STUDY ON FORECASTING THE IRRIGATION OF AGRICULTURE LANDS USING IOT

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Abstract: Agriculture Internet of things helps in increasing crop productivity by way of managing and controlling the activities. Crop water management, adequate water supply is an essence for agriculture and the crops can be damaged in either of situation of excess of water supply or lack of water supply. Agriculture internet of things with integration of web map Service (WMS) and sensor observation service (SOS) provides a solution to manage water requirement or water supply for crop irrigation. agriculture internet of things smartly analysis the water requirement of crop and utilizes the scarce water resource available to reduce wastage of water. Crop development and forecast yield in the largest contiguous irrigation network in the world monteith's model is used for calculation of Absorbed Photosynthetically Active Radiation (APAR).

IndexTerms: Internet of things, Web Map service, SOS, Crop yield forecasting, photosynthesis.

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INTRODUCTION:

INDIA is the country of village and agriculture plays an important role for development of country. The irrigation is used in agriculture field. In Irrigation system, depending upon the soil type, water is provided to plant. In agriculture, two things are very important, first to get information of about the fertility of soil and second to measure moisture content in soil. IOT has a technology that growing in day by day. The Internet of Things (IoT) is the network of physical objects devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity that enable these objects to collect and exchange data. Web map service specification protocols for the transfer of geospatial data from servers to client applications. A web map service produces an image (e.g.GIF, JPG) of geospatial data. Sensor observation service is a web service to query real-time sensor data and sensor data time series and is part of the sensor web. Crop yield forecasted in photosyntetical achieving the maximum crop yield at the lowest investment is an ultimate goal of farmers in their quest towards an economically efficient agriculture production. The advances in remote sensing have enhanced the process of monitoring the development of agricultural crops and estimating their yields. It depends on rigorous field data collection of crop and yield, which is a costly and time consuming process.

IOT IN AGRICULTURE:

The Internet of Things (IoT) is transforming the agriculture industry and enabling farmers to content with enormous challenges they face. Livestock monitoring, conservation monitoring and plant & soil monitoring are the challenges where IoT can be a solution. The innovative IoT applications address the issues in agriculture and increase the quality, quantity, sustainability and cost effectiveness of agricultural production. Today's large and local farms can leverage IoT to remotely monitor sensors that can detect soil moisture, crop growth and detect pest and control their smart connected harvesters and irrigation equipment's. The recent development in revote sensor enable smart irrigation system gave birth to several IOT devices and helps make irrigation and agriculture smarter and better.

The IoT technologies can support precision agriculture, *a form of agricult*ure whose goal is to maximize return on investment in agriculture. Irrigation / water detection / soil detection sensors give alerts to help protect a farmer's crop and relay information wirelessly to water reserve points on when to irrigate. Furthermore, farmers can adopt automated drip irrigation in areas where water is scarce. This can be achieved by linking data from various sensors which controls not only where water is released but how much is needed.

Here the latest IoT devices developed and successfully a reality crops is the latest IoT enabled smart irrigation device that will not only help improving yields of crops but will also contribute to reducing the cost of water resources. Adequate water supply is crucial for proper yields while conserving water resource is important to prevent shortage.

Benefits of IOT in agriculture:

IoT technologies have the potential to alleviate poverty and uplift the standard of living of the rural farmers. For example, organic greenhouses make it possible to grow a wide range of crops that can not only be consumed locally but also for export to other countries. This enables farmers to generate extra income that help uplift their standard of living and also to contribute to the gross domestic product (GDP). The rural farmers can also leverage the investments in the IoT technologies that support agriculture to improve the standard of living. For example the tapped solar and wind energy can be also be used not only to light houses but also to stay in touch with current affairs through radios and television sets.

IoT technologies can empower the transporters by providing them with information of farmers who require transport. Therefore transporters do not need to wait until they have a full truck load of farm products to start off, they can leave any time provided they are aware that there are farmers waiting for transport ahead.

