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Smart and Integrated Crop Disease Identification System

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ABSTRACT

Farming is the main occupation of large Indian people. To main objective of the farmer is to increase the productivity of the farm. The environmental factors or product resource, such as temperature, humidity, water supply, labor and electrical costs are important. However, above all, crop disease is the grave factor and causes some amount of reduction of the productivity in case of its exposure. Thus, the disease of the crop is much more important factor affecting the productivity of the crops. Therefore, the farmer focuses on the cause of the disease in the crops during its growth, but it is not easy to identify the disease on the spot. Until now, they just relied on the opinion of the experts or their own experiences when the disease is suspicious. However, it triggers a decrease in productivity as no taking correct action and time. In this paper, to find solution of this problem we provide the mechanism, which analyses the images of the crop and checking the condition of soil simultaneously checking the condition of humidity and temperature. Integrating the output of this three unit according to that predict the disease. Whenever disease is identified inform to farmer then farmer take the appropriate action against the disease and overcome the losses.

Keywords : Crop Disease, Identification System, , Camera Module, Soil Sensor, Humidity and Temperature Sensor

I. INTRODUCTION

A. Domain: IOT

The Internet of Things is a system of connect to one another computing devices, mechanical and digital machine, objective, people that are provided with unique Identifiers and the ability to transfer data overall a network without requiring human to human or human to computer interact with each others. The definition of IOT as developed due to convergence of multiple technologies, real time analytics, machine learning sensor, and embedded systems. Traditional fields of embedded systems, wireless sensor network, control systems, automation and others all contribute to enabling the Internet of Things. In consumer market, IOT technology is most similar with products pertaining to the concept of “Smart Home”, covering devices (Such as lighting fixtures, home security systems and cameras, and other home appliances) that support one or more common echo systems and can be controlled via devices associated with that ecosystem, such as smart phones and smart speakers.

II. LITERATURE SURVEY

1. Mrs Jagdish Kashinath Kamble, "Plant Disease detector", [Feb 8-9-2018]

This research paper was proposed for a system which provides fast, efficient, cost effective solution to farmer for detecting plant diseases. Automatic and fast detection of plant disease was main motivation behind this system. Plant disease detected through image processing technique, mobile application is developed for user interface therefore it is easy to use and inexpensive.

2. Hyeon Park, Eun Jeesook, se-Han Kim "Crop Disease Diagnosing Using Image Based Deep Learning Mechanism" [2018]

This research paper was proposed for a system which classifies the healthy and disease crop, it captures the image of fruits, leave or stem and send it to analyze engine, and analysis is done by using CNN (Conventional Neural Network), it analyze the image and classify crops according to condition and analyzed result is send to farmer who requires the decision. And diagnosis of the diseases is done with data set images using deep learning. It performs the accuracy for classification, therefore it increases the productivity.

3. Leninisha Shanmugam, Agasta Adline, Aishwarya N, Krithika G. "Disease Detection In crop using remote sensing image" [2017]

This research paper is proposed for diseases detection using remote sensing image. This system is used when the area of agriculture is high and regular attention is not possible, the purpose of this system is to find and fix the diseases before the disease grows from the bottom to the upper layer. This system is done with two phase.

1st It extracts threshold value of image, and then identifies diseases using canny edge detection algorithm and histogram analysis.

4. Er.Rupinder Kaur, Raghu Garg, Dr.Himanshu Aggrwal. "Big Data Analytics Framework to Identify Crop Disease and Recommendation a Solution" [2015]

This research paper is proposing a system which analyze the image of crop and find diseases according to symptoms and takes appropriate action against diseases, it is all done with the help of big data that is huge amount of data, to accomplish this object hadoop and hive tools has been used. The data is collected, cleansed and normalized. It finds the disease name based on symptoms and finds solution from historical data.

III. PROBLEM STATEMENT

Crop diseases hamper the growth of crop to overcome the crop diseases, using this system find the solution for Crop diseases. This paper focuses on identifying diseases of crop as early as possible, fast, ease and overcome the loss and improve the productivity of farmer. This system has been design in manner that it predict the diseases considering the all parts of agriculture.

IV. PROPOSED ARCHITECTURE

Primary motive of identifying crop disease and find out solution for disease. To find out whether the crop is diseased or not or healthy. We are going to developed crop disease identification. predict the diseases by integrating the result of following three component:

1. Image preprocessing- In this we will capture the image by using REESJ2 math works. For this, different preprocessing used.

