SMART IRRIGATION SYSTEM USING IOT AND BIG DATA

Vimalan B
vimalan.cs17@bitsathy.ac.in
Bannari Amman Institute Of Technology
Bitsathy.ac.in

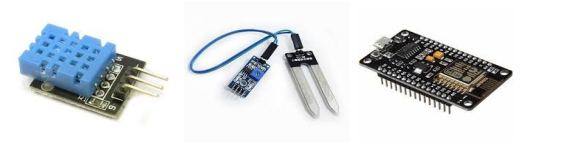
Sasikumar K
sasikumar.cs17@bitsathy.ac.in
Bannari Amman Institute Of Technology
Bitsathy.ac.in

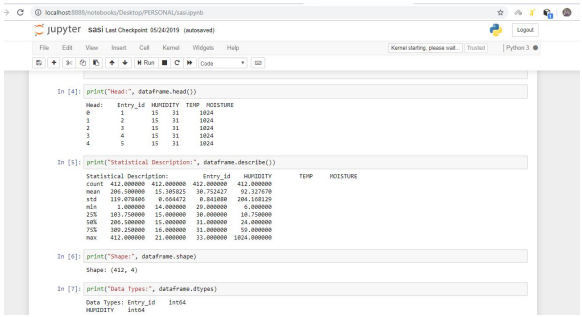
I. INTRODUCTION

Smart irrigation system is a project that involves collecting data using sensors in cloud and analysing them using concepts of big data. This method of analysing real time data and providing user interface will be useful for the modern agriculture. This method can reduce the water usage and reduce wastage of water due to improper irrigation. Using sensors and IOT makes the farm smarter and reduce the human work. Analysing the data collected using those sensors will be helpful in research and development process. User interface will be helpful for those who are in need of verifying the water utilization by the particular group of plants. This method of analysing the moisture content and temperature and irrigating water accordingly can help the farmers to save water.

II. INNOVATIONS IMPLEMENTED

Sensors are used to collect data and the data is stored in the cloud for future analysis. Data is collected in real time from the fields and is analysed using the concepts in big data then the results are displayed in user interface for the clients. Using cloud for storing the data will be helpful for accessing the data and data loss is less in this mode. Wifi module ESP8266 is used to connect the sensors and for connecting to cloud which connects to wifi and transfer the data recorded in sensors. The sensors are moisture sensor temperature sensor and humidity sensor.





Basically in Irrigation field Temperature , Humidity , Moisture are the three dependent values which defines the growth of the plant gradually in an annual or monthly period which depends on the crop. Here we have collected the data from the sensor and analysed with various algorithms and identified the threshold value of the field.

A. TARGET VALUE

By correlating the values of higher and lower , the target value could be defined with the help of mean and we should consider the value as threshold value of the field and the sensor must read the values which is capable of considering it in a good manner.

B. ALERT MESSAGE

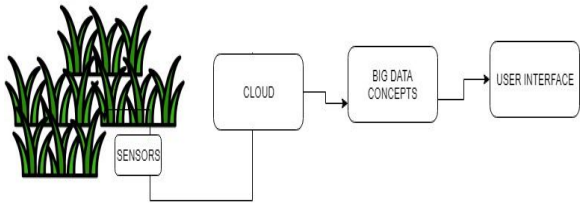
An alert message will be sent to the land owners if there is any changes which arises in the values. So,the land owner should easily identify the problems in their land and customize it accordingly to whatever they want. Alert message will be sent in three ways.

GSM MODULE: An alert message will be sent to the land owner by GSM MODULE if the person is in online and he could easily identify it and rectify the problem of the field.

IFTTT SERVER: IFTT server could be used to send the alert messages directly from the cloud if there is any problem which arises in the land during monsoon or in normal period.

APK MODULE: MQTT app could be used to view the sensor value directly from the mobile . It will get notifications from the app itself. So, the land owner could easily identify it.

III. POC ARCHITECTURE WITH DIAGRAM

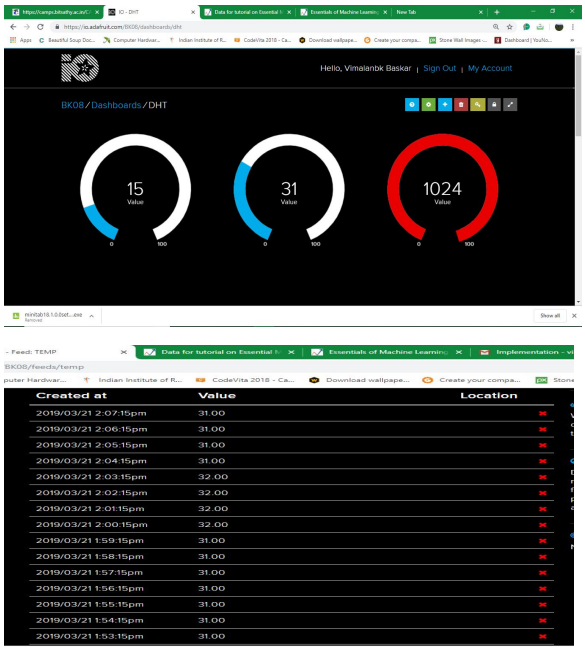


IV. SENSORS

The sensors collect real time data and update the data in the cloud which is further evaluated and analysed using big data. As the data is generated in real time the result produced is efficient.

V. CLOUD STORAGE

Cloud storage is used to store the data generated by the sensors. This method will be helpful to access data from various places. The data will be available online and the risk of data loss is minimum. Clouds that can be used for this purpose are Adafruit and Google Firebase.

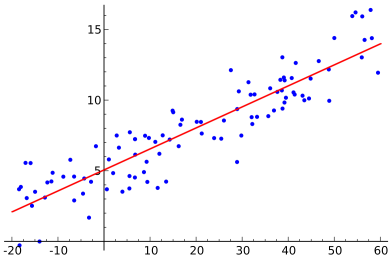


VI. BIG DATA CONCEPTS

Linear regression is the predictive method used to analyse the data that is collected. This method is also used in forecasting, time series modelling and

in finding relationship between the variables. This is an important tool for modelling and analysing data.

Linear Regression-Y = a + bX



VII. USER INTERFACE

In user interface the analysed result is displayed in the form of histogram.

VIII. CHALLENGES OVERCOME

SENSORS→CLOUD

Connecting sensors with cloud using ESP8266 module was a challenging part because of the real time implementation in the field.

IX. TECHNOLOGIES USED

A. Firebase

Firebase is used to represent the results into a mobile application and to deploy as a user interface more than this it is used as a cloud storage for this project. And Firebase can be used to integrate the iOS, Android and web.

B. ESP8266- wifi module

This is an IoT device which is used for connecting sensors and provide as a microcontroller which can store a program and it can perform the task that is defined in the program. It is a low power and highly integrated wifi solution it can connect minimum of 7 external components, its wide temperature range is about -40* C to +125* C. The processors that are used in this ESP8266 is RISC processor which has a clock speed of 160 MHz. ESP8266 runs on Real-Time Operating System.

X. CONCLUSION

Using the model which we developed will help the farmers to monitor the water intake by plants and help them to analyse the data collected from their field. The results generated in our model will be accurate in most of time because the data is collected in real time. This model will be easier to use for analysing the data for the farmers and does not involve any complications. Smart model helps researchers to work on this field and help them to find many new things.

XI. REFERENCES

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