An Overview of how to detect disease in leaves and monitor the soil moisture, salinity and pH value

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ABSTRACT

The prime need of this world is best agriculture which decides the development of each country as the survival of human being is completely dependent on farming and it best production.

The main problem that is observed in most of the regions of farming is the early diseases in crops, no proper monitoring of soil moisture, water level and PH, because of which the production results in low level identification of diseases on plant and is the very important research topic in agriculture fields and It is also important to take the primitive measures in monitoring of water, salinity and PH of the growing crops. thus, this paper illustrates the mechanism for early detection of crop using image processing and it also illustrates, how basic requirements of growing plants are controlled and monitored. This paper contains an overview of how the disease in the plant will be detected and how to monitor and control the moisture in the soil, measure salinity and PH value.

***Keywords**: Image processing, crop disease, soil moisture, salinity, PH value, Raspberry Pi*

I.INTRODUCTION

India being an agro-based economy, farmers experience a lot of problem in detecting and preventing diseases in leaf. So, there is a necessarily in detecting diseases in leaves which proves to be effective and convenient for researchers. Relying on pure naked-eye observation to detect and classify diseases can be very imprecise and cumbersome. The color and texture features are used to recognize and classify different agricultural produce into normal and affected regions. The combinations of features prove to be very effective in disease detection.

The conventional method of disease detection in plants using naked eye observation method is cumbersome and is non-effective. Using computer vision toolbox, the disease detection in plants is efficient and is not time consuming. The process of diagnosis used in plants (i.e. recognition of symptoms and signs of diseases) is completely based on the use of scientific techniques.

On the basis of symptoms of particular diseases and with the help of agricultural scientists, identification of diseases becomes easier.

"AGRICULTURE is our wisest pursuit, because in the end it will contribute most to real wealth, good morals and happiness".

It is said to be the backbone for economic development of the country. But still rural areas follow decentralized and low-level information technology procedure which results in huge gap between supply and demand chain of agriculture product.

About seventy percent of the population depends on agriculture. The continuous demand for food with an increasing population, reductions in agricultural land, climate change makes the agriculture industry to search continuously for new ways to improve production. Hence researchers from multiple disciplines are searching for ways to incorporate new technologies and precision into the agronomic systems. There is a need for efficient and precise techniques of farming, enabling farmers to put minimal inputs for high production.

This paper represents different techniques introduced for the early crop detection and monitoring and controlling the soil moisture content, water level and PH value. In first section the methodology of crop detection is mentioned where the disease from the crop is detected using image processing technique.

Soil moisture monitoring along with the water level and PH value is explained in second section.

II. Literature Survey

Based on the research it is found that for the complete production it is very much necessary that complete agricultural field should be monitored and controlled properly. The various factors that should be taken care of for more production is soil moisture, water level, PH, humidity, temperature and also early crop disease. In agricultural research, Disease detection on crop leaf is essential research topic as it monitors large crop fields and thus detects disease as soon as they appear on plant. To improve agricultural products disease detection of crop is beneficial. This literature review is used to study different types of crop leaf disease detection techniques.

a. Leaf Disease Severity Measurement Using Image Processing

Sanjay B. Patil et. al. [1] explained their research on severity of brown spot disease is measured with the help of image processing technique. Brown spot causes reddish-brown to dark-brown spots on sugarcane leaves. The spots are oval in shape, often surrounded by a yellow halo and are equally visible on both sides of the leaf. The accuracy of the algorithm is tested by estimating the percentage standard known area covered by standard known area shapes like Triangle, Circle, Square, and Rectangle. Estimated values are compared with actual area covered to calculate Percentage Deviation and Percentage Accuracy of the algorithm. Disease symptoms of the plant vary significantly under the different stages of the disease so to the accuracy with which the severity of the disease measured is depends upon segmentation of the image.

