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# LEAF DISEASE DETECTION AND MONITORING SYSTEM USING IOT

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**Abstract -** *Agriculture, the backbone of Indian economy, contributes to the overall economic growth of the country. But our productivity is very less as compared to world standards due to the use of obsolete farming technology, and nowadays people from rural areas migrate to an urban area for other profitable businesses, and they can't focus on agriculture. Innovation in farming is not new but IoT is set to push smart farming to next level Internet of things is a system consists of actuators or sensors or both provides connectivity to the internet directly or indirectly. This paper includes various features like detection of leaf disease, server based remote monitoring system, Various Sensors are deployed in various locations of farms, to control all these sensors it has been used one controller called Raspberry PI . Leaf disease can be detected camera interfacing with RPI. Aim of this project is to process the plant leaf and identify the disease in the plant leaf by using image processing approach. Raspberry PI is used to interface the camera and the display device along which the data is stored in the cloud. The Concept of image processing has been used for leaf disease identification through leaf detection. Leaf Identification means to recognize a particular leaf through his unique structure like pattern, texture, leaf type disease*.

***Key Words*: *Leaf Detection, Raspberry PI* ,**

## 1. INTRODUCTION

In this paper, we propose a vision based automatic detection of plant disease detection using Image Processing Technique. Image processing algorithms are developed to detect the plant infection or disease by identifying the color feature of the leaf area. K mean algorithm is used for color segmentation and GLCM is used for diseases classification. Vision based plant infection showed efficient result and promising performance

## 2. METHODOLOGY

### 2.1. Acquisition of Image

In this conceptual approach, this stage indicates the input. The images are retrieved from different sources. The leaf images are extracted and gets saved in the database for further process.

### 2.2. Image Pre-processing

Image pre-processing is required to resize captured image from high resolution to low resolution .The image resizing can be done through the process of interpolation. In this stage noise removal and data normalization are used as pre-processing model. For filtering the notice in the image, we use Gaussian filter.

We place the image for the greys calling process. Captured input image is being converted into grayscale image using colour conversion by the equation.

Image=0.3+0.59G+0.11B

The captured image placed in white background results in large differences between grey values of object and background.

### 2.3. Image Analysis

In this step, segmentation of images is done to find the region of interest. Disease Segmentation is an important step to make something that is more meaningful and easier to analyse. The goal of segmentation is to simplify or change the representation of an image into multiple segments for further analysis. The technique used in region -based segmentation which separates healthy and diseased region of the plant by using the colour of the leaf.

### System design

In the system design, the focus is on identifying the modules, whereas during detailed design the focus is on designing the logic for the modules. In other words, in system design attention is on what components are needed, while in detailed design how the components can be implemented in the software is the issue.

The design activity is often divided into two separate phase system design and detailed design. System design is also called top-level design. At the first level focus is on deciding which modules are needed for the system, the specifications of these modules and how the modules should be interconnected. This is called system design or top-level design. In the second level the internal design of the modules or how the specifications of the module can be satisfied is

decided. This design level is often called detailed design or logic design.

**System Implementation**

**Introduction:**

Implementation is the process of converting a new or a revised system design into an operational one. The objective is to put the new or revised system that has been tested into operation while holding costs, risks, and personal irritation to the minimum. A critical aspect of the implementation process is to ensure that there will be no disrupting the functioning of the organization. The best method for gaining control while implanting any new system would be to use well planned test for testing all new programs. Before production files are used to test live data, text files must be created on the old system, copied over to the new system, and used for the initial test of each program.

Another factor to be considered in the implementation phase is the acquisition of the hardware and software. Once the software is developed for the system and testing is carried out, it is then the process of making the newly designed system fully operational and consistent in performance.

Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. Implementation of a modified application to replace an existing one. This type of conversation is relatively easy to handle, provide there are no major changes in the

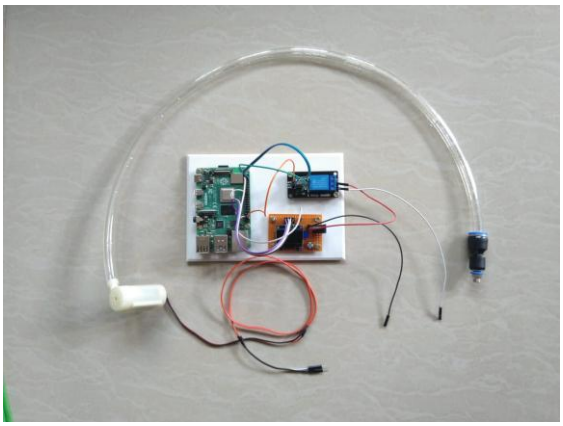


**Fig – 1:** Prototype of Hardware design

**Working**

RGB images of leaves are converted into his color space representation. The purpose of color space is to facilitate the specification of colors in some standard, generally accepted way's color model is a popular color model.

Here identifying the mainly, the green colored pixels,

After this based on specified threshold value computed for these pixels, mostly green pixels are masked as if the green component of the pixel intensity is less than the pre-computed threshold value, the red, blue, green components of this pixel is assigned to a zero value.

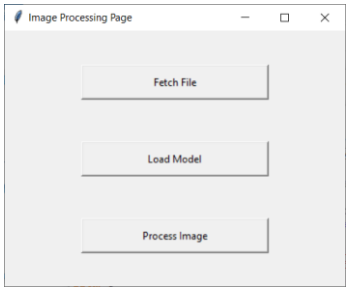



**Fig-2: Upload Data**


**Fig-3: Leaf Image**


**Fig-4: Detection**

**2.4. Feature Extraction**

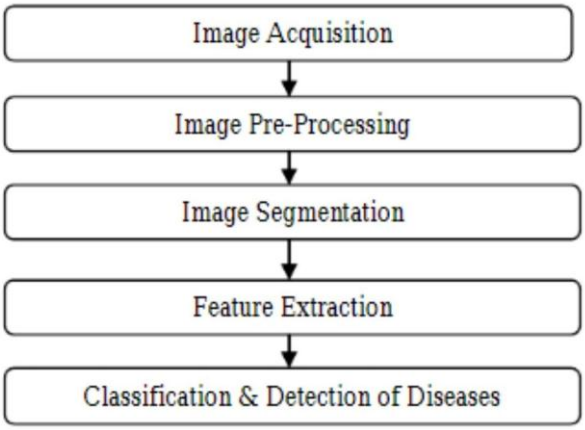
The features extracted from the image includes colour, texture and shape. This is one of the most interesting steps of image processing to reduce the efficient part of an image or dimensionally reduction of parts of an image as a compact feature vector, Feature reduction representation is useful when the image size is large and required to rapidly complete the tasks such as image matching and retrieval.

**2.5. Comparison**

Training images are used to build deep convolutional neural network to extract the macro information about the image. The structure of convolutional neural network model contains convolutional layer, pooling layer, activation function is used to compare and detect the disease in the plant.

### 2.6. Disease Identification in Leaf

Each leaf is detected by many different types of plant pathogens, causing different diseases and some of them are significant and occur most widely around the world. Blast, Anthracnose, Bacterial Leaf Blight, Brown spot, Sheath Blight are main diseases.




## 3. CONCLUSIONS

This project provides the survey of different techniques for leaf disease detection. There is main characteristics of disease detection are speed and accuracy. Hence there is working on development of automatic, efficient, fast and accurate which is use for detection disease on unhealthy leaf. Work can be extended for development of hybrid algorithms and neural networks in order to increase the recognition rate of final classification process. Further to needed to compute amount of disease present on leaf.

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