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END TO END ANALYSIS OF AGRONOMY USING IOT AND BIGDATA

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Abstract - *Technology has brought revolution to each and every field of common man's life by making everything smart and innovative .The aim of this paper is to prepare a Novel Analysis of agricultural field using big data technology. The agricultural stick being proposed via this paper is integrated with an Arduino Microcontroller board with soil, temperature and humidity sensors. These sensors collect the data from the field on the fly from a remote field. The data once received are analysed and discussed. This work invoked to take a preventive measure for loss of crop and also to increase the productivity of crop.*

Key Words: IoT, Big Data, Agro-Based, Embedded, Arduino, Embedded C.

1. INTRODUCTION

Technology has paved our way and lives more easier. Certainly, technology is growing day by day innovatively. If we were asked to name the top emerging technology. Internet of things and Big data is in the top of the IT field.

Internet of things, the name itself suggests that Internet has to play with the things of this vast world. Datas collected by the sensors are then analysed and visualised.

Fig-1

Essentially, IOT architecture consists of various elements such as sensors, protocols, actuators, cloud services and layers. Internet of things expands and innovates the data by connecting millions of devices, immediately sharing, receiving and analysing massive amounts of it to meet the future needs.

Big Data is likewise information yet with an enormous size. Enormous Data is a term used to portray an accumulation of information that is immense in size but developing exponentially with time. In short such information is so vast and complex that none of the conventional information the board devices can store it or procedure it productively.

The way toward assessing information utilizing investigative and legitimate thinking to analyze every part of the information gave. This type of investigation is only one of the numerous means that must be finished when directing an examination analyze.

Fig -2

Information from different sources is assembled, investigated, and after that dissected to shape a type of finding or end. There are an assortment of explicit information investigation technique, some of which incorporate information mining, content examination, business insight and information perceptions.

An implanted framework is a devoted PC framework intended for a couple of explicit capacities. This framework is installed as a piece of a total gadget framework that incorporates equipment, for example,

electrical and mechanical segments. The implanted framework is not normal for the broadly useful PC, which is built to deal with a wide scope of preparing errands.

2. LITERATURE SURVEY

In [1] the author defines the Agriculture is the broadest economic sector and plays an important role in the overall economic development of a nation. Technological advancements in the arena of agriculture will ascertain to increase the competence of certain farming activities. In this paper, we have proposed a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology. Our system focuses on the measurement of physical parameters such as soil moisture content, nutrient content, and pH of the soil that plays a vital role in farming activities. Based on the essential physical and chemical parameters of the soil measured, the required quantity of green manure, compost, and water is splashed on the crops using a smart irrigator, which is mounted on a movable overhead crane system. The detailed modeling and control strategies of a smart irrigator and smart farming system are demonstrated in this paper.

In [2] Internet of Things (IoT) plays a crucial role in smart agriculture. Smart farming is an emerging concept, because IoT sensors capable of providing information about their agriculture fields. The paper aims making use of evolving technology i.e. IoT and smart agriculture using automation. Monitoring environmental factors is the major factor to improve the yield of the efficient crops. The feature of this paper includes monitoring temperature and humidity in agricultural field through sensors using CC3200 single chip. Camera is interfaced with CC3200 to capture images and send that pictures through MMS to farmers mobile using WiFi.

In [3] there has been much research and various attempts to apply new IoT technology to agricultural areas. However, IoT for the agriculture should be considered differently against the same areas such as industrial, logistics. This paper presents the IoT-based agricultural production system for stabilizing supply and demand of agricultural products while developing the environment sensors and prediction system for the growth and production amount of crops by gathering its environmental information. Currently, the demand by consumption of agricultural products could be predicted quantitatively, however, the variation of harvest and production by the change of farm cultivated area, weather change, disease and insect damage etc. could not be predicted, so that the supply and demand of agricultural products has not been controlled properly. To overcome it, this paper designed the IoT-based monitoring system to analyze crop environment, and the method to improve the efficiency of decision making by analyzing harvest statistics. Therefore, this paper developed the decision support system to forecast agricultural production using IoT sensors. This system was also a unified system that supports the processes sowing seeds through selling agricultural products to consumers. The IoT-based agricultural production system through correlation analysis between the crop statistical information and agricultural environment information has enhanced the ability of farmers, researchers, and government officials to analyze current conditions and predict future harvest. Additionally, agricultural products quality can be improved because farmers observe whole cycle from seeding to selling using this IoT-based decision support system.

In [4] the paper researches the part of Internet of Things (IOT) in Agricultural Sector. Today agriculture is inserted with propel benefit like GPS, sensors that empower to impart to each other break down the information and furthermore trade information among them. IT gives benefit as cloud to farming. Agriculture cloud and IT benefit gives an exceptional ability administration to ranchers with respect to development of yields, estimating, composts ,maladies detail technique for cure to be utilized Scientist taking a shot at agriculture will give their disclosures, proposals with respect to cutting edge procedures for development ,utilization of manures can get the history of the area. The review depended on applying a cloud construct application in light of agriculture. This depends on agro-cloud that upgrade agricultural generation and accessibility of information identified with research extends in the fizzled, the effect of doing this will spare the cost and time make the correspondence simpler and speedier. This paper would advance a ton of research in the region of use of IOT in agriculture.