b. Agricultural plant Leaf Disease Detection Using Image Processing

Prof. Sanjay B. Dhaygude et. al. [2] proposed application of texture statistics for detecting the plant leaf disease. Firstly, by color transformation structure RGB is converted into HSV space because HSV is a good color descriptor. Masking and removing of green pixels with pre-computed threshold level. Then in the next step segmentation is performed using 32x32 patch size and obtained useful segments. These segments are used for texture analysis by color co-occurrence matrix. Then texture parameters are compared to texture parameters of normal leaf. Finally, the presence of diseases on the plant leaf is evaluated.

c. Pest Control in Agricultural Plantations Using Image Processing

Murali Krishnan et. al. [3] introduced Clustering Method which is an iterative technique that is used to partition an image into clusters. The difference is typically based on pixel color, intensity, texture, and location, or a weighted combination of these factors. More commonly used clustering algorithms are K – means algorithm, fuzzy c-means algorithm, expectation maximization algorithm. The quality of the final result of the clustering method depends mainly on the initial set of clusters. Since the algorithm is extremely fast, a collective method is to run the algorithm several times and select the best clustering obtainable. A drawback of the clustering algorithm is that the number of clusters is an input parameter. A wrong choice of number of clusters may yield poor results. The algorithm also assumes that the variance is an appropriate measure of cluster scatter.

III.METHODOLOGY

The system which is been proposed consists of an artificial vision system (camera), a combination of classifier and image processing algorithms for disease detecting and monitoring and controlling the content of moisture in soil, water level and PH value.

A)

The methodology for disease recognition in fig.1 starts with capturing of images of plant leaf using cameras. These images are preprocessed into different steps for improving its qualities using image enhancement, noise reduction, background subtraction, normalization and digitization. Features are extracted for given leaf and get applied as an input to the image processing toolbox. Overall method is contributed using the following steps. Based on the output of the image processing, the result is then sent to the farmer via a mail.

