Comprehensive Review on Machine Learning Based Agriculture Automation

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Abstract- In India, Agriculture sector is one of the most important Growing sectors. Automation of farming suggests monitoring and controlling of various parameters which could be helpful in increasing productivity. This paper review Solar Powered ML & IOT Based Agriculture Automation. The main purpose of this project is to improve efficiency of agriculture sector. IoT helps us in many fields among which agriculture is one of the primary ones. With the help of IoT along with Machine Learning in the field of agriculture, we can increase the efficiency of crop production. The propose system consists of raspberry pi, various sensors, solar panel and a motor. Raspberry pi is the main controlling unit which can control whole system operation. System is equipped with solar panel which provide power to the system. The weather is one of the highest natural barriers in all parts of our lives in the world, we need to look at the weather including temperature, rain, humidity and etc. To improve productivity of agriculture we have to analyze data by using ML algorithm.

Keywords: Solar panel, Raspberry pi, IOT, ThingSpeak, Smart Agriculture, ML.

INTRODUCTION

In India agriculture plays major role in economy of country. India ranks second worldwide in farm output. Almost 70% of Indian population relies on agriculture for their sustenance. We live in a world where everything can be controlled and operated automatically, but there are still a few important sectors in our country where automation has not been adopted or not been put to a full-fledged use. One such field is agriculture. In this project, we have designed a system uses a hardware which provides an effective and efficient solution to be defined problem in Indian farming system. One of the advantages of this system is, it saves electrical energy by turning off the motor when there is no water in the pump. This is one of such projects that solely concentrates on making the farming process more efficient and accurate by analyzing the different conditions of a farmland. This project not only helps in easing the farmers' jobs and making their life better but also helps in saving variety of environmental resources. In this paper we propose a raspberry pi based smart agriculture using ThingSpeak to reduce the man power required in the agriculture field. In this project we can deploy various wireless sensor using IOT for measuring the various environment parameters. Raspberry pi is the main controlling device that can send all the collected data to ThingSpeak cloud and also receive controlling action from ThingSpeak service.

ThingSpeak is open-source IOT platform which enables a farmer to visualize data instantly and remotely. So, they can control various parameters from a remote location. ML is a new way of computing intelligence using machine. It's observed that there are various researches have been done for smart agriculture in IOT and ML individually. In this project we review those solutions and propose how ML and IOT blend for better and precision agriculture.

NEED FOR AGRICULTURE AUTOMATION

The Farm automation practices can make agriculture more profitable while also reducing the ecological footprint of farming at the same time. Site-specific application software can reduce the amount of pesticides and fertilizer used while also reducing greenhouse gas emissions. The development of agriculture was a watershed moment in humanity. Humans' ability to engineer the environment to generate enough food to sustain massive population growth was the first profound change in the relationship between fully-modern humans and the environment. The advent of agriculture kickstarted a wider range of advancements from the use of fire and prepared food to self-driving machinery. Agriculture has moved us forward us so far in 12,000 years, but we are now at a turning point. And with a global population projection of 9.7 billion people by 2050, agricultural production will need to increase by at least 70% from current levels to serve nutritional trends. Now more than ever, the pressure

on farmers to produce nutritious products is putting our planet's health under even more stress. New advancements in technologies

ranging from robotics and drones to computer vision software have completely transformed modern agriculture.

Farmers now have access to tools that will help them meet the demands of our world's everincreasing population Farm automation, often associated with "smart farming", is technology that makes farms more efficient and automates the crop or livestock production cycle. An increasing number of companies are working on robotics innovation to develop drones, autonomous tractors, robotic harvesters, automatic watering, and seeding robots. Although these technologies are fairly new, the industry has seen an increasing number of traditional agriculture companies adopt farm automation into their processes.

BENEFITS OF USING ML AND IOT BASED AGRICULTURE AUTOMATION

Machine learning is the current technology which is benefiting farmers to minimize the losses in the farming by providing rich recommendations and insights about the crops. Application of machine learning in agriculture allows more efficient and precise farming with less human manpower with high quality production.AI systems are helping to improve the overall harvest quality and accuracy known as precision agriculture.

AI technology helps in detecting disease in plants, pests and poor nutrition of farms. AI sensors can detect and target weeds and then decide which herbicide to apply within the region. Farmers can now rely upon ML to assess complex patterns and accurately identify related plant and weed species.

Digital identification of plant species saves farmers time, allowing them to increase productivity in other critical areas. On farms, IOT allows devices across a farm to measure all kinds of data remotely and provide this information to the farmer in real time. IOT devices can gather information like soil moisture, chemical application, dam levels and livestock health as well as monitor fences vehicles and weather. Farmers use AI for methods such as precision agriculture; they can monitor crop moisture, soil composition, and temperature in growing areas, enabling farmers to increase their yields by learning how to take care of their crops and determine the ideal amount of water or fertilizer to use.

IoT in agriculture uses robots, drones, remote sensors and computer imaging combined with continuously progressing machine learning and analytical tools for monitoring crops, surveying and mapping the fields and provide data to farmers for rational farm management plans to save both time and money.

