A Study on Crop Disease Detection of Banana Plant using Python and Machine Learning

Satyamedha Hosur, Praveen Banasode, Minal Patil

Abstract*— Crop or leaf disease detection using Python and Machine learning application is designed by using image processing technique for the purpose of farmers to identify, analyze and classify automatically through the computer vision and machine learning vision system for mainly banana leaf to find diseases and by plotting the graph for their pixel range of the affected areas. Leaf diseases are restricting the growth of the plants and it is also destroying the crop. Disease can be controlled by knowing which disease is destroying the plant. The symptom of the banana diseases will be noticed in the leaf, by change in color to yellowish and turning to a dark color and this can be observed between the fourth and fifth month of the plant. Causing reduction in the growth of the plant as well as rotting of the banana. The support vector machine (SVM) algorithm is used for extraction of color and texture features. The proposed work attains a high accuracy in identification of diseases and thereby controlling the spread in other plants.

Keyword: Banana Plant Disease, Banana, leaves, Machine Learning, Support Vector Machine (SVM).

I. INTRODUCTION

As we all already know India is an Agriculture country and farmers are the backbone of the India. Most of the farmers face losses in crops for the leaf diseases, and the actual objective of doing this application is discovering leaf diseases by using the python and machine learning.

Leaf disease is the invention of the leaf tissues and the disease may cause through some agents such as bacteria, fungus and virus etc. and it's also happens for the degradation of leafs and also the plant. Leaf diseases are categorized by the dots and spots and black circles on it, and drought and variations of the colors on it.

Leaf illness or infection is happening for the purpose of changes in the condition of the environment such as heavy rain plunge, and temperature changes through the season and the improper maintenance and also for the some of the insects and pesticides. When the organisms are entered in the leaf tissue, those organisms are bacteria, fungus and the viruses

Shape and functions of the plants how it responses through the pathogen is of two diseases those are Bacterial wilt and another one is the black sigatoka. And another important feature is when the leaf is not affected any of the above symptoms it will not give any diseases name or else the above all symptoms are match to the selected portion of leaf it will show the suitable disease names.

II. PROPOSED SYSTEM

By using the proposed system in the image processing and also for the necessary algorithms, it will help for easily developing the applications.

- Easy to identify the appropriate disease name.
- It will reduce the time consumption.
- Saves the amount of experimental devices.
- Classifying leafs into healthy or having the diseases.
- Gives the results in the form of graphical representation like histogram by using the ranges of the pixels in the image.

The proposed work is the easy way of accessing the required results or what the user wants and gives exact disease name by taking different types of the images which will be first displayed in the browser after selecting image it goes for the extracting the features of the affected disease leaf, by using the dataset after extracting it is converted to RGB to the gray scale image by using the Gaussian blur algorithm, the affected area of the leaf is cropped after this will shows the graphical representation of the histograms whether the usage of the pixels the graph is to be drawn for the x and y axis after done all this the exact disease name will be displayed on the interface.

III. METHODOLOGY

Based on the symptoms of the leaf and it is the process of using various concepts. First we want to do the extraction of the features, and image processing for the identifying the diseases easily.

a) *Image Acquisition*: is by selecting picture, select the leaf image and upload it on browser, from the agricultural field. Care has to be taken; the image background should be in the white color and in the RGB form.

b) *Image preprocessing*: after capturing the leaf diseases image. Image must be in RGB format but in the pre-processing stage the RGB image will be converted to blur image by using the machine learning algorithm that is by Gaussians blur algorithm, by using this RGB is converted to filtering as a blur image and it will increase contrast of the image.

c) *Image segmentation*: by completing the image pre-processing unit it will be applied with the HIS (Hue, Saturation, Intercity) method. It is for partitioning the image into various parts of the similar features.

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d) *Feature extraction*: it is one of the important parts of our work. After Image segmentation step it can be extracted from the exactly disease affected area. By using the symptoms of the Color, texture, shape, edges and morphology of the leaf. One of the features that is called color it is extracted by the histogram for using the pixel's rate of the selected image.

e) *Classification and leaf disease detection*: after completing all the above steps classification methods used as purpose of preparation the validating set of data. This step will support for the SVM (Support Vector Machine), k-nearest neighbor, Decision tree algorithm these are used to classifying and detecting the affected leaf diseases.

The following figure helps in resolving the effects of communicating with the datasets; it shows about the extracting the features and also detecting the disease.