- Image Clipping- Cropping the crop image to get interested region.
- Image Smoothing- It is done by smoothing filter.
- Image enhancement- Used for increasing the contrast.

2. Soil condition- In this we will check the condition of soil using the OLtus sensor.
3. Humidity and temperature condition-In this we will check the humidity and temperature condition using DHT-11 sensor.

Integrating three output of this three unit and checking previous data stored in cloud according to that predict disease.

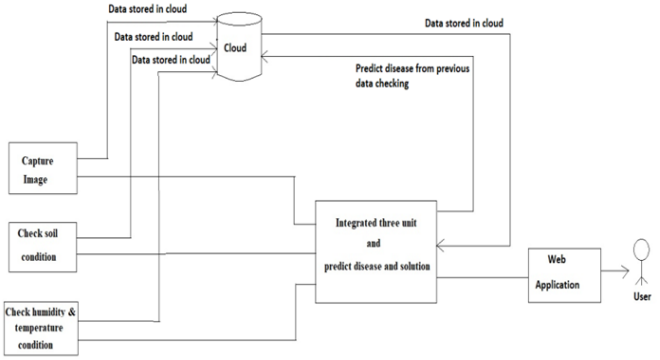

Fig.1 Architecture of proposed system

V. PROPOSED SYSTEM

In previous system we are using different devices to check temperature, soil moisture, etc. But in this system we are using soil sensor, temperature and humidity sensor and Image processing in one single unit, so there is no need to use different devices. Soil sensor will sense the moisture level in soil, Humidity and Temperature sensor will sense the humidity and atmospheric temperature respectively and image of crop. Collectively input will be taken from sensor and output will be displayed on web application. Output will be generated by comparing it with previously available data.

In this system we are using Arduino board for mounting the different sensors on it. The result from different sensors will be combined by the Arduino board and compare it with previously available data to generate desired output, and send output to user interface through web application.

VI. SYSTEM REQUIREMENTS

A. Hardware Requirement

- Arduino UNO
- Arduino MKR GSM14000
- SORACOM Air global IOT sim
- MKR Shield
- DHT-11 Temperature and Humidity Module
- UV light module
- Soil sensor
- Camera module
- GSM module
- Arduino MKR 1000 WIFI
- Log-scale Analog Light sensor(Ga1a12s202)
- Relay module
- Resistors/pushbuttons

B. Software Requirement

- Azure cloud IOT interface
- Machine learning datasets and Triplet program for identifying objects
- Android application to connect with cloud
- Scikit Learn
- Tensrflow

VII. EXPECTED RESULT

Previously, different devices were used to detect diseases. These devices includes image sensor, soil sensor, temperature and humidity sensor. The following diagram shows the working of different devices used for disease prediction.

Fig.2 Image Processing

Fig.3 Soil Sensor

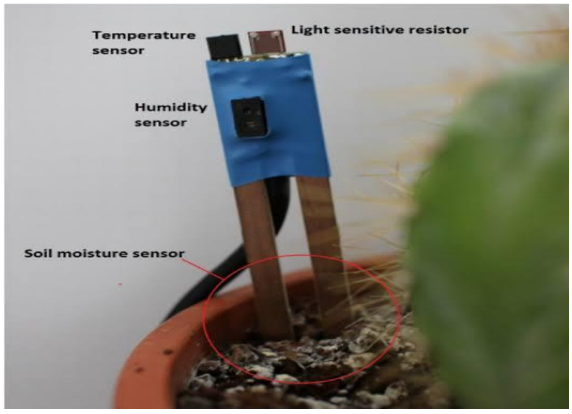

Fig.4 Temperature and Humidity Sensor

Fig. 2 shows the image processing.
Fig. 3 shows the soil sensing.
Fig. 4 shows the temperature and humidity sensing.

There is no single device to detect disease by considering all the agricultural factor, therefore we are preparing device which has all the features which are needed for disease prediction.

VIII. CONCLUSION

Detecting the diseases is main purpose of this system. There is main characteristics of disease detection are help to farmers with speed and accuracy using Internet Of Things (IOT). Thus we will prepare a device which can detect diseases by combining output from soil sensor, Temperature sensor and comparing it with previously available data.

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