

Plant Leaf Disease Detection Techniques & Irrigation

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ABSTRACT

Plants are the way to live. We are completely dependent on plants from our daily life factors to breathing. So, there should be proper care of plants. Many studies show that quality of agricultural products may be reduced due to various factors. One of the most important factors contributing to low yield is disease attack. The plant diseases are such as fungal, bacteria and viruses. In this review paper we discuss the various methodologies for plant disease detection. Studies show that relying on pure naked-eye observation of experts to detect and classify diseases can be time consuming and expensive, especially in rural areas and developing countries. So we present fast, automatic, cheap and accurate image processing based solution. Crop protection especially in large farms is done by using computerized image processing technique that can detect diseased leaf using color information of leaves. The leaf disease not only restrict the growth of the plant but also destroy its crop. There is the need of some expert to identify plant diseases but manual identification is time consuming & laborious process. So, some automatic methods required.

Keywords: Image Processing , Disease Detection , Feature Extraction , Classification.

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I. INTRODUCTION

In our country Agriculture is major source of food production to the growing demand of human population. In agriculture, irrigation is an essential process that influences crop production. Generally farmers visit their agriculture fields periodically to check soil moisture level and based on requirement water is pumped by motors to irrigate respective fields. Farmer need to wait for certain period before switching off motor so that water is allowed to flow in sufficient quantity in respective fields. This irrigation method takes lot of time and effort particularly when a farmer need to irrigate multiple agriculture fields distributed in different geographical areas.



Figure1. Infected leaf of cotton plant

Traditionally farmers will present in their fields to don irrigation process. But nowadays farmers need to manage their agricultural activity along with other occupations. Automation in irrigation system makes farmer work much easier. Sensor based automated irrigation system provides promising solution to farmers where presence of farmer in field is not compulsory. A small processor programmed for control a electromagnetic valve and also compare to electromagnetic valve operate motor to start watering. Really INDIAN farmers need cheap and simple user interface for controlling sensor based automated irrigation system. Now a day's internet is widely used. Using internet farmer know about the agriculture field irrigation status. This helps farmers to know the status of farm field watering direction through a message whether the farmer is far away from field know the status of water motor is ON or OFF and direction of watering.

In this project we present a prototype for fully automation accessing of irrigation motor with crop disease detection where Prototype includes number of sensor node placed in different directions of farm field. Each Sensors are integrated with a wireless networking device and the data

received by the “ATMEGA-328” microcontroller which is on a “ARDUINO-UNO” development board. For experimentation we have abstracted number of soil moisture sensor used in different direction of the farm fields. The soil moisture in each direction of field is sensed by sensor node and the sensed data is sent to microcontroller node through wireless networking device. On receiving sensor value the controller node checks it with required soil moisture value.

II. TYPES OF DISEASES

Most plant diseases are caused by fungi, bacteria, and viruses. Fungi are identified primarily from their morphology, with emphasis placed on their reproductive structures. Bacteria are considered more primitive than fungi and generally have simpler life cycles. With few exceptions, bacteria exist as single cells and increase in numbers by dividing into two cells during a process called binary fission. Viruses are extremely tiny particles consisting of protein and genetic material with no associated protein. The term disease is usually used only for the destruction of live plants.



Figure2. Fungal Disease Symptoms



Figure3. Viral Disease Symptoms



Figure4. Bacterial Disease Symptoms

III. LITERATURE SURVEY

Plant identification and classification play an important role in ecology. In this work, a methodology for plant identification and classification based on leaf shapes, that explores the discriminative power of the contour- Centroid distance in the Fourier frequency domain in which some invariance (e.g. rotation and scale) are guaranteed. In addition, it is also investigated the influence of feature selection techniques regarding classification accuracy.

Gurpreet kaur (2012), Plants play an important role in human life and provide required information for the development of human society. The urgent situation is that due to environmental degradation and lack of awareness, many rare plant species are at the risk of extinction so it is necessary to keep record for plant protection.

Smita Naikwadi (2013) We propose and experimentally evaluate a software solution for automatic detection and classification of plant leaf diseases. Nowadays crops face many traits/diseases. Damage of the insect is one of the major trait/disease. Insecticides are not always proved efficient because insecticides may be toxic to some kind of birds. It also damages natural animal food chains. The following two steps are added successively after the segmentation phase.

Khushal Khairnar (2014), here author aimed to decrease the diseases which restrict the growth of plant and quality and quantity of plant also reduces.

Image processing is best way for detecting and diagnosis the diseases.

