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Cloud-IoT Based Decision Support System

Krishan Kant Sharma

Department of Physics, Vivekananda Global University, Jaipur, India

Email ID: krishan_sharma@vgu.ac.in

ABSTRACT: The implementation of a Decision Support System (DSS) in agriculture to prevent potato late blight disease has proved its usefulness. In addition, the DSS offers flexibility and decreases the cost of production as well as the environmental impact because it calculates the exact amount of fungicide to be applied. This prediction uses model blight forecast based on environmental condition. Typically needs weather information from costly weather stations, or imprecise historical records. Nevertheless, thanks to the evolution of the Internet of Things (IOT), climate data could easily be gathered. In reality, a large number of low-cost, low-power sensor nodes inside farms might do this. Afterwards, climate data can be redirected from the sensors to the Cloud-IOT system via an internet connection. In this paper we developed and experimented a late blight decision support framework based on Cloud-IOT. Our proposed program provides broader usability and a lower cost relative to the state-of - the-art DSS study.

KEYWORDS*:* BlightMot, Cloud-IOT, DSS, Late blight, WSN

I. INTRODUCTION

In our areas, potato late blight has always been the most dangerous disease for potatoes. Potato late blight has been a nightmare for farmers and potato growers since its introduction in the mid-seventies. It is now known in our regions as the most important disease affecting potatoes because of the harm it causes and its effects on crop production and the quality of the commodity itself. Nonetheless, there are conventional approaches in place to prevent this disease from being even more successful. Phytophthorainfestans will damage the potato leaves, infect the tubers and in just a few days make them unfit for marketing. Therefore the harm is total, and immediate. Farmers have to spend a large amount of money taken out of their means of production to counter this epidemic. This also includes the overuse of phytosanitary materials. Such techniques have multiple impacts which can be seen in various scales. The economic consequences of the cost of production could be seen in rising. Hence, the high market price of the drug. Excessive use of phytosanitary products can affect both the environment and the possibility of new diseases arising from the first. The method of implementing the means of security and monitoring on a social scale is also time-consuming for farmers. Before applying this fungicidal defense it is also necessary to recognize the effect of the "late blight" on the crops.

In this sense, Decision Support Systems (DSS) is helping farmers adopt successful treatment programs, thanks to the knowledge they incorporate. This, for example, helps farmers develop more efficient control methods with minimal risks. Worded a different way DSS does not actively minimize the number of interventions, but instead more efficiently track and regulate the "late blight." DSS can be used both to improve the effect of control methods and to sustain fungicide application. The latter DSS requires the processing of weather data from, or based on historical records, an expensive weather station network. Historical records have become more and more important with the climate change offering accurate forecasts of the climate conditions. In addition, we can not rely on weather forecasting systems in developing countries to obtain critical climate information. DSS is far from being effective in North African countries, based on the latter's state-of - the-art observation. It should be remembered that the growth of the Internet of Things has in fact made it possible to interconnect vast numbers of tiny and low-cost climate sensors. The objective of this study is to create and implement a late blight cloud-IOT DSS that allows the use of location-specific weather data to drive disease predictors and a late blight disease mechanistic model to provide real-time and in-season guidance to prevent and counter late blight disease.

The aim of this study is to build and introduce a late-blight Cloud-IOT DSS. The latter would require regional weather data to be used to guide disease forecasters. This Cloud-IOT DSS for late blight is also believed to require the use of a

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late blight disease mechanistic model to provide guidance in real time and in season to prevent and counter late blight disease.

