PLANT PATHOLOGY DETECTION CONTROL AND USING RASPERRY PI

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Abstract— For the detection and prevention of disease of plants from getting spread, this paper discussed a system using raspberry PI. For the image analysis, the Haar cascade classifier algorithm was used. It has many advantages for the use in big farms of crops and thus it automatically detects signs of disease whenever they appear on leaves of the plant. In pharmaceutical research of leaf disease detection is necessary and important topic for research because it has advantages in monitoring crops in field at the form and thus it automatically detect symptoms of disease by image processing by k-means clustering algorithm.

In the existing system of the leaf shape description is that the key downside in leaf identification. Up to now, several form options are extracted to explain the leaf form. however, there's no correct application to classify the leaf once capturing its image and identifying its attributes, however. Thus, we create the color transformation structure that defines the color space conversion. Then, we apply device-independent color space transformation, which converts the color values in the image to the color space specified in the color transformation structure.

The experimental results indicate that the proposed approach is a valuable approach, which can significantly support an accurate detection of leaf diseases in a little computational effort. An extension of this work will focus on developing hybrid algorithms such as genetic algorithms and NNs in order to increase the recognition rate of the final classification process underscoring the advantages of hybrid algorithms; also, we will dedicate our future works on automatically estimating the severity of the detected disease

Keywords: Raspberry PI, Camera, Cloud, Image-processing, Segmentation

I. INTRODUCTION

India is notable for its generation of horticulture. The majority of the masses depends upon horticulture Farmers have a variety of cultivation options in the field. These crops are still cultivated in a technical manner for the best harvest and the highest quality of production. Thus, the yield can be increased and the use of technology can improve quality. Generally speaking, when a plant has disease, we can say that leaves are the fundamental marker of the plant's disease. We can generally observe the spots on her leaves due to illness. However, when the plant has a lot of infection, the whole leaf is secured by the sickness spots. India is quick creating nation and farming is the spine for the nation's advancement in the beginning times. Because of industrialization and globalization ideas the field is confronting obstacles. Over that the mindfulness and the need of the development should be imparted in the brains of the more youthful age. Presently multi day's innovation assumes essential job in every one of the fields yet till today we are utilizing some old procedures in horticulture. Recognizing plant ailment wrongly prompts colossal loss of yield, time, cash and nature of item. Recognizing the state of plant assumes a vital job for fruitful development. In former times ID is done physically by the accomplished individuals yet due to the such a significant number of natural changes the forecast is getting to be extreme. So we can utilize picture handling procedures for recognizable proof of plant malady. By and large we can watch the side effects of ailment on leafs, stems, blossoms and so forth so here we use leafs for distinguishing proof of sickness influenced plants.

II. LITERATURE SURVEY

1. Fast and Accurate Detection and Classification of Plant Diseases

Experimentally evaluate a software solution for automatic detection and classification of plant leaf diseases. The proposed solution is an improvement to the solution proposed in [1] as it provides faster and more accurate solution. The developed processing scheme consists of four main phases as in [1]. The following two steps are added successively after the segmentation phase. In the first step we identify the mostlygreen colored pixels. Next, these pixels are masked based on specific threshold values that are computed using Otsu's method, then those mostly green pixels are masked. The other additional step is that the pixels with zeros red, green and blue values and the pixels on the boundaries of the infected cluster (object) were completely removed. The experimental results demonstrate that the proposed technique is a robust technique for the detection of plant leaves diseases. The developed algorithm"s efficiency can successfully detect and classify the examined diseases with a precision between 83% and 94%, and can achieve 20% speedup over the approach proposed.

2. **An image processing based algorithm to automatically identify plant disease visual symptoms**

The present work proposes a methodology for detecting plant diseases early and accurately, using diverse image processing techniques and artificial neural network (ANN). Farmers experience great difficulties in changing from one disease control policy to another. Relying on pure nakedeye observation to detect and classify diseases can be expensive various plant diseases pose a great threat to the agricultural sector by reducing the life of the plants. the present work is aimed to develop a simple disease detection system for plant diseases. The work begins with capturing the images. Filtered and segmented using Gabor filter. Then, texture and color features are extracted from the result of segmentation and Artificial neural network (ANN) is then trained by choosing the feature values that could distinguish the healthy and diseased samples appropriately. Experimental results showed that classification performance by ANN taking feature set is better with an accuracy of 91%.

