ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

AGROMETEOROLOGY ASSISTANCE SYSTEM

Dr.Anita H.B, Tapasya Kala, Lokesh Kothari, Pranav Sharma
Department of Computer Science, Christ University, Bangalore

Manuscript Info

Received: 14 October 2015
Final Accepted: 15 November 2015
Published Online: December 2015

Corresponding Author

Dr.Anita H.B

Abstract

In recent years, agricultural researches have gained momentum at rapid rate, as half the untry still de- pends on this agriculture. In the upcoming sections, an assistance system is proposed such that effective agricultural suggestions can be given to users based on weather data. The main aim here is to provide current weather of a place using sensors, google APIs or manual entries by authorized expert users, such that predictions can be made for growing suitable crops. The project aims to benefit agro-meteorologists, decision sup- port systems for cropping, statisticians and economists. The sensors data are considered to provide precise and best possible suggestions.

Key words: Weather, Agro-Meteorology, database, Sensor, query.

INTRODUCTION

In the growth of an economy, agriculture plays an important role while agricultural prosperity relies on weather. Weather is the state of the atmosphere, to the degree that it is hot or cold, wet or dry, calm or stormy, clear or cloudy. Decision regarding the plantation of unseasonal crops is one of the challenging tasks for agriculture planners and scientists, as it involves various natural and scientific phenomena. Agro-Meteorology Assistance is designed to develop an automated system, which not only monitors the weather condi- tion but also gives the automated suggestions to users regarding the plantation of crops.

This project combines the hardware such as arduino and sensors, which senses the accu- rate weather, and a software system, which processes the sensor data for providing best suggestions in crop decisions. System aims at giving the accurate weather details of a place and builds effective solutions for agro- scientists, farmers and businessmen. Section II (part A,B) of the paper talks about related existing and proposed system. Section III ex- plains about the methods used in system pro- posed. Section IV and V deals with test cases and experimental results.

2. LITERATURE REVIEW

A. Existing System

The related study has revealed IMD and IndiaEnvironmentPortal as some of the exist- ing agro-meteorology systems. These systems have undoubtedly a strong mechanism for Agromet advisory, but few drawbacks in their processes needs attention. Firstly their processes are much more manual hence it consumes a significant amount of human effort. There is a possibility of providing generic advice. It requires significant effort and coor- dination to cover all the crops. Secondly its also difficult to prepare the Agromet bulletin by considering several weather-specific dy- namics at a given location and time [1]. The governmental meteorological website like IMD is more focused on complex geograph- ical data. The common user cannot under- stand how to analyze or understand technical- ity of the system. Thus data cleaning or outlier detection becomes challenging task. Additonally the weather reported by the existing system is much more general and not specific, which means it doesn't cater to the current place rather its related to the nearest area.

B. Proposed System

This paper proposes a simplified system that combines weather monitoring sensor based system along with an agro-meteorology assis- tance website. For simplicity the cropping trends of Karnataka region are taken into consideration. The related study is from [2], [3] and [4]. There are four main benefits of the proposed system. Firstly the system pro- posed is comparatively much more user friendly as compared to the existing systems. It eliminates the drawbacks of populated and complex websites by providing better user interface. Secondly the weather data is pro- jected based on different sources such as Google weather APIs, Sensor generated files and manual entries by authorized users. Thirdly, Limit verification method is used for outlier detection in which we compare the observed data against extreme values based on climatologic records. If any of the follow- ing occurs, an observation is flagged for fur- ther investigation [5]. Different reports based on different sources of weather are generated by the system. Thirdly the user can view the weather where he is present currently irre- spective of the state or city. The average of the readings from the sensor files will pro- vide the weather of the current locality. Fourthly the system includes agricultural sys- tems along with alerts based on particular crop.

3. METHODOLOGY

3.1. SYSTEM REQUIREMENTS

In order to create the agro-met system in depth, all the components given below, are of necessity. The main components of the pro- ject is divided into two categories:

i. **Sensor based Hardware System**:

a. LM35: The LM35 temperature sensor hav- ing an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain conven- ient Centigrade scaling.

b. DHT11: Temperature & humidity sensor, ensuring high reliability and excellent long-term stability. The DHT11 has three lines: GND, +5V and a single data line. By means of a handshake, the values are clocked out over the single digital line.

ii. **Assistance System**:

It includes a web interface built using Html/Css/Javascript, MAMP server and PHP/MySQL databases. The information about humidity and temperature is auto- matically collected and stored in a text file or .csv file. The text information is fetched into the database by query operations, for suggestive agricultural and weather calcu- lations. For better functionality, an authen- tication is given to experts for manual weather entries and viewing past data sheets. Plant tables play a major role in framing an assistance system as the main motive of assistance is suggesting crops. It is to be noted that main operations are through complex queries that replaces the unnecessary need of macro-queries.