II. LITERATURE REVIEW

Ubiquitous sensing provided by technology from the Wireless Sensor Network (WSN) cuts through many areas of modern life. It includes the opportunity to assess, infer and appreciate environmental factors, ranging from fragile ecologies and natural resources to urban environments. The emergence of such devices in a communicating-actuating network this paper provides a cloud-centric vision for Internet of Things to be applied worldwide. It addresses the primary enabling technologies and application domains which are likely to drive IoT research in the near future. Presentation of a cloud architecture using Aneka, which is based on private and public cloud interactions. We conclude our IoT vision by building on the need for WSN, the Cloud, and global technical science community-oriented computing convergence[1]. The Internet of Things (IoT) is an Internet-based concept that involves multiple integrated technologies, such as RFID (Radio Frequency Identification) and WSAN (Wireless Sensor and Actor Networks), for information sharing. The current needs for better control, monitoring and management in many fields, as well as ongoing work in this field, have led to the introduction and development of multiple systems such as smart-home, smart-city and smart grid. This paper presents a survey of the components of integration: cloud systems, cloud infrastructures and IoT middleware. However, some integration ideas and data analytics approaches are being assessed, as well as numerous problems and open research concerns being highlighted[2]. It is important to break down application and technology-based silos and promote widespread networking and data sharing in order to realize the wide dream of ubiquitous computing underpinned by the 'Internet of Things' (IoT); the cloud is a natural enabler. This paper focuses on security issues for IoT from the viewpoint of cloud tenants, end-users and service providers operating through a broad variety of IoT technologies (whether they are objects or whole IoT subsystems) in the light of large-scale proliferation. Our goal is to evaluate the current state of cloud-supported IoT so that the security issues that need more study are made clear[3]. The Internet of Things (IoT) is gaining prominence with growing applications in the realms of ubiquitous and context-aware computing. Whether it's sensor nodes or stupid objects, basically anything can be part of it in IoTs, so many different types of services can be generated. In this regard, it will need much better infrastructure and sophisticated mechanism for resource management, service development, service management, service discovery, data storage and power management. We addressed this idea in depth in this paper, and introduced Smart Gateway architecture with Fog Computing. Based on Upload Delay, Synchronization Delay, Jitter, Bulk-data Upload Delay, and Bulk-data Synchronization Delay, we checked the definition[4]. This article surveys common IoT cloud platforms with a view to solving various service domains such as application development, device management, system management, complexity management, data management, analytics tools, delivery, monitoring, visualization, and study. A measure for the complete distribution of IoT clouds is provided according to their applicability. Further, few challenges are also described that the researchers should take on in near future. Ultimately, the goal of this article is to provide detailed knowledge about the existing IoT cloud service providers and their pros and cons in concrete form[5]. The Internet of Things (IoT) creates an unparalleled quantity and data diversity. Yet by the time the data for review finds its way to the cloud, the ability to act on it may be gone. This white paper, intended for professionals in IT and operational technology, describes a new paradigm for evaluating IoT data and acting on them[6]. The recent proliferation of the Internet of Things (IoT) and the consequent increase in data volume generated by smart devices have resulted in data outsourcing to designated data centers. However, centralized data centers, such as cloud storage, cannot afford an auspicious way to handle such massive data stores. The proposed model makes high-performance computing at cost-effectiveness. In addition, we include a safe distributed fog node architecture that uses SDN and block chain techniques to carry computing resources to the edge of the IoT network and allow low latency access to large volumes of data in a secure manner[7]. The advances in cloud computing and the web of things (IoT) have provided a great opportunity to address the difficulties posed by the growing problems of transport. We aim to deliver a unique multi-layered communication information technology platform using cloud computing and IoT technologies To tackle the challenges raised by that transportation challenges. Using cloud computing and IoT technologies, we present a novel, multilayered vehicular data storage platform. Reviews are also provided on two groundbreaking vehicle data cloud services, an intelligent cloud parking service and a vehicular data mining cloud service in the IoT setting[8]. This paper introduces an IoT-based block chain architecture that provides centralized control of access and data

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management. We depart from the current model of trust which delegates access control of our data to a centralized trusted authority and empowers users with data ownership instead. The architecture is adapted to IoT data sources and allows safe data sharing. By using the block chain as an auditable and transparent access control layer to the storage layer, we allow efficient and scalable access control management. We facilitate the storage of time series IoT data at the edge of the network through a decentralized locality-Aware storage system which is managed using blockchaintechnology[9]. This paper assesses the functions of blockchain in promoting protection and preserving privacy. Given that much of the data is actually stored in cloud data centers, it also compares how blockchain performs in various security and privacy aspects vis-à-vis the web. The paper provides a detailed overview and explanation of the functions of blockchain in monitoring the origins of vulnerability in the IoT-related supply chains. The paper also discusses how blockchain may be able to targeted contain an IoT security violation after it is discovered. In this point, it examines and analyses the efforts of governments, inter-organization networks and industries[10].

III. METHOD

The prototype proposed consists of three main blocks: Stuff, Gateway, and Cloud-IOT. A number of collector Sensor nodes are rendered into this layer. The latter are used to gather information about microclimates such as temperature, heat, and humidity. We have several approaches proposed in the wireless sensor network markets. However, the risk is too high for use in the sense of farming. Enables the elimination of light-illness attack rates. The system alerts farmers when special attention and human intervention can be needed on conditions. This approach, based on a Labellum sensor, appears to be a little costly for agriculture since we have introduced our low-cost WSN system that is tailored to late blight use. We will explain the solution in this section. Our prototype WSN node is based on the IoT platform Node MCU and the humidity and temperature sensor DHT11. Figure 1 shows the application design.