3. **Semi-automatic leaf disease detection and classification system for soybean culture**

Development of automatic disease detection and classification system is significantly explored in precision agriculture. In the past few decades, researchers have studied several cultures exploiting different parts of a plant. A similar study is performed for Soybean using leaf images. A rule based semi-automatic system using concepts of *k*-means is designed and implemented to distinguish healthy leaves from diseased leaves. In addition, a diseased leaf is classified into one of the three categories (*downy mildew*, *frog eye*, and *Septoria leaf blight*). Experiments are performed by separately utilizing colour features, texture features, and their combinations to train three models based on support vector machine classifier. Results are generated using thousands of images collected from Plant Village dataset. Acceptable average accuracy values are reported for all the considered combinations which are also found to be better than existing ones. This study also attempts to discover the best performing feature set for leaf disease detection in Soybean. The system is shown to efficiently compute the disease severity as well. Visual examination of leaf samples further proves the suitability of the proposed system for detection, classification, and severity calculation.

4. **Plant pathology detection and control using raspberry**

The main objective of this paper is detection of diseases at the early stage. In this paper, we mainly focus on image processing techniques. This includes a series of steps from capturing the image of leaves to identifying the disease through the implementation in Raspberry PI. Raspberry PI is used to interface the camera and the display device along which the data is stored in the cloud. Here the main feature is that the crops in the field are continuously monitored and the data is streamed lively. The captured images are analyzed by various steps like acquisition, preprocessing, segmentation, clustering. This in turn reduces the need for labor in large farm lands. Also the cost and efforts are reduced whereas the productivity is increased.

5. **Plant disease detection Using image processing**

Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product. The studies of the plant diseases mean the studies of visually observable patterns seen on the plant. Health monitoring and disease detection on plant is very critical for sustainable agriculture. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertize in the plant diseases, and also require the excessive processing time. Hence, image processing is used for the detection of plant diseases. Disease detection involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. This paper discussed the methods used for the detection of plant diseases using their leaves images. This paper also discussed some segmentation and feature extraction algorithm used in the plant disease detection.

III. METHODOLOGY

The detection of plant diseases is done through image processing techniques. The images of the plant are captured by a digital camera which is interfaced with the raspberry pi board. Various image processing techniques are applied on the acquired image to obtain the features for further analysis. This method of image processing involves a series of steps. They are:

1. Image acquisition
2. Conversion of the RGB image into HSV format.
3. Green pixel masking
4. Removing green pixel masks
5. Segmentation of the components
6. Obtaining the useful segments from the processed image.
7. Colour co-occurrence method
8. Evaluate the texture Statistics

1. Image acquisition

The RGB images from the plant are acquired by the camera module. The camera is of 21 mega pixels and thus the RGB images are obtained with high clarity.

2. Conversion of the RGB image into HSV format

The RGB images are converted into Hue Saturation Value colour space, which is an ideal tool for colour perception. The RGB is used as an ideal representation for colour generation.

Hue is nothing but a colour attribute that represents the pure colour similar to the perseverance of the observer.

Saturation is described as the representation of the amount of white light added to the Hue of the image or it is referred to relative purity. Value is referred to the amplitude of light.

3. Green pixel masking

Masking is defined as the process of setting the pixel value in an image to zero or any other background value. The pixels that are mostly coloured in green are identified from this step.

4. Removing green pixel masks

It is followed by setting the green pixels to zero based on the specified threshold value that is computed for the pixels. The red, green and blue components in the pixel are given a value of zero by RGB component mapping. Here the healthy areas in the leaf are represented through the green coloured pixels and so they do not help for identification of diseases.

5. Segmentation

The infected portion of the leaf is extracted and segmented into number of segments that are of equal size.

6. Obtaining the useful segments from the processed image

All the segments do not contain significant information. The segments that have considerable amount of information are chosen for analysis.

7. Colour co-occurrence method

The texture features are derived from the statistical distribution of observed combinations of intensities at positions specifically relative to each other in the image.

IV. PROPOSED SYSTEM

This paper presents a algorithmic program for image segmentation technique used for automatic detection still as the classification of plants and survey on completely different diseases classification techniques that may be used for plant leaf disease detection.

