Survey on Smart Crop Weather Based Disease Prediction and Monitoring System

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Abstract : A Vital role is played by soil and weather in the yield. The growth of plant is affected when the conditions of weather and soil changes. The influence of these changes may be positive or negative. If the influence is positive then there is nothing to do, but if it influenced negatively then the farmer should me made alert about the effects. So the crop need to be monitors continuously in order to keep track on the soil and weather and soil conditions. The papers discussed below describes about forecasting disease on the basis of weather and soil conditions at a particular area by collecting this data. By analyzing those data their predictions, their solutions given etc. the various techniques used such as Big-data, ANN, Image processing.

Keywords-IOT(internet of things); Big-data; ANN(Artificial neural network); Image processing; facility agriculture ecosystem; intelligence; framework

I. INTRODUCTION

Agriculture plays vital role in the development of agricultural country. In India about 70% of population depends upon farming and one third of the nation's capital comes from farming. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. Issues concerning agriculture have been always hindering the development of the country. Traditional farming in Indian context is farming done using embedded knowledge and wisdom gained from the experience over many generations. Mostly passed on by visual and oral instructions. It is generally suited to the local conditions.

To tackle farmers' problem we carried out a survey regarding modern farming. We studied different papers which described various techniques of farming. Modern agriculture uses advanced technology, it is less labor intensive than traditional agriculture, and the yield quantity is larger because there is a focus on maximizing production and maintaining a consistent quality. This is in terms of both Harvesting and growing the plants but also in cases where one is applying fertilizers and pesticides. Modern agriculture uses advanced technology such as ANN, Image processing, big data, etc. The Image processing techniques it is used to enhance accuracy and reducing farmers' manual monitoring. The Artificial neural network technique can be used to Forecasting diseases on the basis on prior data.

II. RESEARCH METHODOLOGY

The survey is done on the basis of various performance parameters.

II.1. lOT of Agriculture based on Three Layers Architecture

Jingzhou Hubeiin in [1] The Author has represented three main layer of agriculture : Perception, transportation and Application and the research on Sensors for first layer that is Perception layer , application modes on Bluetooth's and 4G in Transportation Layer and for the layer of application the studied various Algorithms and Framework.

In [1] accordance with the proposed system by author describes the improvement in farmers income by providing farmer's knowledge regarding the plants getting contracted duty to the diseases through Mobile applications providing FAQ facility.

II.2. Framework and Case Studies of Intelligence Monitoring Platform in Facility Agriculture Ecosystem

Tianchen Qiu, Hang Xiao and Pei Zhou in [2] described a framework for intelligent monitoring platform and system structure which is used for facility agriculture ecosystem based on JOT. The solution is divided into four layers based on the difference in information exchange process and task logical handling, i.e. sensor layer, transmission layer, monitoring layer, application layer.

A. Sensor layer

This layer is responsible for numerical sensor of physical values in farming. In this layer the sensor module formats and processes collected data based on public standard, and transforms to information and stores.

B. Transmission layer

This layer summarizes collected data from sensor layer, using Internet technology. The transmission layer provides data for upper layer to invoke analyze and process.

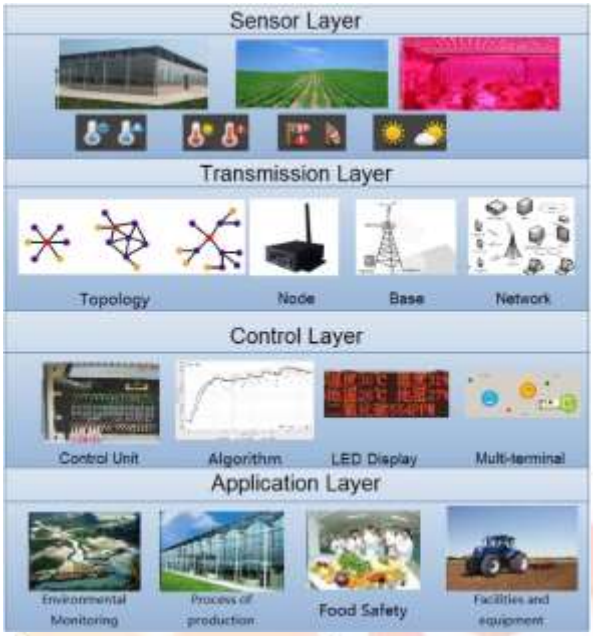

Figure 2.Platform Framework from [2]