In [5] as an agricultural country, Bangladesh needs a developed agricultural field, empowering the farmers and using the technologies such as e-agriculture, online marketing which can establish a strong economy. In

this paper, we propose smart e-agriculture monitoring system for Bangladeshi farmers, mainly says the development of farmers as well as our country. By developing our agriculture with empowering country´s farmer, this paper provides the facilities of advertisement of the agricultural product, their worldwide marketing systems. In this paper, we show the statistics of products yearly growth, storage, savings, problems with their solutions, the agricultural news and the other information about the agricultural product and the related things through the information and communications technology (ICT) tools. For the development of Bangladesh, it is so much significant to provide all the facilities of information about the product to the farmers and agriculture-related person to pace with the modern world. It is mainly the integrated solution of all the agriculture.

3.IoT IN AGRONOMY

IoT has the ability to impact the world we live in; cutting edge ventures, associated vehicles, and more astute urban areas are generally parts of the IoT condition. Be that as it may, applying innovation like IoT to the agribusiness business could have the best effect.

3.1.1 Proposed solution for the improvement of agronomy

Agribusiness innovations progressed quickly in the second 50% of the twentieth century and toward the start of the 21st century. These advancements everlastingly changed the manner in which ranchers work.

In the proposed system we can monitor the plants remotely and that datas are stored in IOT. And external sensors are used to monitor the plants exact status

- ❏ It can be operated automatically.
- ❏ More operations can be performed using Automation
- ❏ Has intelligence to avoid flooding of field
- ❏ By using IOT we can the monitor

4. WORKING PRINCIPLE

To accomplish our proposed framework need to utilize Arduino Super controller to screen the field. In this temperature sensor, water level sensor, PH sensor, dampness sensor, downpour sensor and UV sensor is associated remotely so we can screen the precise perspective on plants and the fundamental piece of the framework is IOT. In this idea is predominantly used for reducing global warming. PIR sensor is utilized to identify the any creatures, if any creatures are went to the rural land around then the signal will on and message is send to the approved individual through GSM. So we can screen the plant is great condition or not in remote screen. Engine will naturally on and off dependent on sensor esteem. The sensor esteem are dissected with the BIG DATA.

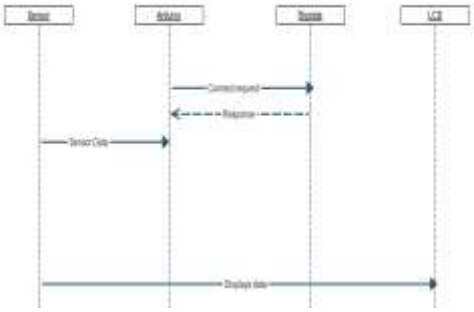

FIG 3: SEQUENCE DIAGRAM

5. COMPONENTS:

HARDWARE REQUIREMENTS:

- ❏ Arduino mega

IoT based Savvy agronomy fuses Arduino Mega 2560 unit that gives base to live observing of temperature and soil dampness

sensors used

- ❏ Rain sensor
- ❏ Moisture sensor
- ❏ PIR Sensor
- ❏ PH sensor
- ❏ UV sensor
- ❏ Temperature sensor
- ❏ Water level sensor
- ❏ Humidity Sensor
- ❏ Buzzer

Monitors the animate objects around surroundings

- ❏ Solar panel
- ❏ LCD

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits

- ❏ IOT
- ❏ Pump Motor

A pump motor is a DC motor device that moves fluids. A DC motor converts direct current electrical power into mechanical power.

SOFTWARE REQUIREMENTS:

- Arduino IDE
- BIG DATA
- Embedded c

6.DATA ANALYSIS

Data analysis is the prominent part of our activity. Big data involves storing large amount of data, analyzing and retrieving them according to our needs. Data analysis are of two types qualitative and quantitative analysis. Qualitative analysis sees the color and some texture of data whereas Quantitative analysis seeks for the numbers. Here we will analyze the temperature, water level, PH of the water level, UV rays of the sun that falls on the plant.

Fig 6: Cloudera os

6.1 Hadoop:(Hadoop Distributed File Systems)

Hadoop is used for running applications that stores large amount of data for predictive Analysis. Thus it enables parallel processing of datas for storing and analyzing. Hadoop uses mapreduce and HDFS. HDFS provides high throughput access to application data and is suitable for applications that have large amount of data.