Detection of disease through some automatic technique is helpful because it reduces an oversized work of watching in huge farms of crops, and at terribly early stage itself it detects the symptoms of diseases means that after they seem on plant leaves.

This paper presents a algorithmic program for image segmentation technique used for automatic detection still as the classification of plants and survey on completely different diseases classification techniques that may be used for plant leaf disease detection.

There are many techniques that are presently being utilized to make computer-based vision systems victimization options of plants extracted from pictures as input parameters to varied classifier systems. A method to argument already existing techniques of plant leaves identification system is represented. This paper, a brand new classification model involving Haar cascade classifiers was utilized to develop a PC primarily based vision system for automatic identification of plant species.

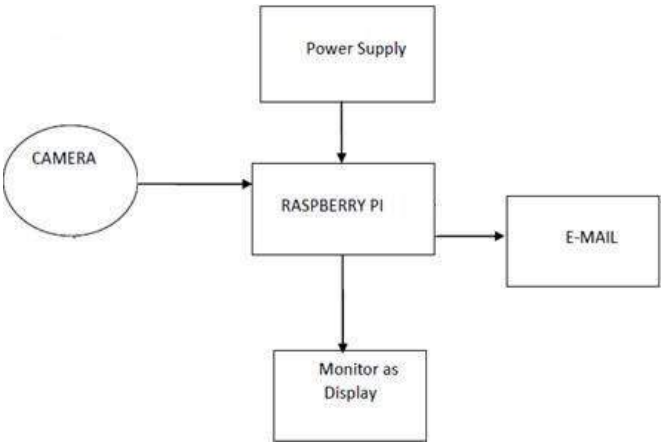

Fig 1: Block Diagram of the plant pathology detection

RASPBERRY PI 3:

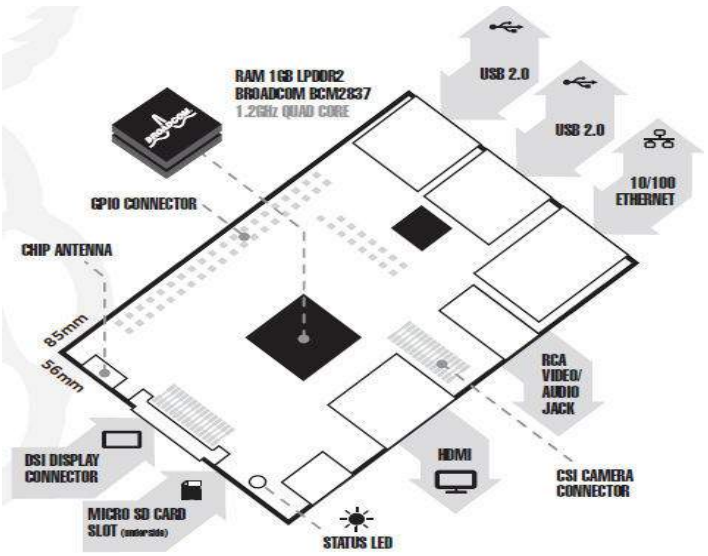

Fig 2: Architecture of Raspberry pi 3

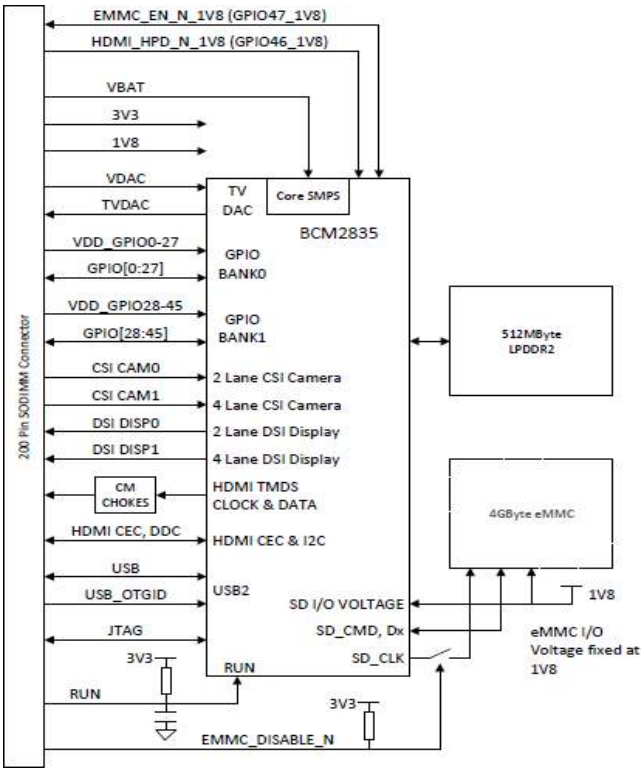

Fig 3: Circuit Diagram of Raspberry Pi

Block Diagram Description.