3.2 SYSTEM MODEL

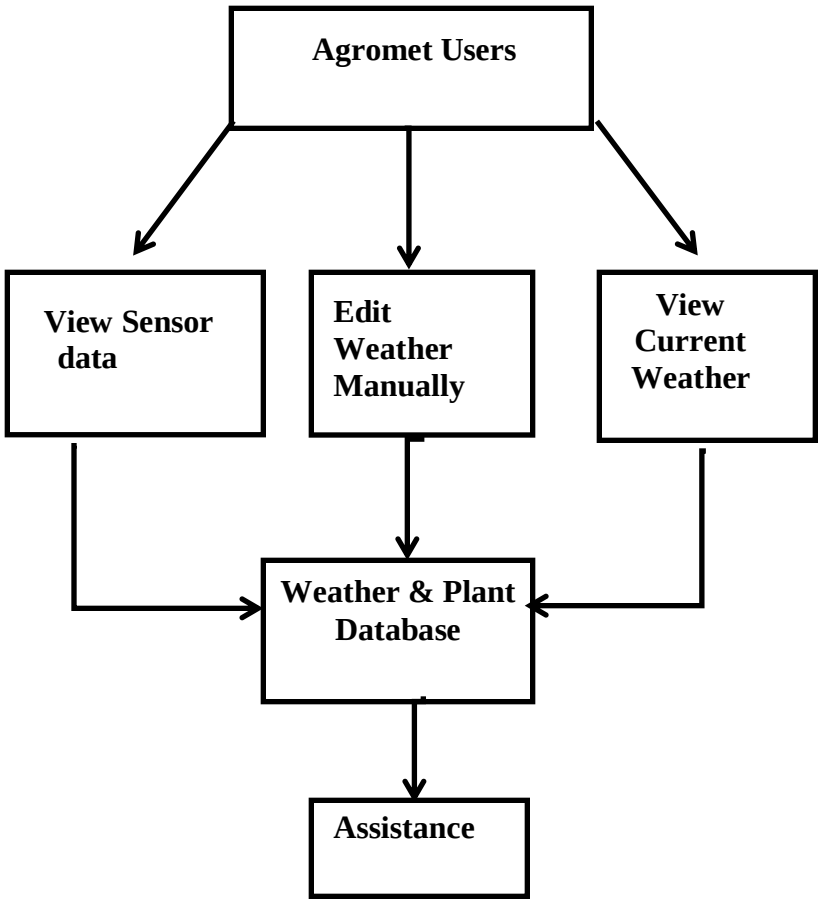

Fig. 3.1 : System Model

3.2.1 Module Description:

a. Agro-Met Expert Users:
Expert Users of Agro-Meteorology Assistance system that are authenti- cated to view the sensor details, edit weather manually in case of hardware faults. This stage involves outlier de- tection by applying few validation conditions.

b. Other Users:
General users who can get assistance related to agriculture, view current weather of their city and their locality. They can also do purchases, view news, videos related to agro-met system.

c. Sensors:

This is the input for agro and meteor- ology system that helps in giving the weather through a text file. Sensor system generates a text file in an un- structured form, which gets structured when fetched into MySQL database through a query. The main attributes of the file comprises of temperature and humidity.

d. Assistance:

This system includes powerful data- base querying operations to generate suggestion for growing

appropriate crop according to weather conditions. This comes with a display of related crop image along with alerts.

e. Explanation For Important Queries

The text file containing sensor data is in an unstructured form, which needs to be structured in order to perform database operations. The following MySQL query will transfer the data from a file generated from sensors to the database.

LOAD DATA LOCAL INFILE '/Path folders/File.csv' INTO TABLE data FIELDS TERMINATED BY ' ' LINES TERMINATED BY '\n' ;

The query given below fetches the recent readings of past one hour. To find weather, an average of most re- cent readings is taken into considera- tion. This average will provide the weather of the current place, which serves as the base for assistance system through joins performed on weather table.

Select * from Avg_Readings where cur_datetime<=NOW()or cur_datetime<=(SELECT (NOW() – IN- TERVAL 1 HOUR));

The flow of steps involved in an Agromet system is illustrated in the figure.

