



A SURVEY ON IOT ENABLED EXPERT SYSTEM FOR SMART AGRICULTURE

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Abstract: Agriculture is one of the most important profession that makes surplus services to the mankind. Without agriculture necessities, the benefits from it cannot be obtained. Therefore, food will not be satisfied. Meanwhile technology is taking a tremendous growth across the horizons. So this technology can be utilized for making agriculture easier. In earlier days, the farmers can predict the various types and impacts of the disease by observing the crops. Now a days, since there is inflation in plant disease, it is very challenging to recognize those diseases in the plants. This survey examines the various technologies used by the farmers in smart agriculture. This focuses on finding the health issues of the crops in short period of time by recognizing the various types of diseases present in the crops and avoiding the massive destruction on the crop field.

Keywords: IOT, artificial intelligence, smart agriculture, wireless sensor networks.

I. INTRODUCTION

IOT has been incorporate with next massive thing in Internet.[10] This special aspect features and emerging prior services, IOT architecture ,protocol and applications. IOT provides a combination of various sensors and objects that can speak directly with one another without human interaction. The Things in the IOT incorporates physical devices, such as sensor devices, which observes and gathers all types of communities. The zenith rise of the IOT led to the consistent global connection of people, sensors, objects and services. The main aim of the IOT is to provide a wide web infrastructure with interoperable converse protocols and software to enable the connection and fusion of physical/virtual sensors, personal computers, automobiles, smart gadgets and items like refrigerator, dish washer, food, microwave and medicines.

WSNs are mostly used in many places, [11] such as framework monitoring systems, smart grid systems, IOT systems and smart home system. Wireless sensor networks are suitable to many sophisticated industrial or military applications, including environmental monitoring, surveillance, object tracking. In WSNs Energy harvesting (EH) is the development of opportunistically pick up energy from the surrounding environment, such as piezoelectric, thermal, solar and radio frequency (RF) to enhance a device's real time. In many daily applications, sensor nodes can be equipped with very small video cameras to ease the task of tracing a specific object of interest, or the periodic monitoring of any coinage in the environment.

The Detection and analyze of invertebrates on crops is essential for[12] IPM because it could provide an specific time when crops are attacked and it could afford the perfect location where crops are infect based up on time. For instance, Andhra Pradesh Chief Minister N.Chandrababu Naidu have introduced an inventive multi-lingual plant a

disease and pest diagnostic application named plantix for farmer's mobile phones. This application would lead farmers to identify various diseases, the required pests for their crops and will also suggest remedies for the same. Initially launched in the Indian regional languages of Telugu and Hindi, the application will soon be available in other regional languages.

Real-time diagnosis: Uploaded crop photos are analyzed using image-recognition technology that uses a database of half a million pictures covering 30 crops and offers prescriptions for over 120 crop diseases. The small holder farmers are the end-users. It is free of cost, with an easy-to-use dashboard in local languages and also tested successfully. Recently demonstrated successfully with farmers at several sites, including Krishna district in Andhra Pradesh

The Indian government has taken various actions for developing agricultural credit for farmers. But some of the farmers committed suicide by intensive fungicides, crop failure and inefficiency to repay the bill. Necessary motivates of the suicides due to lack of sufficient water and inadequate rainfall. Farmer suicide mostly happens in the region of Punjab, Kerala and delta regions of Tamil Nadu. So, the analysis is conducted on field survey in Tami Nadu specifically in the districts of Salem, Trichy and Namakkal. The survey is taken from the planted crops like tomato, onion, turmeric and tapioca. After that few data's are gathered and arranged based on some requirements of these crops as per the data given by the farmers around. On basis of these information sensors are used for measuring temperature and humidity.

II. RELATED WORKS

In this work [1] author proposed a system which allows the farmers to view their farm information detail from isolated location. The prediction of disease in the plant is a major task to prohibiting the yield of agriculture commodity from the diseases and which is very challenging to do physically by the human. A classical way of irrigation system is not that much effective and uncertain. Therefore, this system involves IOT, system irrigation and wireless sensors. It optimizes the water usage in the field and provides a remote controlling and also monitor the irrigation system. Using Internet of Things concepts, the system communicates and processes data from sensors.

This proposed work [2] by the author deals with then non-linear analysis of electromagnetic and heating phenomena required in the soil disinfection. The usefulness of the system is demonstrated in a practical case and an optimal design technique is derived for any kind of soil. This work develops an approach to assess the usefulness of the pest control by means of microwave heating of farmland with various types of compositions and thermal equations are fully based on the order of magnitude difference in their time – scale, allows a very effective solution. The temperature depends on both dielectric and thermal properties of soil. For different types of exposure time and kind of soil, it is conceivable to follow this approach here to optimize a disinfection procedure and this model gives a far more realistic description of the heating process.

In this concept author is aimed [3] at accurate detection and identification of crop and effectively controlling and preventing diseases for supportable agriculture and security in food. This proposed approach is mainly includes various concepts similar to image processing such as image acquisition, feature extraction, image pre-processing, creating database and classification by using artificial neural network. The statistical moments are used to extract texture features which provides the accuracy of 80.45%. Since, it is not applicable for multiple crops of various types. Because the system has to select those features that can classify their crop diseases accurately. Classification of accuracy of the system can be improved by using additional texture features and Gabor filter can also be used for texture feature extraction.