C. Monitoring layer

This layer uses the summarized data as input parameters, and intellectually control task in agriculture, by regulating automatic control algorithm. It results in better ecosystem that better suits crops' growth, reduces human interference, and eventually achieves more accurate farming process.

D. Application layer

This layer summarizes and analyzes huge volume of information across locations and industries, through advanced open-ness and intelligence. It is useful for build up the industry's information service on environment, and better supports decision-making and action. Adjacent layers in the same system use standard interface to send data.

This paper described the above-mentioned framework in intelligent monitoring platform is used to agriculture ecosystem. It can be also used to analyze and verifies the whole implementation process and selection of decision-making model.

To conclude this discussion [2] the framework motioned in this paper focuses mainly on the improvement of traditional mode agricultural management enhancing prevention and control capabilities of flora and fauna epidemic disease ensuring the raise in the quality and safety of agricultural products and salubrious cultivation, busting production efficiency.

II.3. Detection of plant leaf Diseases using image segmentation and soft computing Techniques

Vijai Singh and A. K. Misra in [3] give the solution related to leaf diseases. In which, image segmentation technique algorithm is used for automatic detection and classification of plant leaf diseases. It also gives information about different disease classification techniques. Genetic algorithm is used for disease detection in plant leaf.

To conclude this discussion [3] the image segmentation technique motioned in this paper is used for the automatic detection and classification of plant leaf diseases.

II.4. A Survey on Crop Disease Detection and Prevention using Android Application

Santosh Reddy, Abhijeet Pawar, Sumit Rasane and Suraj Kadam in[4] described view on experimental farming and proposed a Mobile application on the basis of Image Processing , Online market place, Market rate guide, Weather report System ,Soil information which provides information of diseases by visualizing the plant.

To conclude this discussion [4] author has Using the above techniques the proposed system mostly focuses on the peat of visualization and on the basis of reposts that are gathered.

II.5. Artificial Neural Network Assisted Weather Based Plant Disease Forecasting System

R. Bhagawati, *K. Bhagawati, A.K.K. Singh, R. Nongthombam, R. Sarmah and G. Bhagawati in [5] research on plant disease forecasting which is design artificial neural network has multilayer perception architecture. The prediction from the propose model has about 81-87% of accuracy for the rice blast disease. Since the model is multivariate non-layer, non-parametric, data driven self-adaptive statistical method, the resultant output is highly accurate than conventional regression models.

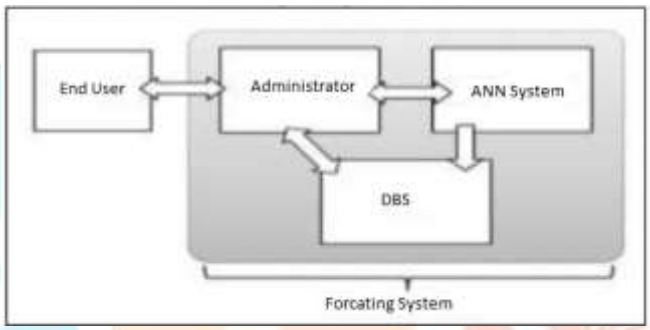

Figure 3.The forecasting system with different modules from [5]

II.6. Enabling Agricultural Automation to Optimize Utilization of Water, Fertilizer and Insecticides by implementing Internet of Things (IoT)

Arindam Giri[1], Subrata Dutta [2], Sarmistha Neogy [3][6] these authors from India. In this paper they developed a framework called as "AgriTech". This is a framework of optimizing resources. The recourses such as water, fertilizers, insecticides and manual labor etc. in agriculture through the use of IoT. The paper consists of all the investigated problems elaborated in the implementation of an application.

