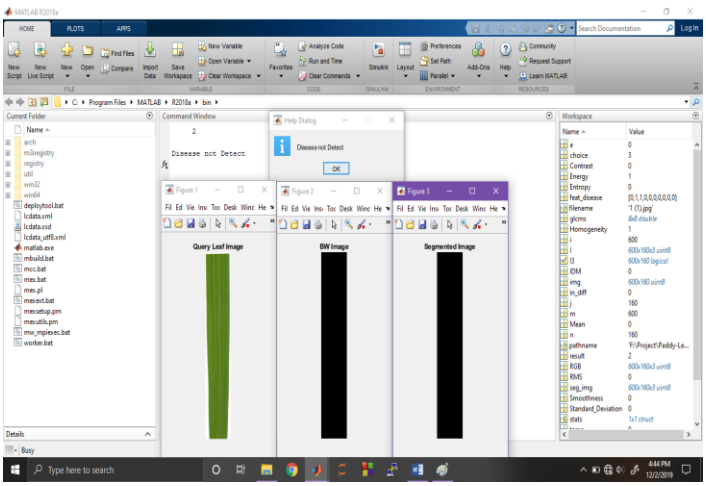


**Figure -3:** Healthy wheat crop result

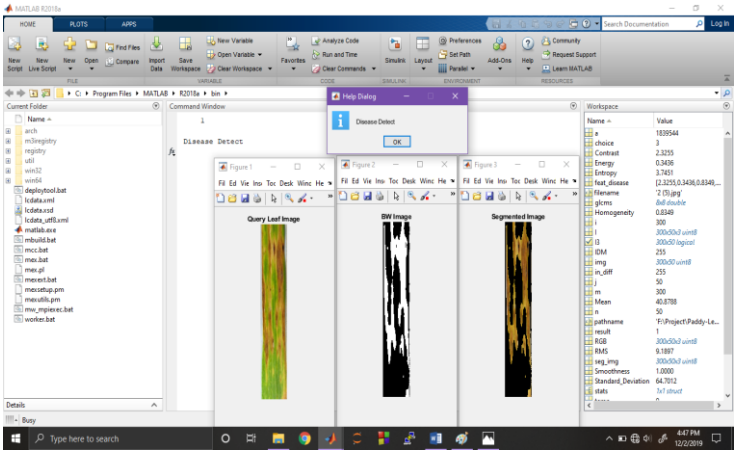


**Figure -4:** Unhealthy wheat crop result

## 6. CONCLUSION

Data mining technologies have been incorporated in the agriculture industry. This project implements an innovative approach to identify the affected crops and provide remedial measures to the agricultural industry. By the utilization of the k-mean clustering algorithm, the infected region of the leaf is segmented and analyzed. The images are given as input to our application for the identification of diseases. It provides an honest choice for the agriculture community particularly in remote villages. It acts as an efficient system in terms of reducing clustering time and therefore the area of infected region. Feature extraction technique helps to identify the infected crop part and also to classify the plant diseases. The embedded voice navigation system helps to guide us throughout the method. As a future enhancement of this project is to develop the open multimedia (Audio/Video) about the diseases and their solution automatically once the disease is identified.

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