

D.R.I.V.E

(Disease Recognizing and Inspecting Various Plant-Ecosystems)

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ABSTRACT:

The country's economy highly depends on its agricultural productivity. That is why disease detection in plants plays a significant role in the agriculture field as having a disease in plants are quite normal. If we don't take good care of this, then it will cause serious effects on plants and due to which respective product quality, quantity or productivity is affected. This paper presents a way for early detection of leaf diseases in plants based on some vital features extracted from its leaf images. In the proposed system, the image of leaves is captured and compared with images in the database of the leaves that are pre-stored in the device memory. This detection may be resolved by laboratory analysis, however this is a process that is often time-consuming and expensive.

Keywords: Image processing, Image acquisition, Image segmentation.

I.INTRODUCTION

Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for 18% of India's GDP. Agriculture provides employment to over 50% of the population. Traditionally, the application of fertilizers for the plants was done in manual manner. Sometimes, due to over application of chemical fertilizers, the plants may get damaged resulting in reduced crop yield. Due to this contamination, other members of the ecosystem viz. water, air, soil, animal and human health are also affected. This approach is time consuming and expensive. The

application of fertilizers should be judiciously managed in order to maintain essential sustainability. In this paper we are proposing an efficient method to overcome the traditional method which has been used from years. The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which costs very high when we do with large farms. There is need for developing technique such as automatic plant disease detection and classification using leaf image processing techniques. This technique would be useful for farmers and would save their time and energy. Various image processing algorithms could be used for constructive inspection of diseases in a particular plant. Some of the basic algorithms practiced in this paper are mentioned below.

A. Image Acquisition:

In Image Processing, it is defined as the action of retrieving an image from some source. It is the first step in the workflow sequence because, without an image, no processing is possible. The image that is acquired is completely unprocessed.

B. Image Pre-Processing:

Pre-processing is a common name for operation with images at the lowest levels of abstraction- both input and output are intensity images. The main aim of pre-processing is improving the images data and to suppress any unwanted distortions and to enhance the image features which is important for further processing. It is also

used to remove the clamour, stabilizing the intensity of images and clear the artefacts.

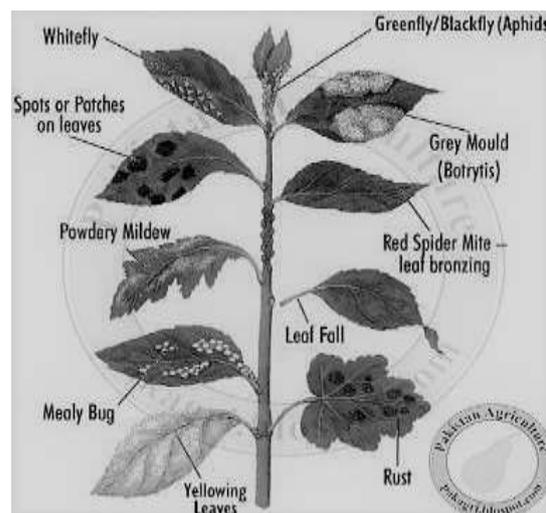
- C. Image Segmentation (k-means clustering): Image Segmentation deals with division or partition of an image into various parts called segments. This helps to process the important segments of an image efficiently. Clustering is the task to divide the population into a number of groups, such that data points in the same group are more similar to the other data points in the same group than those in other groups. One of the most commonly used clustering algorithms is k-means. Here, the k represents the number of clusters (not to be confused with k-nearest neighbour). Let's understand how k-means works:

1. First, randomly select k initial clusters
2. Randomly assign each data point to any one of the k clusters
3. Calculate the centres of these clusters
4. Calculate the distance of all the points from the centre of each cluster
5. Depending on this distance, the points are reassigned to the nearest cluster
6. Calculate the centre of the newly formed clusters.
7. Finally, repeat steps (4), (5) and (6) until either the centre of the clusters does not change or we reach the set number of iterations.

The key advantage of using k-means algorithm is that it is simple and easy to understand. We are assigning the points to the clusters which are closest to them.

Since we are talking about diseases related to plants, we should discuss about various types of diseases which are generally found in plants. There are various ways to detect them but image processing has proved to be the best way.