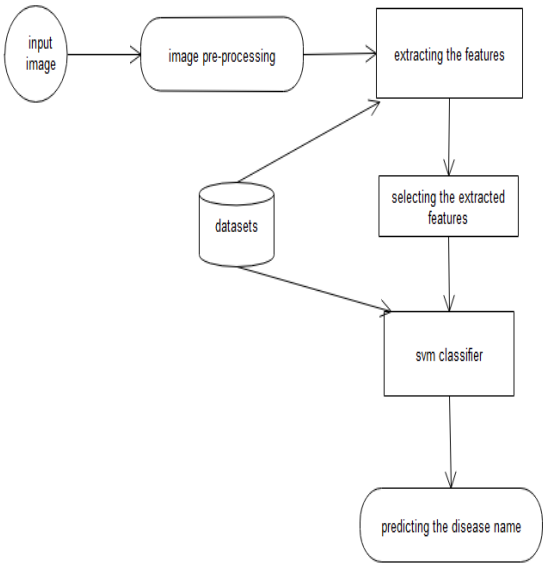

Fig. 1: Block diagram of leaf disease detection.

- The user must be able to browse the image through the provided user interface.
- The system should display the correct images after selecting by the user.
- The image should be properly converted from RGB to grey scale.
- The System must plot the histogram using the pixels of the image.
- The system should display the affected area of the crop accurately.

The result must be displayed on the User interface.

The following diagram shows the how to detect the diseases by using the image processing technique.

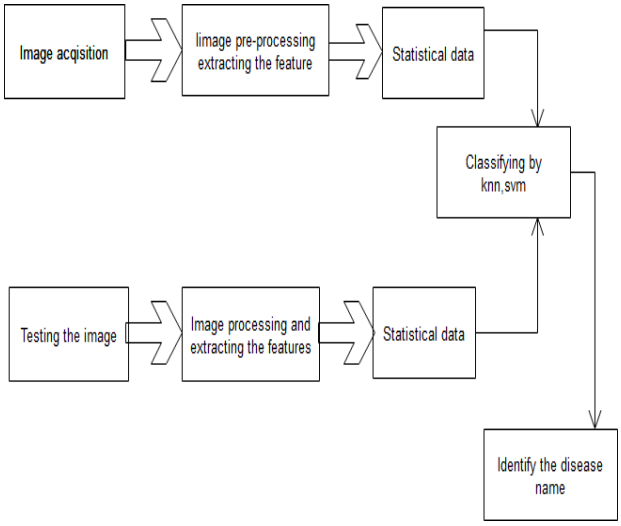

Fig 2: Image procession technique.

IV. EXPERIMENTAL RESULTS

The detection of defects on banana leaves around 250 samples collected, according to the color of the leaves can identify the defects. And also we can see here with what accuracy image is processed based on many factors. First we collected good leaves with different colored leaves then torn leaves; with these differences in leaves we can check accuracy of our system.

Table 2: Result and accuracy detection

Sl.No	Number of Leaves Collected	Defected Leaves	Accuracy SVM %	Error %
1	230	220	98.4	4
2	200	185	96.0	9
3	180	160	93.5	11
4	155	129	91.6	14
5	125	98	90.2	17

a. Experiment -1

Some sample images are taken for image processing and detecting the defects in the leaf. A proposed system achieves an accuracy more than 96%. Different types of leaves are collected like healthy, abnormal, torn, white spots, black spots and we come across some eggs on banana leaves during random collection of leaves.

Fig 3: Original image

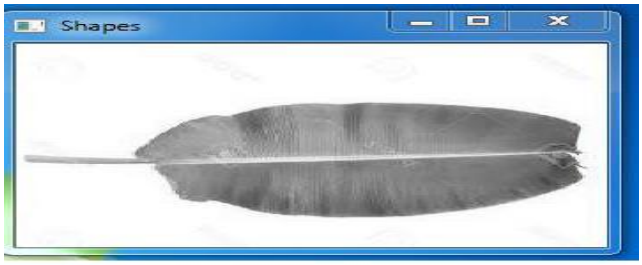

Fig 4: Converting the affected image to the blur image by Using Gaussian blur algorithm.

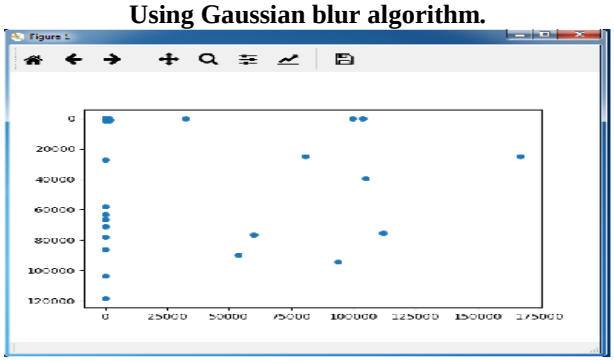

Fig 5: Histogram, the range of the pixels in affected areas.

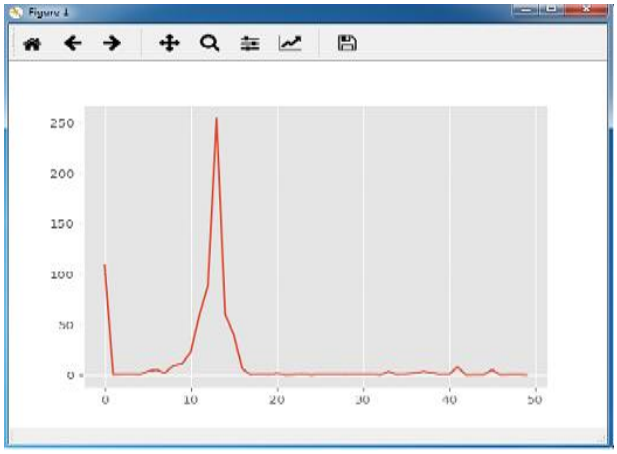

Fig 6: Histogram for fetching the range of pixels.