1. Power Supply

A 5V, 1A control supply is required for this framework. The exceptional association is accommodated the raspberry pi demonstrate B. The power supply can be given by utilizing that USB association.

2. Camera

Used to catch a yield picture, it is legitimately associated with the Pi 3 Model B raspberry. There are two different ways to associate the camera to the Pi 3 display B raspberry. The first is by means of USB port and the second is a 15pin header for raspberry Pi3 camera interface.

3. Raspberry PI

Raspberry Pi is a little PC like module. The camera caught picture will be sent to the Raspberry Pi.Using Open CV library; Raspberry Pi forms the picture and recognizes it.

4. Screen as presentation

The screen shows the name of the infection identified and the name of the pesticide.

5. Email

The email will be sent to the framework proprietor. This email contains the identified infection and the pesticide's name.

Flow Chart

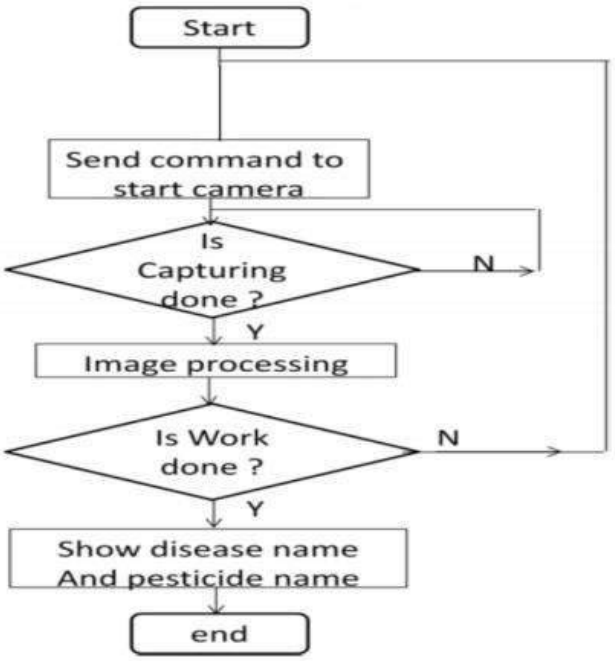

Fig 4: Flow diagram of disease detection

V RESULT

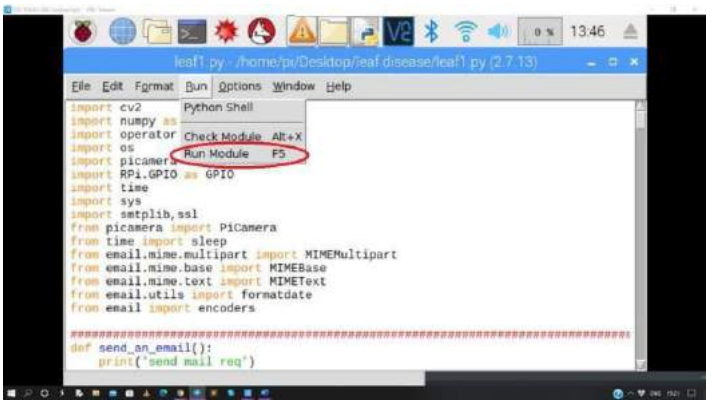

Fig 5: Select run module to run the code

Fig 6: Raspberry pi captured the leaf 1

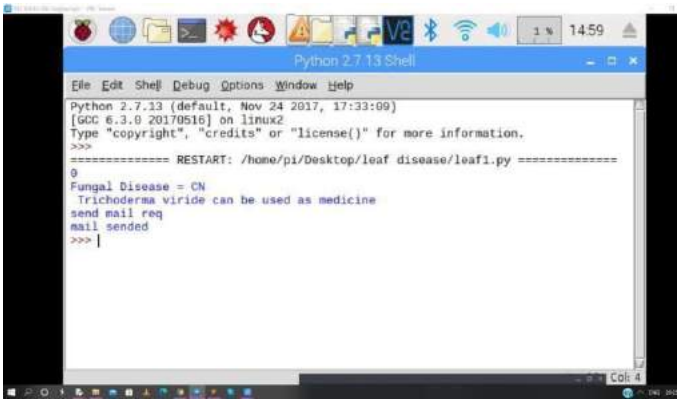

Fig 7: Output of the leaf 1