Few diseases are displayed in the image below (Refer fig 1.1).



1.1 Types of Diseases on Plants

Basically crop leaf diseases are broadly classified into bacterial, viral, fungal. These are further categorized that are shown above in Figure 1.1. Some of them are early scorch, tiny whiteness, late scorch etc. Bacterial type diseases are characterized by tiny pale green spots which soon come into view as water-soaked. Among all types of diseases viral type diseases are difficult to diagnose and control once they starts spreading. Leaves might have wrinkled, curled pattern and growth may be stunted. Fungi are identified primarily from their morphology, with emphasis placed on their reproductive structures.

II. LITERATURE SURVEY

According to literature survey after studying different IEEE paper, collected some related papers and documents some of the point discussed here:

1. Detection of plant leaf diseases using image segmentation and soft computing techniques.

Author : Vijai Singh , A.K.Misra

This paper presents an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It also covers survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in

plant leaf disease, is done by using genetic algorithm. presents the survey on different diseases classification techniques used for plant leaf disease detection and an algorithm for image segmentation technique that can be used for automatic detection as well as classification of plant leaf diseases later.

2. Plant Disease Detection Using Image Processing.

Author : Sachin D. Khirade and A.B. Patil

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, expertise 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. This paper discussed various techniques to segment the disease part of the plant. It also discussed feature extraction and classification techniques to extract the features of infected leaf and the classification of plant diseases. The use of ANN methods for classification of disease in plants such as self organizing feature map, back propagation algorithm, SVMs etc. can be efficiently used. From these methods, we can accurately identify and classify various plant diseases using image processing techniques.

3. Plant leaf diseases detection and auto-medicine.

**Authors: Channamallikarjuna
Mattihalli , Edemiale Gedefaye , Fasil
Endalamaw, Adugna Necho**

This paper presents a method for early detection of leaf diseases in plants based on some important features extracted from its leaf images. In the proposed system, the image of leaves are captured and compared with images in the database of the leaves that are pre-stored in the device memory. Leaf diseases are detected it checks for initial or final stage. If it is in initial stage, it sends message to the user through GSM regarding diseases. User can enable the medicine flow through relays by sending message back to GSM to turn on the medicine valve if necessary. The diseases are at final stage, it does not wait for user message, and it automatically enables the medicine flow to the farm. Soil moisture and temperature sensors are used to avoid the spreading of diseases due to change in climatic conditions. Through these sensors this system can maintain the moisture of the land depending on the type of crop. If the values of moisture/temperature exceed the predefined range, the device enables auto medicine or water to the plants. Information regarding the plants and motor operations are intimated to farmer through GSM.

4. Plant Leaf Disease Detection and Classification Using Image Processing Techniques

**Author : Prakash M. Mainkar,
Shreekant Ghorpade, Mayur
Adawadkar**

Perception of human eye is not so much stronger so as to observe minute variations in the infected part of the leaf. In this paper they have provided software solution to automatically detect and classify plant leaf diseases. In this they have used Image processing techniques to classify diseases and quickly diagnosis can be carried out as per disease. The approach enhances productivity of crop. It includes several steps viz. Image acquisition, Image Processing, segmentation, features extraction etc.

5. **Detection of Diseases in Different Plants Using Digital Image Processing.**

Author: K.Gowthami, M.Pratyusha, B.Somasekhar, B.Hemanth Nag

The studies of the plant diseases mean the studies of visually observable patterns seen on the plant. This detection may be resolved by laboratorial analysis, however this is a process that is often time consuming and expensive. For that, we use Digital Image Processing for detection of diseases in plants. It 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 Feature extraction and classification techniques to extract the features of infected leaf and the classification of plant diseases. The use of ANN methods for classification of disease in plants such as self organizing feature map, back propagation algorithm, SVMs etc. can be efficiently used.

III. EXISTING SYSTEM

- A team of scientists in conjunction with the National Crops Resources Research Institute (NaCRRI) Namulonge has developed a mobile phone application which uses artificial intelligence to accurately identify crop pests and diseases in the field.
- In field studies in India, China, the Democratic Republic of Congo, Benin, Colombia, and Uganda, the researchers found that the new tool which uses the phone's camera to screen crops is at least 90% accurate in identifying the six most serious diseases and pests that plague banana plants.

