

Agricultural Plant Leaf Disease Detection Using Raspberry Pi

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Abstract: It is difficult for human eye to detect the diseases on the plant leaf as it is widely spread and difficult to catch, the system proposed in this paper is an image processing unit which will help in the detection of various diseases on cotton leaves. Image processing for accurate detection of disease by using plant leaf, Various spots, patterns on plant leaf are useful in detecting the disease. Further advancement can include the use of digital image processing for more accurate results.

IndexTerms - RGB (Red Green Blue), Image Processing, ANN (Artificial Neural Network)

I. INTRODUCTION

Agriculture is the most important sector of Indian Economy. The main topic and research covered in this paper is the cotton leaf as it's a plant which readily affected by the disease like leaf spot, rust etc. Few of the disease are covered in this paper Indian economy is highly dependent on agricultural productivity. Therefore, in field of agriculture, detection of diseases in plants plays an important role.

Using the automatic disease detection technique is very much beneficial in the detection of disease at very initial stages. Cotton plants have a very high disease affection rate. To save the plant and overall quality and quantity of the production proper care should be taken.

As the technology evolving the basic and old ways are also evolving with it. The advance farming is been introduced the most of the farming is controlled and observed in high facility but this processes are very cost affective we can channel a data and processed it with basic blocks witch a portable technology solution then this technology can be available to common farmer as well.

The self recognition of the disease occurrence could be quickly and accurately provided to the farmer, experts and researcher. This in turn reduces the monitoring of large field by human being. In disease recognition from images the key is to extract the characteristic feature of the diseased region. According to disease the feature may vary. The features which are taken in consideration are shape texture and size etc. The complexity of the system is all depends of the disease feature as complex it become as complex the system hardware and software becomes hence the main approach of this paper will be to minimize the hardware and software complexity. The basic system which is been used is appointing a human to the job but the investment and error are both the aspects are much higher.

Types of disease which are taking in count in this paper:

1)**Black Spot:** It is a disease caused by different types of fungi and bacteria.



Fig 1 Black Spot



Fig 2 Leaf Spot

2)**Leaf Spot:** the round blemishes found on the leaves of many species of plant, mostly caused by parasitic fungi or bacteria.

3) **Powderly Mildew:** A fungal disease that affects a wide range of plants it is also a diseased caused due to a number of species of fungi like Erysiphales, it is also the most common disease.

4)**Rust:** Plant disease caused by pathogenic fungi of the order Pucciniales also called as Uredinales.



Fig 3 Powderly Meldive & Rust

II. PROPOSED SYSTEM

The proposed system is Raspberry –Pie controller based system. The conventional system involves the human as a medium to observe. But the rate of human error is very much high as it involves the general inspection through the naked eyes. Human cannot predict the outcome if the disease will affect the plant in future. The human base conventional system is not able to predict the disease on the basis of symptoms. When the human base system detects the disease until then around 20-30% plant is already affected.

The paper proposed a system which is compact reliable and very predictive which can predicts the outcome as well as the disease at very early stage and hence the production quality and quantity is saved. Proposed system involves a raspberry pi as the main processing unit. The unit requires the input image which is taken by a digital camera, as a digital image is required to be processed. Then the algorithm is run the image in various states which will provide the results.

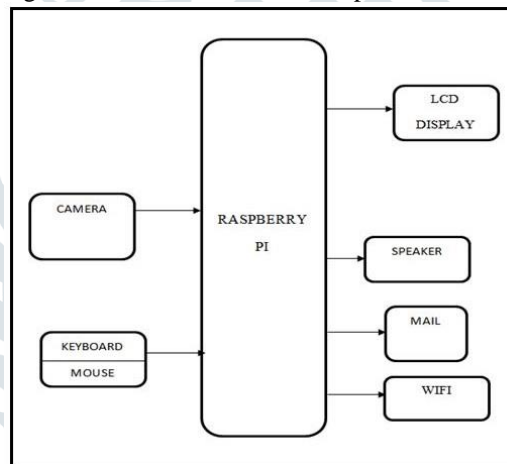


Fig 4 System Block Diagram

The main processing unit is a Raspberry pi which provides all the interface and required structure to the system.

In put image – A digital image is either captured through a small digital camera or a already taken image is considered as the input image which is to be proceeded.

Keyboard and mouse – Other input device are like key board and mouse are provide so that to access the unit and to provide the commands to control the unit. Sometimes the system needs to be restart or required modification which can be done using this device.

LCD Display – The output result of the processed data is shown on the lcd display. The device or the system is compact which is able to show the final result on the screen.

Wi-Fi / mail – The result is also supposed to be send on the portable devices and for that purpose the system is provided with wifi system/ module.