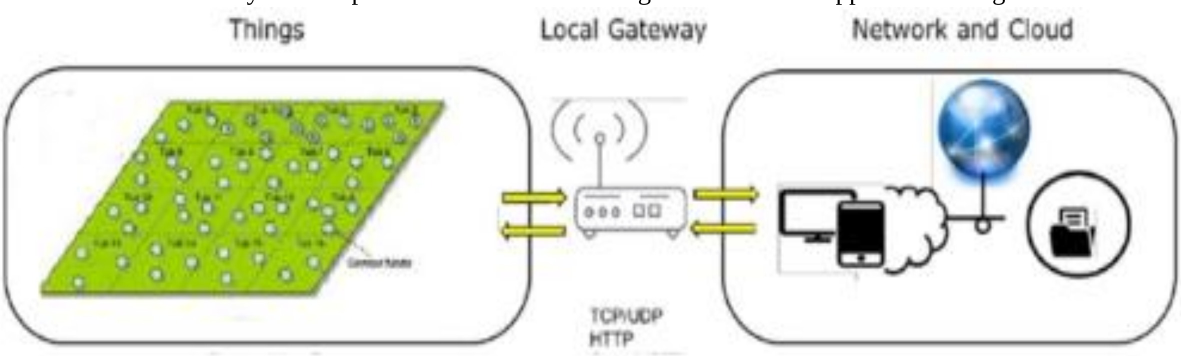

Fig.1: Application Design

Node MCU:
The Node MCU is an open source IoT platform, built on chips from ESP8266-12E. It is breadboard friendly and low-cost. This also integrates a serial chip with a USB. This module is designed to build IoT applications, and includes a firmware running from articulate framework on the ESP8266 wifiSoC. This development board gives access to the subsystem GPIO (General purpose Input / Output). There are different modules available based on ESP8266; and each module has some advantages and disadvantages, depending on the application being addressed.
DHT 11:
Temperature and humidity sensor DHT11 low cost comprises two main parts: a capacitive humidity sensor and a thermistor. The sensor also incorporates a chip to take care of the analog to digital conversion to produce a digital signal according to the temperature and humidity values observed. With any micro-controller the digital signal is relatively easy to read. The following parameters are characteristic of the DHT11 sensor. Power from 3 to 5V and max current I / O 2.5mA during conversion (when requesting data). It is ideal for moisture readings of 20-80 percent with a precision of 5% and for temperature readings of 0 -50 ° C with a precision of ±2 ° C.
Blight Mote sensor:
The key component of our Blight MOTE prototype consists of a Node MCU linked to the DHT11 using a 1-wire protocol, which is used to obtain the sensor measurements. The payload in 1-wire mode consists of a moisture value, a

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temperature value and a checksum. Only three of the four pins are employed; and all four pins are used in I2C mode. Even though older sensors do not support I2C, they will still have 4 pins. 1=VDD, 2=Data, 3=NC, 4=GND.

Gateway:

Because it includes two network interfaces, the gateway can be separated from other devices. It offers a Wireless Sensor Network connection to a more conventional network. An Internet connection, in our case. Yes, the conventional way sensor network collects sensor measurements and processes those data on the end user's computer to obtain more relevant information. We used a gateway in this program called Meshlium. The latter is a multi-protocol router in that it has five interfaces (2.4GHzWifi, 5GHz Wifi, Wifi, ZigBee and 3G / GPRS) and is designed to collect and forward all data from sensor nodes and store it in the cloud.

Cloud-IOT:

The sensors deployed to monitor and collect data in the environment have many limitations. Therefore, the need to store and process the data in the cloud, which offers a vast space for storage.The operation on the cloud platform which cannot be done at the sensor node.

The virtual computers in cloud computing enable the services for the user and the user does not need any knowledge about the location of the services. The data is gathered from a network of wireless sensors and transmitted to the cloud through the gateway. The cloud data for the software applications is stored in a database. The data obtained by different types of sensors have different types of data and this must be consistent with all the applications. 6 KarimFoughali / Procedia Computer Science 00 (2019) 000–000 Ubidots was born as an engineering service company, specialized in the production of hardware and software for IoT projects in Latin America.

The collected information is stored in database. The data can be transferred by single hop or multi-hop communication from one node to the sink node. For the communication of data between items, energy-efficient routing protocols are important and shape the distinct sensor nodes to the sink node. It is important to properly store the data sent to the cloud by classifying and clustering according to data features. Because varying devices accumulate large quantities of data, it is stored in cloud. As the data is manipulated and organized in a particular order it is easier for users to navigate. Another important feature that Ubidots provide is the alert system. In the above, we can write warning triggers that allow an alarm SMS to be sent if an event is detected in the event that humidity is above 90%.

IV. CONCLUSION

We introduced a decision support framework in this work for preventing potato disease. This is achieved through the use of climate knowledge and the forecast model "Ullrich" to help farmers apply efficient methods of treating diseases. We deployed a wireless sensor network for this purpose to collect crop humidity and temperature information, and a cloud server to store it. We used a risk factor estimation warning method according to the "Ullrich" model to warn the farmer by SMS when the disease "Late Blight" first appears. Nonetheless, we can improve our application by creating an IOT framework that captures plant images and performs some analyzes of the sudden transformations during disease development; either on the leaves in the form of pale brown and pale green margins, or on the stems. The fungus leaves brown spots that can hurt young plants or sever adult stems.

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