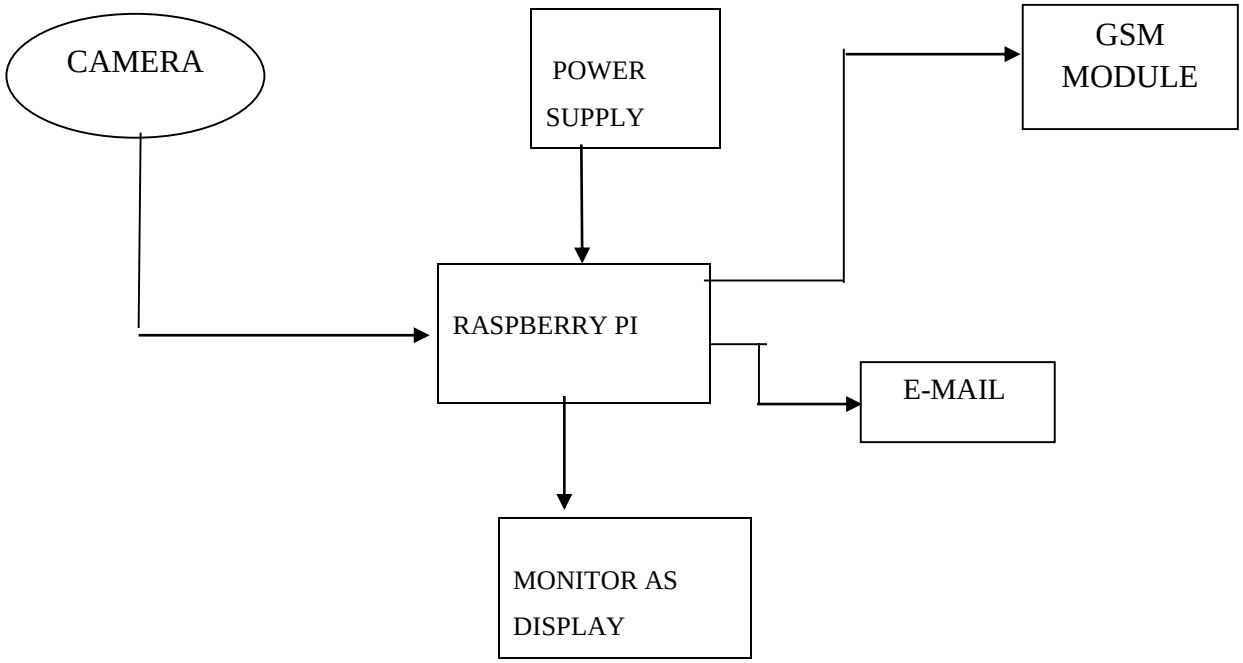
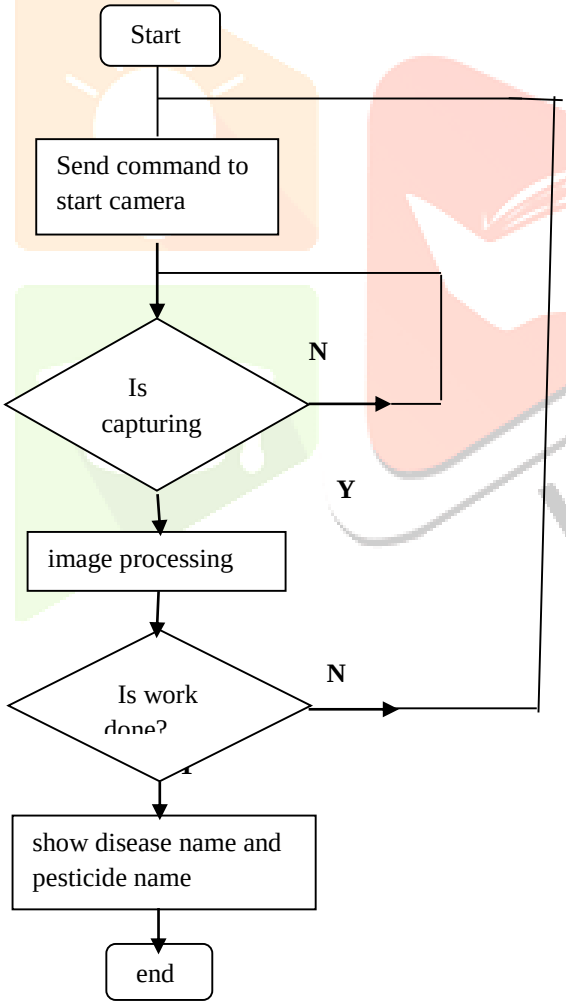


Fig.1 Block Diagram



B)

When moisture sensor is placed in soil, sensor takes soil as input and gives output in measure of moisture content. Soil moisture sensor is connected to an Raspberry PI which is in turn interfaced with GSM Module. Soil moisture is continuously being monitored by the sensor and the output values are stored in database. The same is processed using Correction factors and neural network algorithm. The output values are fetched from database and are sent to the farmer via an email. When the water level sensor is placed in the agricultural field, it continuously

measures the water level and if the level of water is found to be less than the required level then automatically pump will be on and an email will be sent to the farmer informing that the pump is on and the level of water is less than the required.

The same process is carried for measuring the PH value.

