FARMER SURVEILLANCE SYSTEM WITH PADDY DISEASE DETECTION

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Abstract -*Smart farms are taking a leading role to create an efficient, innovative, dynamic and eco-friendly farms. For implementing these farms sensors, cloud and sophisticated algorithms offer a monitoring system designed to diagnose the condition of the farm's field wirelessly with the help of a web application. This Web Application makes it possible to monitor the farm constantly, measuring data such as moisture, air temperature and humidity of field. Since paddy is a major crop in India so we implementing this system for paddy. The paddy disease can be detected by use of deep learning technology with hybrid algorithms. As well as we suggest the type of chemical fertilizer to be used when any type of disease gets detected. We are providing the new and advanced concept of analyzing the disease varieties in an efficient manner. The result will be periodically updated to the farmer through the web applications and SMS.*

***Key Words*: Sensors, Monitoring, Web Application, Disease Detection, Paddy, Hybrid Algorithm, Fertilizer**

1. INTRODUCTION

In Indian GDP, agriculture plays a vital role of 15.4%. Basically India is an agricultural based country. Most of the rural areas mainly depend on the cultivation. Agriculture can be done in both large and small scale.

But weusing the traditional forming technique for cultivations. We have to improve our technologies in forming methods to increase the productivity and reduce the time consuming, man power, cost etc… India is a vast country having different food culture followed by the peoples from different states and different locations. So, people in India has cultivates several food crops. Even though Wheat, Rice, Sugar Cane are the major crops cultivate by Indian people

Hence we implementing this system for paddy crop live monitoring and diagnosis the commonly occurring diseases to provide better solution to the farmers.

Farmer surveillance frequently monitors the crops to get the continuous update about the crops. Plants are cultivate in both the large and small scale throughout the different types of soil, weather conditions. The land Soil Quality and moisture content are frequently measured using various sensors. This system continuously gives the lively status of agriculture land and paddy crops through the web application and the SMS notification. Hence this system that are very helpful to the farmers to reduce effort and time for monitoring and also the new farmer could able to learn about different types of paddy disease through this application.

Due to diseases occurrence in crop, the productivity and quantity are decreases and Sometimes Farmers may use wrong fertilizer to the plants will also create major impacts on soil conditions and agro-environmental conditions .so then losses in yield productivity and quantity will acquired. There are few numbers of diseases only occurred frequently in paddy. So we decided to provide a common solution to the identified diseases in the crop field when those unwanted activity or diseases detected in our system. Some of the common diseases which affect the paddy plants such as Rice Blast, Brown spot, Bacterial Blight, False smut, Grain Discolouration, Leaf steak and Tungro.

This project reports a novel approach for detection and identification of disease by using various advanced algorithm such as VGG16, Fine tuning the model using Alexnet, hence we can provide accurate result for disease detection. Based on the type of disease detect we suggest the type of chemical fertilizer which to be used. Hence farmers need not use wrong fertilizers and we can provide a solution in early stage so loose will be minimize by this system and saves energy, manpower, time and cost required.

2. LITRATURE SURVEY

These literature surveys provide information about the existing systems and related projects.

1. Pallavi S, Jayashree D. Mallapur, Kirankumar Y. Bendigeri "Remote Sensing and Controlling of Greenhouse Agriculture Parameters based on IoT " The paper proposed a remote detecting of farming parameters and control framework to the nursery agri business. The arrangement is to control CO2, soil dampness, temperature, and light, in view of the dirt dampness the controlling activity is practiced for the nursery windows/entryways dependent on crops once a quarter total round the year. The goal is to expand the yield and to give natural cultivating. The outcome shows the remote control of CO2, soil dampness, temperature, and light for the nursery.

2. R.P.Narmadha, G. Arulvadivu "Detection And Measurement of Paddy Leaf Disease Symptoms using Image Processing" . The target of this paper is to perceive the paddy maladies. A portion of the paddy malady is Blast

Disease (BD), Brown spot Disease (BPD), Narrow Brown spot illness (NBSD), which stops the development and assurance of the paddy. Illness can taint paddy at various phases of development and all pieces of the plants as the leaf neck and the hub. The rundown of the paddy sickness can be brought about by microscopic organisms, parasite and so on. The strategy was intended to expel the clamor programmed, blunder by human and limiting the time taken to estimation the effect of paddy leaf illness.

3. A. SenthilRajan, "Paddy Grade and Dirt classification using image processing Techniques" This paper introduce paddy grade classification and dirt inspection system using combination of image processing methodology. That work mainly focus on develop of the grading system for paddy classification system. Paddy grade classification algorithm and dirt classification algorithm technology has achieved a classification accuracy between 80% and 90%.