This proposed work [4] of the author is mainly aimed to establish the new spectral indices (NSIs) that would be more useful for determining various diseases on crops. There are three different types of pests were used in this method that are powdery mildew, yellow rust, and aphids in winter wheat. The newly optimized spectral indices were acquired from a weighted consolidation of a single band and adjusted wavelength difference of two different bands. The most and the least compatible wavelengths for the different types of diseases were extracted from the leaf spectral data by using the RELIEF-F algorithm. Diseases could be resolved and differentiated, which is not preferable in the existing system. This work is expecting the use of hyperspectral information to enhance NSIs will further improve the sensitivity of disease.

This proposed concept [5] by the author is aimed at evolving a spectral disease index (SDI) that is capable to analyze the various levels of wheat leaf rust disease at different DS levels. In order to meet the aim of this study, the reflectance

spectra of leaves with different symptom values and DS levels were deliberated with a spectro radiometer. Then, the spectra of the various disease symptoms at the leaves were determined, and a new process was developed to determine the wavelengths that are sensitive to the disease symptom values. In this proposed work Spectral data have been used to calculate the disease severity levels of various plants. However, such data have not been calculated to estimate the disease stages of the plant. This SDI exhibited high accuracy and sensitiveness in discerning disease levels at a certain Ds. In this proposed system [6] the author aimed to create an on-the-food auditing of conceivable bacterial infections in real-time. The author successfully established an on-the-plant design for detecting signature molecules from bacteria beneath UV light using MB designed for the detecting the gene, Bt cry1Ac and co-in filtrating Arabidopsis with genomic DNA from B. Thuriensis and its respective MB, potentiating its uses in the field using a basic handheld UV device. However, further works are need to be performed in order to practically implement this detection technique. Additional experiments will be required to find sensitiveness and specificity for more than one target organisms in real-world environmental.

This work author [7] proposed a system to make a alert scenario promoting empower advances, for example, sensors, inserted electronic gadgets, and correspondence delegation. For producing a result the author picked a grape plant in certain foundation. Creating Grape is an conquer errand as the plant is presented to the charge from various small scale life forms, bacterial maladies. The side effects of the assaults are generally diagnose through the leaves, stems or organic product analysis. The cause leaf ailment region of grape plant is picked in this shell. The side effects of the violations are normally identified through the organic product or stems leaves in the plants.

This aimed approach [8] by the author is based on robotics detection. Robotics detection is the combination to identify disease in the agriculture. This approach uses a computer vision for automation. This can be overcome the threat in the crops or leafs in the agriculture. The disease was monitored in the green house physically by the human experts. It upsurge the green house yielding, quality and sustainability. In this system the disease detection in greenhouses is used to develop the control of disease, to upgrade the yield, and decreases the fertilizer application. This system is Develop to operate the work-volume that is used to solve the problems. Since it was persuade based on the top side of the leaf to identify the symptoms of the disease is start on its bottom side. The hazard of the down side of the leaf during detection is habitual to increases PM condition detection.

In this concept the author is [9] aims to present a study process on the image processing techniques used to determine and classify the fungal disease symptoms affected on different agriculture/horticulture crops. Many diseases exhibit common note that are be caused by different pathogens produced by leaves, roots etc. Images Often do not acquire enough details to assist in diagnosis, resulting in waste of time, misshaping the diagnostician to access at incorrect diagnosis. Farmers experience great complex and also in changing from one disease control policy to another i.e. profound use of fungicides. Farmers are also anxious about the massive costs involved in these activities and

severe loss. The cost power, automatic correct apperception and classification of diseases based on their specific

symptoms is very essential to farmers and also agriculture scientists.

TABLE 1: OVERVIEW ON THE SMART AGRICULTURE TECHNOLOGY

References	Devices/Tec hnologies	Benefits	Support service cloud	Data capture in real time
Smart irrigation system[1]	MATLAB, wireless sensor, IOT.	optimizes the water usage, provides a remote controlling, monitor the system.	YES	YES
Non Linear Analysis of Soil Microwave Heating:[2]	Microwave antennas, electromagn etic heating.	Allows a very effective solution.	NO	YES
Cucumber Disease Detection[3]	Artificial neural network, MATLAB.	Provides the Accuracy of 80.45%.	NO	YES
Identifying and Monitoring Winter Wheat Diseases.[4]	Hyperspectr um	Diseases could be determined and Differentiated.	NO	YES
Detection and Identification of Disease Stages[5]	ASD spectro radiometer, MATLAB.	This SDI exhibited high accuracy and sensitiveness.	NO	YES
Mega-Nano Detection of Foodborne Pathogens and Transgenes[6]	Quantum dots, DNA.	Established an on-the-plant design for detecting signature molecules.	NO	YES
Leaf disease Detection[7]	IOT, Zigbee module, WSN.	Monitoring both the climate and plant would give the more accurate information.	YES	YES
Robotic disease detection in green houses[8]	RGB camera, laser sensor, computer automation.	Overcome the threat in the crops or leafs in the agriculture.	NO	YES
Identification and Classification of Fungal disease[9]	Image processing, pattern recognition.	Monitor the crop for possible diseases and avoids upcoming loss of crops.	NO	YES

Table 1 gives the overview of the various technologies used for smart agriculture.

III. CONCLUSION

IOT is flourishing rapidly and vastly applied in all wireless environments. Smart agriculture is a directed and computerized information technology equip with the IOT. By fixing sensors in the crop field which are connected to the internet through IOT. Profitable to use fertilizers and pesticides can be offered through the expert systems based

on IOT. In this survey, sensor technology and wireless networks integration of IOT technology has been learned and reviewed based on the certain situation of agricultural system. This survey can be beneficial to the farmers to monitor their crops in improving the yield.

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