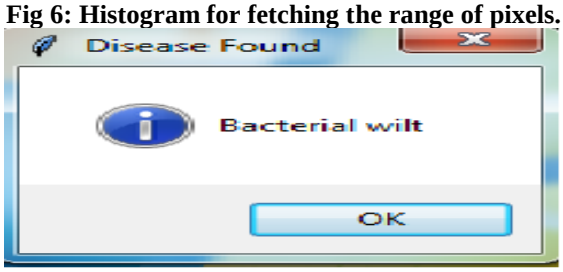

Fig. 7: Extracting the feature gives the exact result.

b. Experiment -2

This experiment was carried out with more than 70 black colored leaves and some yellow spots to determine the disease. The affected area will be drawn with histogram and we found frequency of occurrences for leaves resulted in disease.

Fig. 8: Affected leaf

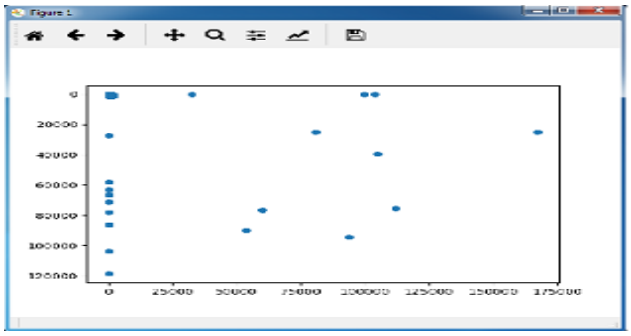

Fig. 9: By using the affected image draw the histogram.

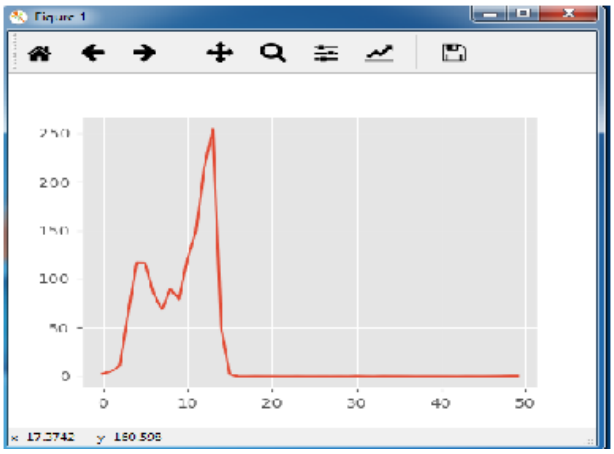

Fig. 10: Affected area is shown with Histogram.

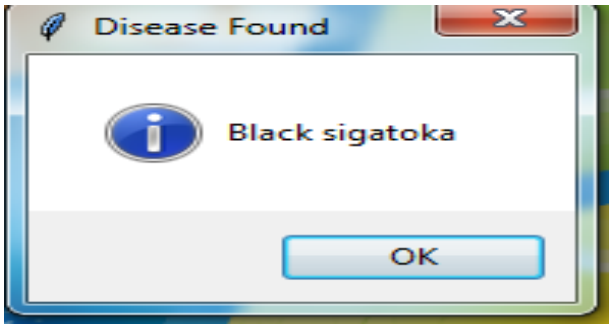

Fig. 11: Result - disease name.

Work shows the exact representation of execution of the application

- The image taken for extracting the feature.
- After extraction conversion of image to gray scales.
- By using the Gaussian blur, the image can be blurred.
- Crop the selecting image where it is exactly affected disease.

- Result shows the exact diseases name.

In order to find the disease name and reducing the risks, time, of the development and costs, performed the following test.

Table 3: In the below table shows the test cases in leaf disease detection in the first column shows about the functions and second column gives rice the results of the test cases.

Name of the function	Test Results
Uploading the image	Testing the uploaded image of the different sizes and different pixels' ranges.
Detecting the disease	Tested for the banana leaf with the white background detecting the exact disease.
Getting the disease name	Testing and matching to the features where it matches and displays the result successfully.

Table 4: The following table will gives the testing results.

Functions of the testing	Input	Results
chooses infected area	accessing the stored image	Any other different images are selected can be uploaded.
Displays the disease name	Select appropriate affected leaf.	Affected disease name can be displayed.

V. CONCLUSION

This Paper describes disease detection in banana plant using python and machine learning application. The SVM concept is implemented for detecting the disease with accuracy. The accuracy is 98%, this will help in various problems faced by the agriculturist.

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