## 3. MODULES

3.1. DATA COLLECTION

While conveying the Deep Learning model in a true application, one should be continually taking care of it more information to keep improving its exhibition. The more named information we have, the better our model performs. So we will gather distinctive datasets from different assets of web.

3.2. DATA PREPROCESSING

Data Pre-processing is a technique is used converting those raw data format into a clean data set information. whenever the data is gathered from different sources it is collected in raw format which was not feasible for the analysis. There are a number of pre-processing steps that may wish to carry out before using this in any Deep Learning project.

3.3. TRAINNING BY USING VGG16

The preprocessed data were collected and make this perform image recognize by using VGG16 Algorithm. VGG16 Algorithm is a Highly Accurate image recognize algorithm VGG16 initially divides that dataset into several pixel formats that each picture has a separate RGB values, that RGB values are further converted into binary format data. Each image classification has own binary format, the binary format of real time data is matching with trained image then it produce the outcome.
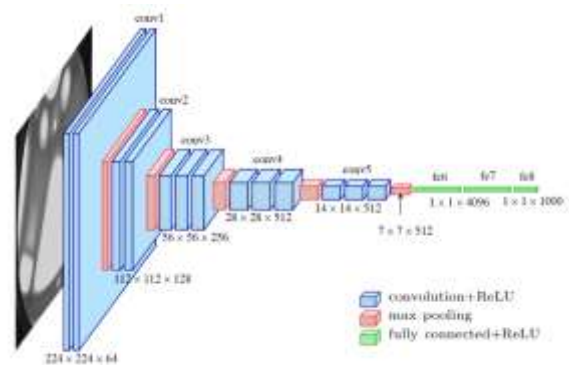
3.4. FINE TUNING WITH ALEXNET

Fine tuning is the process improve the output result and boost accuracy of pre-trained network. First we have to train the system using VGG16. For better result we use fine tuning system with Alexnet. Some of the features of VGG16 is freeze and connected with Alexnet header those process is performed by Network Surgery. After network surgery both VGG16 and Alexnet features were mixed with together hence it produces accurate result. The disease detection flow diagram follows.
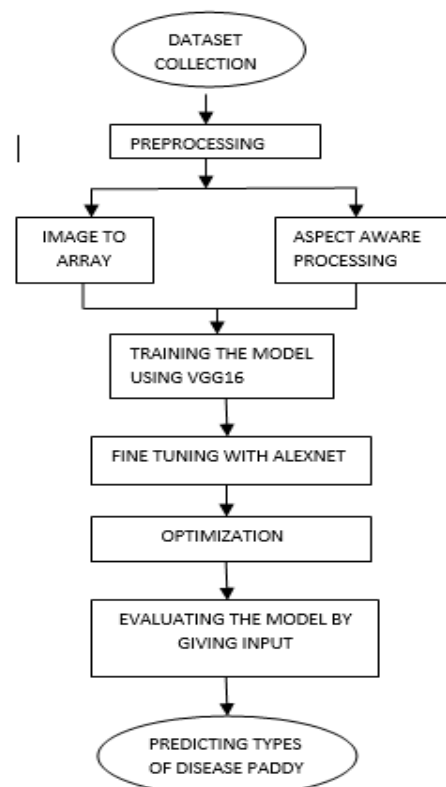

Diagram – 1: Flow Diagram

3.5. LIVE ENVIRONMENT MONITORING

The sensors and the digital imaging technologies gave farmers a better picture of their fields and crops. Farmers can also monitoring various parameters on smartphones or tablets.

The sensors for Soil Moistures(Fig–1), temprature and humidity Sensor(Fig–2) are connected with the Arduino board(Fig-4) to get the real time data from the field , that are stored in the cloud storage. Arduino is the single board microcontroller meant to make the application more accessible which are interacts objects and surroundings. The Raspberry pi camera(Fig-6) module that captures the real time data and transfers into the Arduino board through Raspberry pi.

Raspberry pi(Fig-3) is a processer that specially designed to for image capturing and video streaming. Nodemcu((Fig-5) is use for transmit these data into the cloud for remote accessing.