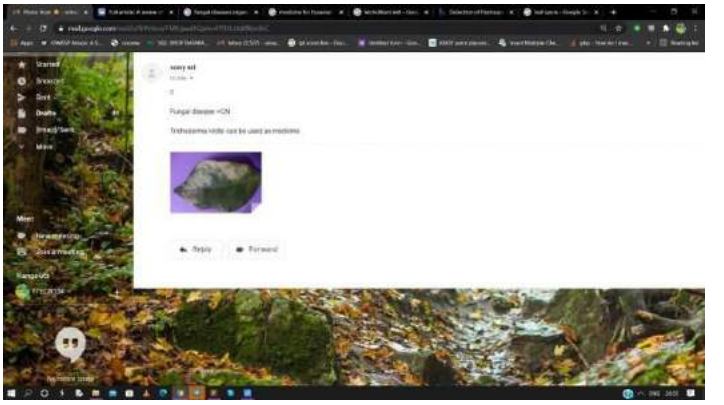

Fig 8: The output received via Email of leaf 1

Fig 9: Raspberry pi captured the leaf 2

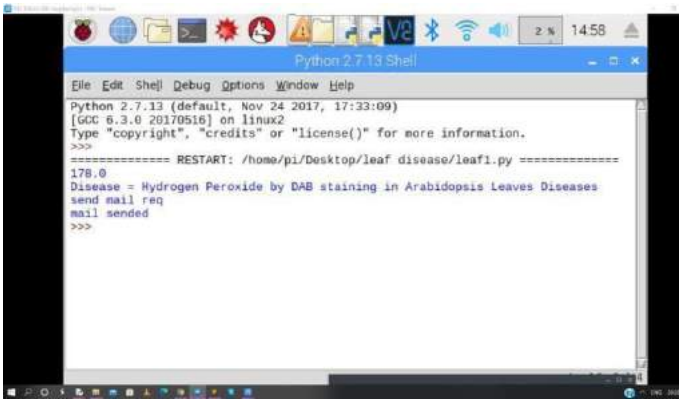

Fig 10: Output of the leaf 2

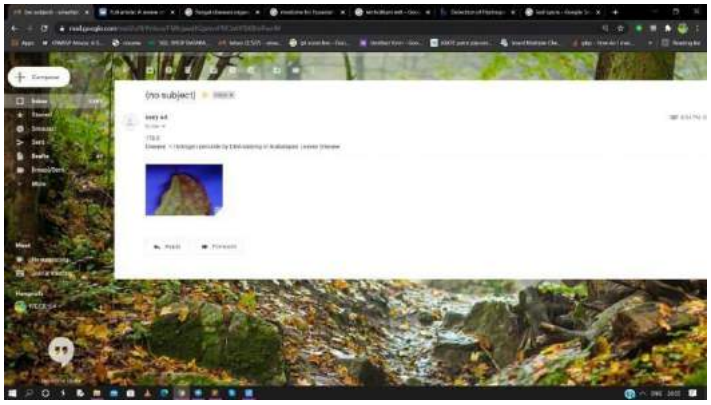

Fig 11: The output received via Email of leaf 2

The output gives the information of the disease of the plant along with the control measures. This way the health conditions of the crops are continuously monitored and necessary steps for the prevention of disease are taken.

VI CONCLUSION

This method of disease detection is done periodically by the processor such that the spreading of disease can be easily controlled. It is an efficient method as it requires less man power and yields high productivity. Through this the accuracy of image processing is maximized.

Scope of Future

In this paper, we have proposed a system using raspberry pi which can detect disease infected leaf. The project has many verticle int leaf detection. So far we have achieved in detecting the disease affected leaf. In future we will segregate the disease whether it is affected by bacteria, fungi or viral and specify the solution to the farmer in the field.

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