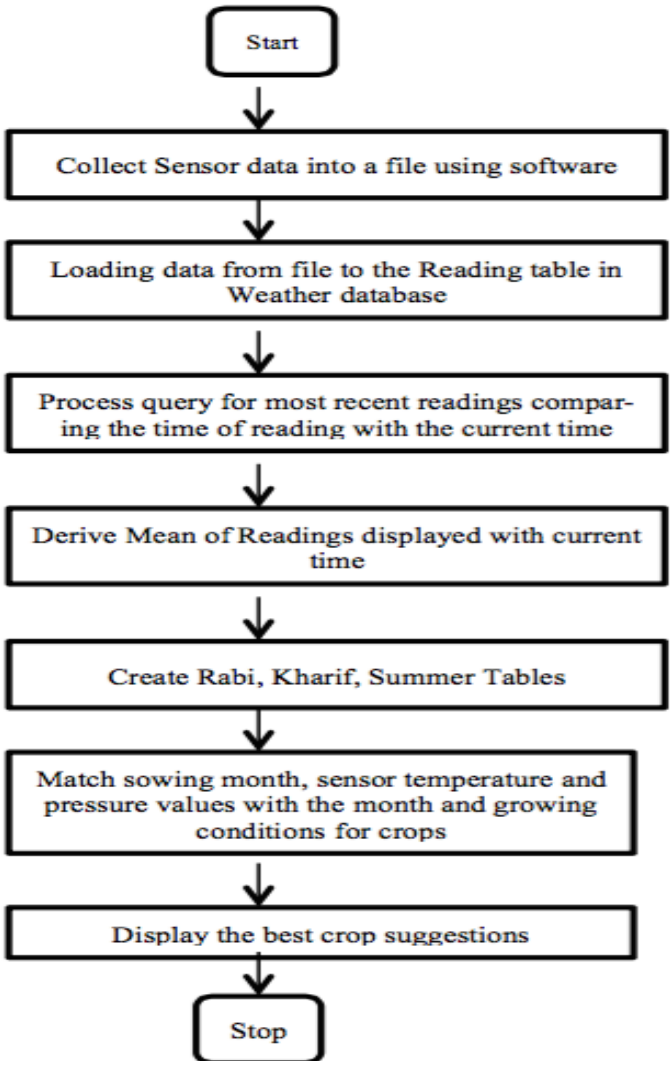

Fig.3.2.FlowDiagram

3.3 TEST CASES

In order to test the working conditions and functioning of code, there is a need of best test cases possible so far. The following table shows test cases in an agro-met system.

Table 3.1: Test Cases

Sensors	DHT11 and LM35 should give correct readings with an appropriate delay.
Loading data	Exact data needs to be loaded into Sensor file, each time the code in burnt on hardware.
Queries	Complex queries should work suc- cessfully.
Login/Register forms for Experts.	Text fields, submit buttons should be validated.
Control Flow Testing	The control flow between several modules is to be tested.
Abstraction	There needs to be an efficient abstraction at all levels. Only Experts can view all sensor data and not users.

3.4 EXPERIMENTAL RESULTS

From the above cases, it is observed that the sensors and software collabo- rate successfully to build an efficient assistance system.

- Sensors DHT11 and LM35 are tested to produce temperature and humidity. The mean value is taken into an account.
- Form validation and redirection to appropriate pages is checked.
- Abstraction is thoroughly observed such that experts data is available only to expert.
- For cleaning up of data, outliers need to be detected in order to achieve correct results.
- Queries combining several tables resulted in successful records.

5. CONCLUSION

Agro-Meteorolgy system is an efficient step in increasing the agricultural productivity, by assisting farmers and agro scientists about weather and planta- tions. It has used weather sensors and da- tabase system effectively for producing best possible solutions. Since data clean- ing is an integral part of the system, it serves as the reliable source of real time solutions such that the quality assurance of the system enhanced.

6. REFERENCES

[1] P.Krishna Reddy, B.Bhaskar Reddy, P.Gowtham Srinivas, D.Satheesh Kumar, D.Raji Reddy, G.Sreenivas, L.S. Rathore, K.K. Singh, N.Chattopadhyay "eAgromet: A Pro- totype of an IT-Based Agrometeoro- logical Advisory System", 9th Inter- national Workshop, DNIS 2014, Azu-Wakamatsu, Japan, March 24-26, 2014. Proceedings.

[2] Komol Singha, Rohi Choudhary and Kedar Vishnu"Growth and Diversi- fication of Horticulture Crops in Kar- nataka: An Inter-District Analysis", Published 12 September 2014

[3] Saraswati Poudel Acharya, H. Basavaraja, L.B. Kunnal S.B. Maha- janashetti and A.R.S Bhat "Crop Di- versification in Karnataka: An EconomicAnalysis."Agricultural Economics Research Review01/2011; 24(2). Source : RePEc.

[4] Dr. Premakumara G. S and Usha- rani N. D. "Financial Productivity of Agricultural Crops in Karnataka".

[5] CarsonK-S. Leung, Mark A.F. Mateo, Andrew J. Nadler "Camel: An Intelligent Computational Model For Agro-Meteorological Data"