HOW ML AND IOT ARE USED IN AGRICULTURE AUTOMATION

Now a days various machine learning are used in agriculture to solve various issues. In this paper we studied applications of machine learning and iot in agriculture field Agriculture is a crucial part of the global economy, but the pressure on agricultural systems would increase as human populations continue to evolve. Precision agriculture, now known as digital agriculture, is evolving into a new field of research that uses data - intensive methods to improve agricultural efficiency while increasing environmental impact. Agricultural systems are able to increase productivity and efficiency in crop production through the use of machine learning and artificial intelligence, as well as data analysis. Companies use computer vision and deep-learning algorithms - learning how to process data captured by drones and software - to monitor plant and soil health. Machine learning models are developed to track and predict the health of plants, soil conditions and other aspects of the environment such as temperature, humidity and humidity, as well as crop yields Precision farming, also known as smart farming, is a key element of sustainable intensification, as is the use of machine learning and artificial intelligence. Machine learning is designed to unravel, quantify, and evaluate data - intensive processes in the agricultural environment in new ways, using data from sensors, computers, drones, sensors, and other technologies. The data generated in modern operations is complemented by sensor variants that allow for more accurate analysis of the data and lead to greater accuracy and faster decision-making. In this study upcoming sections are: section 2) machine learning, provide details and types of machine learning section 3) talks about IoT and the working of IoT system, Section 4) Literature Review, a different research study in which machine learning and IoT were used in agriculture are discussed and section 5) is a conclusion. II. MACHINE LEARNING ML is the process of training a machine to do what humans do naturally through knowledge and practice. It can also be defined as automating and improving a computer's learning processes based on its interaction with human support.

EFFECTIVENESS OF ML & IOT BASED AGRICULTURE AUTOMATION

In India one of the main economic activities is the agriculture. Around 60–70% of employment in India is dependent on agricultural sector. It has the maximum arable land that is second largest after U.S. This is because of the high soil fertility and large network of water sources for irrigation. Due the varying nature of climatic conditions at different locations it ensures the high availability and productivity of flora.

Although the well presence of resources it does not produce the results equivalent to the availability. It is because of scarcity and incompetent use of technology, deficiency of knowledge and awareness among the agrarians, use of some antiquate methods. In addition most of the crops are affected by pests, insects, diseases resulting in decreased yields. Many crops are affected by the attack of insects or pests. Insecticides or pesticides are not always proved effective because they may be toxic to some kind of birds and animals. It also damages the natural animal food web and also food chains. Crop disease results in considerably low throughput. The authors in outlines the yield depletion between 20% and 40 % of worldwide agricultural production caused by insects, pests, viruses, animals, and weeds. In addition, they have a number of facets, some with short-term, and others with long-term consequences for the global food security. Crop production losses due to pests and diseases are quite substantial, particularly in the Indian weather semi-arid conditions. Weather has an extremely extensive role in agricultural production. Generally, crops are more common in the weather based frangible agriculture systems.

Survey have challenged that with the rise in population up to 10 billion, then definitely by 2050 we are moving towards food doomsday. It implies food production ability will bankrupt unless we establish and advance the smart technologies in agriculture. So, for proper management of limited resources, it is necessary to develop an economical technology for Indian farmers. The system should help the farmers to prevent the diseases of crops on time and improve the quantity and quality food. The system should be reliable enough to sustain in hilly areas like Jammu and Kashmir for timely prevention and cure. It is because of their capability to monitor environmental parameters, soil parameters, plant parameters by spatially deploying sensors remotely. On time prediction of diseases caused by the various harmful entities whether by the lack or exceed in the normal values of the monitored parameters can aid the agriculturalists. So that they can take special measures against the attack of these pests and insects in a controlled manner. This will prevent any usage of chemicals and reduce the diseases occurring in fauna.

In addition, it would definitely boost the Aggie productivity and hence will bridge the gap tween increasing population and increasing demand of food. Evidently, overall loss percentage of crops would be reduced. In the last decade science and technology has revolutionized the globe. Current era is the technological era. To provide applicable information to the agriculturalists, presently, remote monitoring techniques are being used. Wireless Sensor Networks and Internet of Things plays an essential role in this connection. The miniaturization of the technology resulted in Internet of Things (IoT) The term “Internet of Things” (IoT) was first time used by Kevin Ashton, while the presentation on Management of supply Chain in IoT is an interconnected network of computational objects like sensors which are uniquely identifiable smart objects. The term “Things” represents a general array of objects, sensors, people, smart devices and any other entity having the ability to connect and share information with other entities, that is aware of its context and is making anything available at anytime, anywhere. It means

everything is accessible without any place or time restrictions. In the IoT, wireless technologies play a central role in data gathering and data communication. Wireless Sensor Networks (WSN) and radio frequency identification (RFID) are considered as the two main building blocks of sensing and communication technologies for IoT Wireless sensor networks have been used in different applications, such as military, agriculture, sports, medicine, and industry Due to which voluminous amount of data is being generated. Wireless sensor networks sensors, smart devices, RFID tags, tablets, palmtops, laptops, smart meters, smart phones, smart healthcare, social media, software applications and digital services generate the volume of data.

They continuously generate large amounts of structured, semistructured and unstructured data which is strongly increased. The growth of data in various domains of applications like network operation, healthcare management, social media, intelligent traffic system, business, marketing, resource optimization, precision agriculture and social behavior etc. to study all this, data analytics committed for diverse wireless sensor networks to take benefits. Data analysis is a process of data collection, data transformation, data cleaning and modelling data with the goal of discovering the required knowledge. The results and findings so obtain are communicated by suggesting conclusions and supporting decision making**.**

CONCLUSION

This proposed system is very beneficial for government and farmer also. Due to use of solar, government finds a solution over energy crisis. Using this solar, farmer able to manage wastage of water and also reducing human intervention. This system is implemented by considering low cost, reliability, alternate source of electric power and automatic control. The model always ensures the sufficient level of water in the field avoiding the under-irrigation and over-irrigation. To overcome necessity of electricity and ease the irrigation system for our farmers, the propose model can be suitable alternative.

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