IV. PROPOSED SYSTEM

We are proposing a system named DRIVE which stands for Disease Recognizing and Inspecting Various Plants. Our system, with

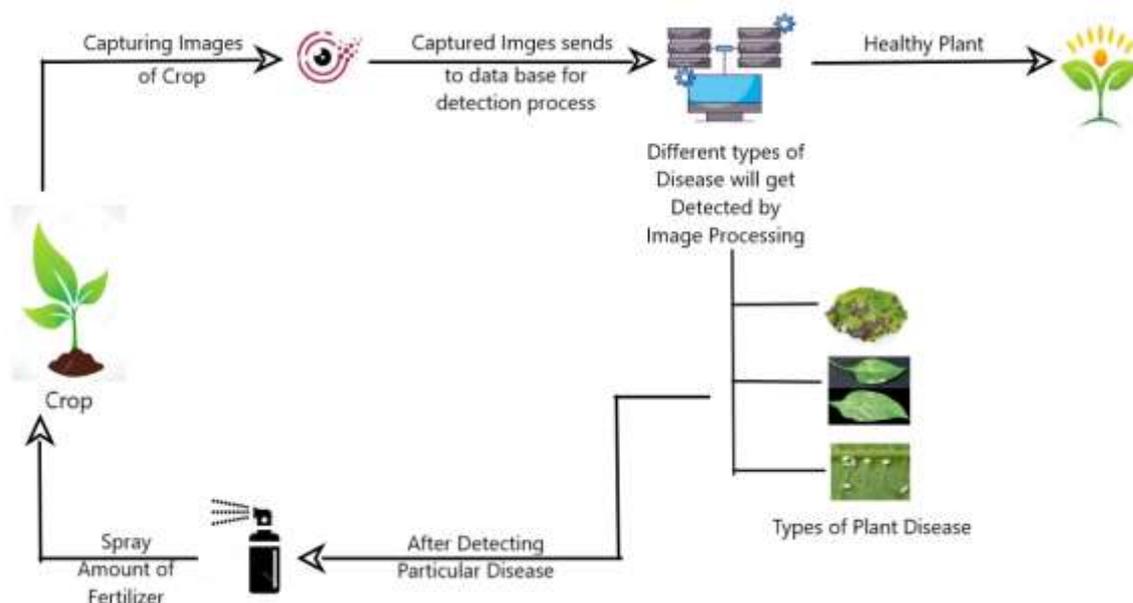
help of Image Processing method will recognize whether the plant is affected by a disease or not. The recognition will be done with the help of various algorithms of image processing to get a better result. The resultant data will be then compared with pre stored images in the database to know the kind of disease observed on plant. Upon inspecting the kind of disease, the system will provide the plant with an appropriate amount of fertilizer required. We will provide an automatic robotic fertilizer sprayer which will be spraying the fertilizers in the appropriate amount required according to each disease. The robotic functionality will make the overall system faster and more efficient. The system will reduce the time consumption and also, farmers can rely on it. It will prevent the overuse of fertilizer and will help in maintaining the nutrients of the plant and keeping the plant ecosystem healthy and nutritionally rich. Also, the system will help in increasing the productivity of crops for the farmers.

V. SYSTEM ARCHITECTURE

Below, we are presenting the system architecture for the proposed system. The architecture helps in explaining each and every segment of the system in more detailed manner. It explains how each part of the software is being implemented.

Advantages of the proposed system:

- Saves time and energy.
- Reduction in loss of crops due to disease.
- Would avoid contamination of plants due to overuse of fertilizers.
- Maintains the nutritional value of the soil.
- Increases productivity.



System Architecture of the Proposed System

VI. CONCLUSION

We have proposed a system for detecting different disease in various plants. We are using the concept of image processing to identify the infected plants. Once the disease is detected, an appropriate amount of fertilizer will be sprayed on the plant. It will help to maintain the nutrient value of the soil as well as the plant. Effective implementation of our system would save time and energy of the farmers and would increase the overall productivity of the crops.

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