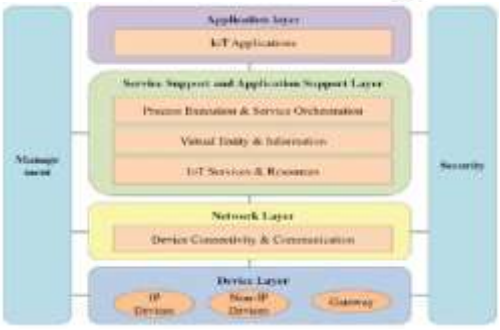

Figure 4. IoT reference model and functional groups from [6]

In the above figure, the IoT reference model can be represented by four layers (application, service support / application support, network, and device layers). Each layer is accomplished with management module and security module for providing efficient and secure system.

III. RESULTS AND DISCUSSION

Results of Descriptive Statics of Study Variables

Table III.1: Descriptive Statics

AUTHOR(S) AND YEAR	FRAMEWORK DEVLOPED	ADVANTAGE	DISADVANTAGE
Jingzhou Hubei	Big Data, Internet of things	Monitoring the plant production process, warning of main diseases and pests, and rapid diagnosis	Monitor Statically the calculated data may not be same as intended
Tianchen Qiu, Hang Xiao and Pei Zhou	Monitoring platform framework and system structure	Monitoring platform and system structure for facility agriculture ecosystem	High cost compared with other structural systems
Vijai Singh and A. K. Misra	Image segmentation technique	Automatic detection and classification of plant leaf diseases	Need prior knowledge of image
Santosh Reddy, Abhijeet Pawar, Sumit Rasane and Suraj Kadam	Android app	Farmers to take proper decisions and improve their farming experience without suffering from heavy losses	Static information about soil
R. Bhagawati, *K. Bhagawati, A.K.K. Singh, R. Nongthombam, R. Sarmah and G. Bhagawati	Artificial neural network	Forecasting diseases on the basis on prior data	No structural method, required more data and computer time for training
Arindam Giri[1], Subrata Dutta [2], Sarmistha Neogy	AgriTech Framework	Optimizing resources in agriculture through the use of IoT	amount of money is needed to accommodate the framework

Table III.1 describes comparative based on the following parameter- Author name with year of publication, technique developed by the author, advantages and disadvantages of used techniques. Vijai Singh and A. K. Misra in their paper image segmentation technique motioned and it is used for the automatic detection and classification of plant leaf diseases.

The author Jingzhou Hubei in his paper published in 2017 has described the three layer architecture which monitors the plant production process and warns early about the diseases and the remedial pasts and rapid diagnosis.

Author Santosh Reddy and others in their paper published in 2015 have designed an application which on the basis of image processing provides the solutions to the diseases but according to my perspective the image processing will provide the information after the crop has been affected the crop that will cause loss to the crops and the static information about soil me not that much be helpful to the famers

According to us R. Bhagawati the author herwritten in his paper about weather based plant disease forecasting in their research paper they have brilliantly forecasted the diseases that may affect the crops the accuracy is also at the highest rate but this is good for data mining or the purpose of business intelligence for study purpose this may not actually be useful during the implementation that is since author himself mentions few drawbacks such as unanalyzed outputs, prone to over fitting problems, unstructured method and huge data requirement

IV. CONCLUSION

This survey will help us to increase our knowledge and help us explore various techniques of smart farming this survey describes various techniques of monitoring environmental conditions and thus providing necessary information to the farmers. All the papers which are taken for references described their methods developed for smart farming which talks more about weather forecasting and disease predictions it helped us know various facts figures and showed different perspective for farming.

V. References

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