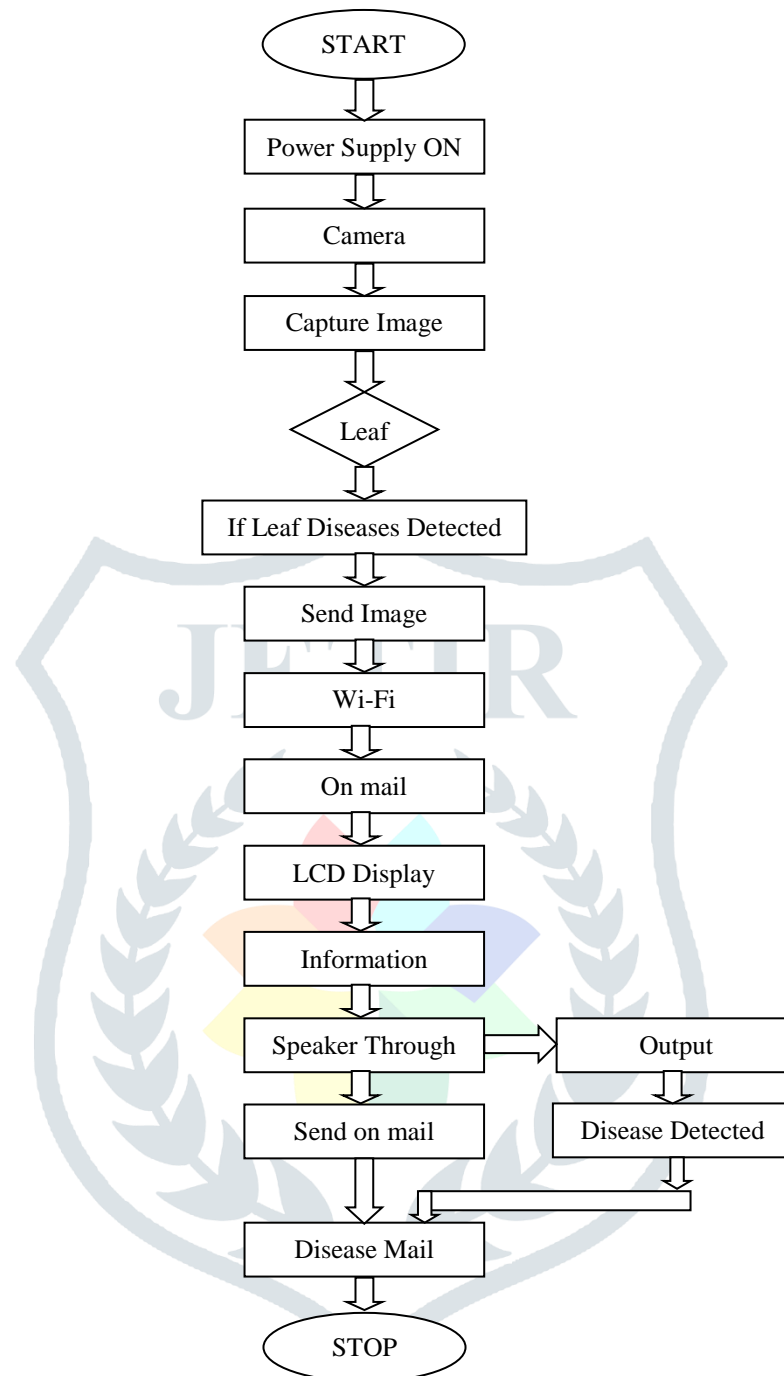


Fig. 5 Flow Chart

III. DESGIN FLOW

Taking the RGB image: The image is taken by digital camera or saved in the system is processed. The image is taken on the white paper or with a white background.



Fig. 7 RGB image of disease affected plant

Image Color transformation of RGB to Gray Scale: The image which is capture is first converted from RGB to Gray scale. The image processing required a gray scale image. This gray scale image is processed in this stage.



Fig 8 RGB Image converted to Gray Scale

IV. RESULT

HSI transformation is used to transform defected image into HSI color space. Increase contrast of image by adjusting its intensity for image enhancement purpose. Image segmentation is the first step in image analysis and pattern recognition it is a critical and essential step and is one of the most difficult tasks in image processing, as it determines quality of the final result of the analysis. Artificial Neural Network to perform classification task based on data summarize in feature database. ANN is excellent for performing classification task. Proposed System shows usefulness of integration of an image analyzer aided with pattern recognition within a diagnostic expert system model. In order to diagnose a disorder from leaf image four image processing phases have to be applied: Image enhancement, Image segmentation, Feature extraction, & classification.

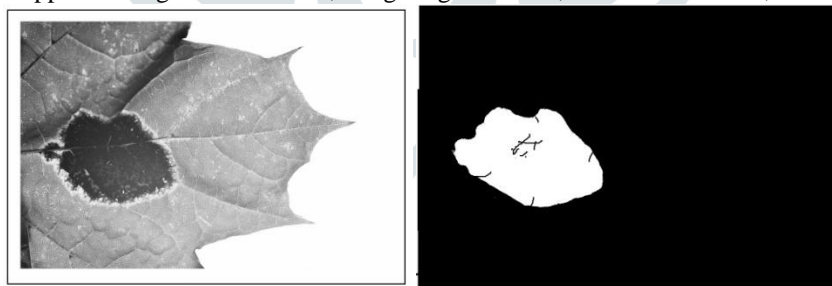


Fig 9 Final Output Image

Above image is taken for reference from the referenced papers the color transformation structure is created using the color transformation processes. The selection of the cluster is user dependent. The infected cluster is selected green pixels are masked based on the threshold value set and the pixels on the boundaries are also removed.

V. CONCLUSION

The main approach of this system is to recognize the diseases on different plant in agriculture environment where Speed and accuracy are the main characteristics of disease detection. Hence, the extension of this work will focus on developing the advanced algorithms for fast and accurate diseases detection of leaves. After reviewing the above mentioned technique and method we can conclude the way by which we can detect disease of plants and also gather the advantages as well as limitations. Image processing is a technique which helps to improve all existing research and which gives fast and accurate result of plant diseases.

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