Sachin D. Khirade (2015), the key is to prevent the losses in the yield and quantity of the agricultural product of the plant diseases Identification. Visually observable patterns seen on the plant is the studies of the plant diseases. Monitoring health and detection of disease on plant is very critical for sustainable agriculture.

IV. RELATED WORK

Proposed Methodology:

Images of various leaves is acquired using digital camera. After acquiring those images further image pre-processing techniques are applied followed by segmentation and extraction. After that several analytical techniques are used to classify images according to specific problem at hand.

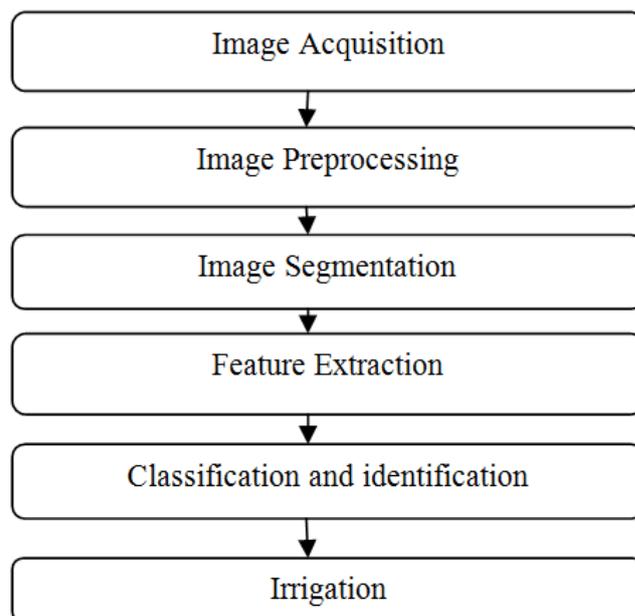


Figure5. Basic Methodology

1. Image Acquisition: The image acquisition stage involves pre-processing, such as scaling. Firstly, the RGB color images are captured using a digital camera with required resolution for good quality. The construction of an image database is clearly dependent on the application.

2. Image Pre-processing: Image pre-processing is among the simplest and most appealing areas of digital image processing. Basically, the idea behind enhancement techniques is to bring out detail that is obscured, or simply to highlight certain features of interest in an image. A familiar example of enhancement is when we increase the contrast of an image because it looks better.

3. Image Segmentation: Image segmentation is the process of separating or grouping an image into different parts. There are currently many different ways of performing image segmentation, ranging from the simple thresholding method to advanced color image segmentation methods. These parts normally correspond to something that humans can easily separate and view as individual objects. In general, the more accurate the segmentation, the more likely recognition is to succeed. Segmentation step find out the infected region.

4. Feature Extraction: Different texture features of images are extracted as given below Mean= Mean is defined as simple average of the numbers. If there are 5 numbers as num1, num2, num3, num4 & num5 then mean is $Mean = \frac{num1+num2+num3+num4+num5}{5}$ Variance= The variance is defined as average of the squared differences from the Mean. Standard Deviation= The Standard Deviation is a measure of how numbers are spread. Its symbol is σ (the greek letter sigma). The formula is easy: it is the square root of the Variance. Contrast= contrast is the difference in luminance or colour that makes an object (or its representation in an image or display) distinguishable.

5. Classifier: In the classification phase, co-occurrence features for the leaves are extracted and compared with the corresponding feature values stored in the feature library. The classification is first done using Minimum Distance Criterion. Classification gain can be calculated as $G(\%) = \frac{Corr}{M} * 100$ Where Corr is the number of images correctly classified and M is the total number of images belonging to the particular texture group.

6. Irrigation: Agriculture field is totally depend on water. According to the disease if the water is required for the futher plant then it will provide automatically through the motor. Also according to the soil testing how much water is sufficient for the field.

V. CONCLUSION AND FUTURE SCOPE

Image processing-based approach is proposed and useful for plant diseases detection. This paper describes different techniques of image processing for several plant species that have been used for detecting plant diseases. In future work, we will develop to incorporate user-feedback into the system. In addition to explore methods for combining texture, edge and color features.

This system gives one way of controlling drip irrigation remotely. Using these system productivity increases and water consumption reduces. The system drip irrigation components remotely. The propose system is beneficial for farmers and avoid the wastage of water as well as no manpower is required and system is relatively quick. This system requires frequent maintenance for efficient operation.

Future Scope

- Will detect all disease which are responsible for disease.
- Smart agribots.
- IoT health monitoring of plants.
- To detect which Plant Leaf is present.

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