3.5.1. SENSORS AND WIRELESS NETWORK

Fig – 1: Moisture sensor   Fig – 2: DHT11 Sensor

**Fig -3:** Raspberry pi 3b+

Fig –4: Arduino Uno

Fig – 5: Nodemcu

Fig – 6: Raspberry pi camera

3.5.2. DATA STORAGE IN CLOUD

Cloud storage is the service model in which those data is transmitted and stored on the remote storage systems, where this is maintained, backed up and made available to the users a network. NodeMcu is used for those data transmission to the cloud, All the sensors are wirelessly connected. MQTT Protocol is used for sending and receiving of data to the cloud Storage.
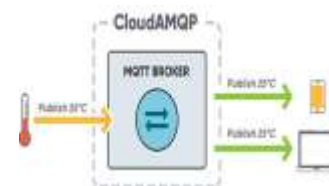
3.5.3. WEB APPLICATION FOR DATA STREAMING

Web application development is creation of application programs that reside on the remote servers and were delivered to the user's device over the Internet. An end user can accessing a web application through web browser such as Google Chrome or Mozilla Firefox. Web applications can be written in NodeJS and HTML5. This web Application can show graphical representation of data from various sensors and live streaming of land using cameras fixed in various places

4. SYSTEM ARCHITECTURE

Architecture Diagram (Diagram–2) consist of raspberry pi which is used interface between camera module and Arduino. DHT11 sensor and Moisture sensor also

connected with Arduino. Data are collected from the sensors and camera module. These input data were processed and sending to cloud storage using Nodemcu ESP8266. Data stored in cloud can access from anywhere. Web Application was created to visualize the data. Data are get from the cloud using MQTT Protocol. Live streaming is provide by this with disease detection techniques. Incase any Disease symptom occurred it notify the farmer with solution.
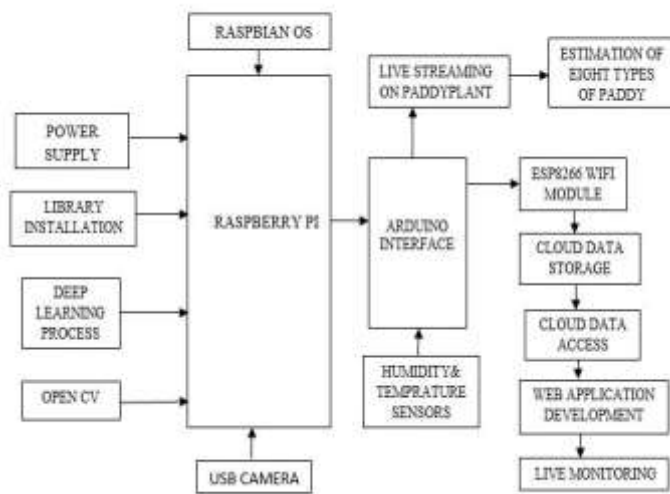

Diagram – 2: Overall System Architecture

5. PADDY DISEASE DATABSE MODEL

Various types of disease occurred in paddy. we take major eight frequently occurring disease for our system. We analysis the historical data and find reasons, symptoms and solution for that disease. Each Disease varied by causes so we cannot use the same fertilizer for every disease. Here we analysis the reasons for the disease and find good solution to that disease. Then we stored these data in database for utilize to these data to give solution. These data are stored in remote sever for further process.

Sample data Table-1 shown below.

Type of Disease	Reason	Symptoms	Solutions
- **Blast**	**Blast disease**, also known as rice rotten neck, is caused by the fungus Pyricularia oryzae and is the most damage of all the fungal **diseases** in the Southern Africa.	Elliptical, whitish to grey **lesions** with the dark-green to reddish-brown margins, up to 2 cm long form on the leaves, which are coalesce and kill the leaf.	The Silicon **fertilizers** (e. g., calcium silicate) can be apply to soils those are silicon deficient to reduce **blast**.
Brown spot	**Brown spot** is a fungal **disease** that infects the coleoptile, leaves, **leaf** sheath, panicle branches, glumes, and spikelets.	The **symptoms** of **disease** appear on those coleoptile, the leaves, **leaf** sheath and the glumes.	Using the fungicides (e.g..iprodione, propiconazole, azoxystrobin, trifloxystrobin, and carbendazim) as seed treatments.
Bacterial Blight	**Bacterial blight** was caused by Xanthomonas oryzae pv. oryzae. It **causes** wilting of theseedlings and yellowing and drying of leaves.	It develop water-soaked to yellow-orange stripes on the leaf blades or leaf tips or on mechanically injured part of leaves.	It reduce disease spread by carefully handling of seedlings during transplanting, maintaining shallow water in nurseries, providing good drainage during the severe flooding.

Table – 1: Sample Paddy Disease database table

6. CONCLUSION AND FUTURE WORK

Our system used is to regular monitoring of agriculture land by various aspect of land and provides a live streaming of land. Additional to this we implement the disease detection module, this detect presence of symptoms of disease at early stage. If we find type of the disease it gaves solution to that. In our system implementation we fix camera various places in field but in future drone camera can be used. Data access from cloud using MQTT protocol, that is two way communication protocol hence we can also control water motor incase moisture level is very low. So we can connect water motor with this system in future.

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