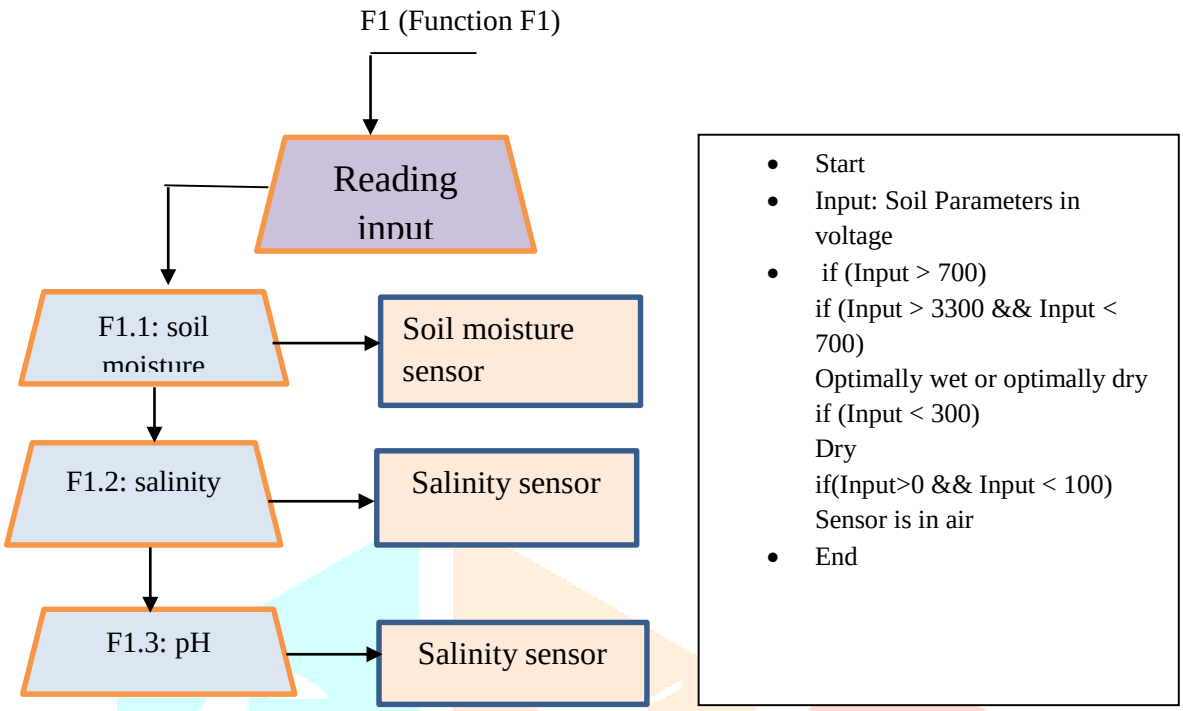


Fig.2 The Function 1 in Function Means Tree

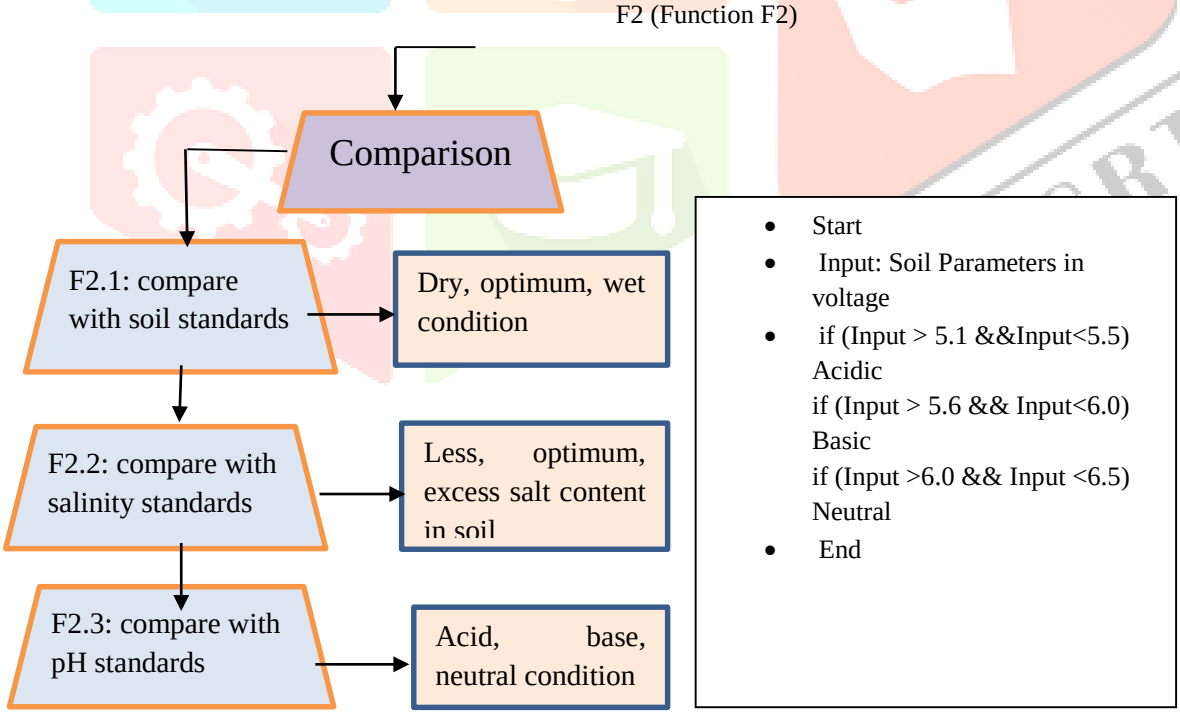


Fig.3 The Function 2 in Function Means Tree

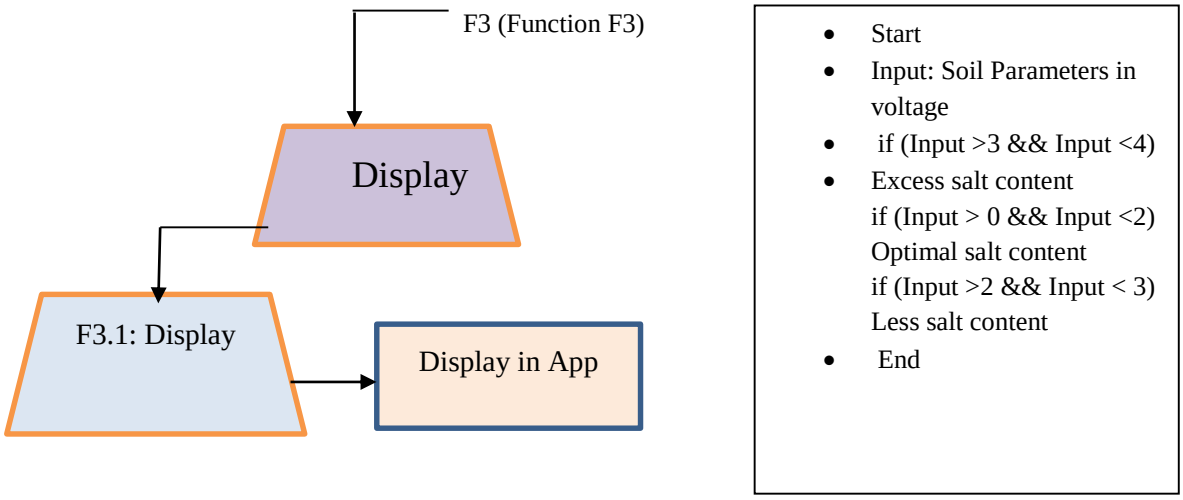


Fig.4 The Function 3 in Functions Means Tree

IV.EXPECTED RESULT

A)

For the detection of the crop disease, leaves of diseases powdery mildew, downy mildew, black rot is selected. The database of healthy leaves and diseased leaves is created at the server. This is necessary to compare the images with diseased and healthy leaves. Hence by comparison, the disease type is classified and the output is sent to the farmer via an EMAIL.

B)

The soil moisture, water level and PH value is monitored using the moisture, water level and PH sensor respectively. the database contains the standards of the moisture, water level and the PH value and hence the output values of the sensor are compared with the values stored in the database and accordingly the output is sent to the farmer via an Email.

V.CONCLUSION

The objective of this work is the crop disease detection, classification of leaf diseases using image processing tools and also monitoring the important factors such as soil moisture, water level and pH value which are of course the important factors for high yield. All information about the disease and the important factors is sent to the farmer's mobile phone through the GSM module. To increase the speed and accuracy of detection as well as classification of leaf diseases we are using Raspberry pi module. One more important benefit of this system is that it also sends the image of the affected crop or the leaf to the farmer, such that it becomes easier for the farmer to take the precautionary measures. This system will largely contribute in growth in the yield of the farms.

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VII. REFERENCES

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