TABLE 1. Data Loaded in HDFS

Computer Time	SOIL(LEVEL)	HUM(AIR)		TEMP(C)	RAIN(mm)	
12:11:18	1012.00 70	32	957	651	37	231
12:11:45	1017.00 70	32	962	648	37	231
12:12:12	1018.00 69	32	965	646	37	2438
12:12:39	1018.00 69	32	968	651	37	2449
12:13:05	1019.00 68	32	971	649	37	245
12:13:32	1018.00 68	32	971	649	37	246
12:13:59	1018.00 68	32	971	649	37	2470
12:14:26	1018.00 69	32	971	648	37	245
12:14:52	1018.00 69	32	971	648	37	214

Time taken: 0.313 seconds

6.2 Sqoop:(SQL to Hadoop)

A tool used for transformation between hadoop and relational databases. Sqoop uses Mapreduce to import and export the data. Database table is the input to the import process. Sqoop reads the table row by row into HDFS. The output is a set of files containing a copy of the imported table.

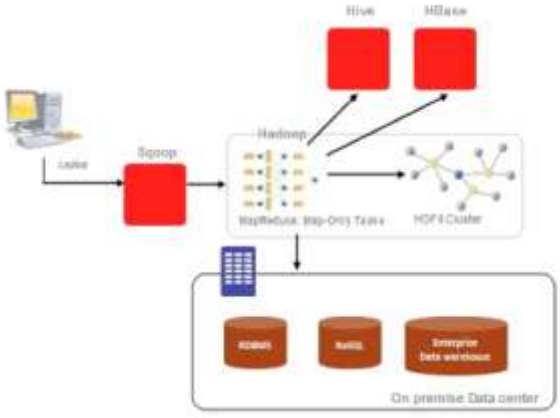

Fig 5: SQOOP ARCHITECTURE

6.3 Hive:

This is data warehouse software that creates interaction between the user and HDFS. It gives SQL-like interface to query the data. Since sqoop have already created tables we can extract and analyze the datas using sql queries.

Table 2 : using hive commands displaying the datas.

```
SELECT THE TABLE:

hive>select * from agricr;
('12:18:29'     '1018.00'       '69'    '31'    '975'   '648'   '19'    '233')
('12:18:52'     '174.00'        '69'    '31'    '978'   '647'   '19'    '7')
('12:19:18'     '1018.00'       '69'    '31'    '93'    '649'   '19'    '235')
('12:19:45'     '1018.00'       '69'    '31'    '77'    '647'   '19'    '252')
('12:20:12'     '1017.00'       '68'    '31'    '73'    '646'   '19'    '232')
('12:20:34'     '1017.00'       '69'    '32'    '74'    '756'   '19'    '252')
('12:20:57'     '1017.00'       '69'    '31'    '77'    '758'   '19'    '9')
('12:21:24'     '1017.00'       '69'    '31'    '80'    '603'   '19'    '237')
('12:21:50'     '1017.00'       '69'    '32'    '86'    '694'   '19'    '8')
('12:22:17'     '1017.00'       '69'    '32'    '96'    '696'   '19'    '231')
('12:22:44'     '1017.00'       '69'    '32'    '108'   '689'   '19'    '253')
('12:23:11'     '1019.00'       '69'    '31'    '127'   '690'   '19'    '252')
('12:23:37'     '1019.00'       '70'    '32'    '153'   '670'   '27'    '244')
```

Table 3: Retrieving datas for analysing

```
hive> select min(ULTRA), max(TEMP) from agricr where Computer_Time='12:18:52';
Total MapReduce jobs = 1
Launching Job 1 out of 1
Number of reduce tasks determined at compile time: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapred.reduce.tasks=<number>
Starting Job = job_201903182123_0007, Tracking URL = http://localhost:50030/job
Kill Command = /usr/lib/hadoop/bin/hadoop job  -Dmapred.job.tracker=localhost:8
2019-03-18 22:09:06,476 Stage-1 map = 0%,  reduce = 0%
2019-03-18 22:09:38,336 Stage-1 map = 100%,  reduce = 0%
2019-03-18 22:10:10,115 Stage-1 map = 100%,  reduce = 100%
Ended Job = job_201903182123_0007
OK
7       31
Time taken: 75.429 seconds
```

Thus we retrieve datas according to our will and are compared to the normal temperature of growth of plant.

When the temperature is high for a particular plant or a group of plants, we can make the plant to grow in a mild temperature.

When considered about ultraviolet rays of the sun, it is noticeable that a plant can bear certain amount of uv rays for its growth. If it's exposed to uv rays than it can bear , the it may leads to Plant damage and leaf burns. So we can change the position of the plant where sunlight is minimum for its requirement.

7. CONCLUSION:

The Paper has introduced the topic of participation in the real world struggle of agronomy. In this Paper, the issues that arise in bringing the project to a close have been examined, analyzed. Thus we conclude that we can increase the productivity to greater level and farmers can get a great advantage using this end to end analysis. After interpreting the datas we can easily analyse the productivity of crops and the plant growth. Thus Bigdata has made a remarkable change in this digitalized world for making new changes.

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