Through the use of Near-Field Communications (NFC), the farmers and buyers can benefit from paperless transactions and this helps minimize on theft and fraud. Similarly this is beneficial to rural farmers who have no access to banks within a reasonable distance to deposit cash from purchases or withdraw cash to buy farming inputs. The use of livestock or crop smart health cards which store information related to affected livestock or crops can be beneficial to both the veterinary or agriculture officer and the farmer. This can lead to efficient and effective diagnosis and prescription of medicine since the officer has access to all the historic information of the affected livestock or crop. If satellite transmission is made available in the deep rural area, this has the potential to create jobs for local businesses who could offer low-cost solutions, access and wireless network services cheaper to the communities.

Satellite transmission can also enable farmers in rural areas obtain information on markets for their products and prices, government services that they can access, and their rights. The systems can also connect to government departments and local and international markets. With the introduction of the mobile internet and low-cost sensors, farmers could interact directly with consumers and cutting off middlemen who usually exploit them. This is beneficial to farmers because they can make better profits on their products.

Web map service (wms):

Web map service specification protocols for the transfer of geospatial data from servers to client applications. A web map service produces an image (e.g.GIF, JPG) of geospatial data. This map service contains maps and data relevant to number of farms, land use, agriculture chemicals used farms by type of organization. It performs operators for farm labor, tenure of farm operators and farm operation, principal occupation of operator, characteristics of farm operators. Geographical information system is providing the current population and future generations with an indefinite food supply is an economic, environmental, and social concern. Geographic information system (GIS) technology enables community planners, economists, agronomists, and farmers to research and devise practices that will enable the sustainability of food production to ensure the survival of the human race.

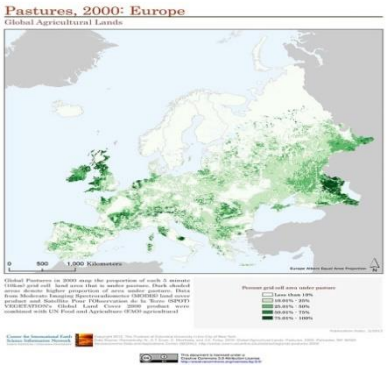
GIS solution for agriculture:

Geographic information system (GIS) technology to share data, increase yields, predict outcomes, and improve business practices. By applying GIS technology to their operations, agricultural operations are able to manage resources and responsibilities more efficiently, devise data portals that disseminate vast amounts of agricultural data and interactive maps, and support farming communities.

Producers use GIS to better manage their farms by creating information-dense reports and maps that give them a unique perspective of their operations. The powerful analytical capabilities of GIS offer an array of options for visualizing farming conditions, as well as measuring and monitoring the effects of farm management practices. Combined with remote-sensing technology, GIS can be used to precisely determine and control inputs, saving preventive expense and reducing the amount of harm to the soil. Farm managers also use GIS to submit government program applications, simplifying what used to be time-consuming multistep processes.

Figure: GIS solution for agriculture

Map for global agriculture lands:



Whether implementing organic farming methods, finding the most profitable and healthy places to plant new crops, or allotting farmland for preservation to secure future food Production, GIS has the capabilities to collect, manage, analyze, report, and share vast amounts of agricultural data to aid in discovering and establishing sustainable agriculture practices.

Sensor observation service (SOS):

SOS is a standard service by which a client can obtain observations from one or more sensors/platforms in a standardized way. It essentially provides an API for managing deployed sensors and for retrieving their observations and aims to provide a standard means of access to all types of sensors and sensor systems, including remote, in-situ, fixed and mobile sensors

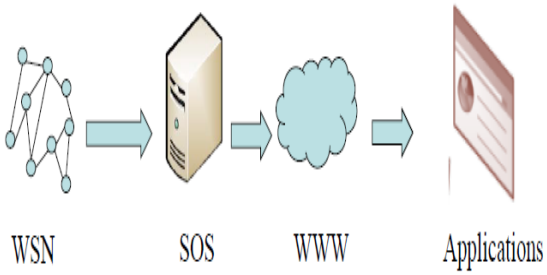


Figure: Sensor Observation Service schema.

OS allows a user to send requests based on spatial, temporal and thematic criteria. This standard provides interoperability between different repositories and end users. Furthermore, implementing this system increases accessibilities to the different environmental data in critical situation. The implementation of this service is a challenging issue since the main users of this system are from two different groups with different expectations and perspectives. In particular, those who are mainly using in-situ sensors and those who deal with remote sensors. SOS aims to carefully model sensors, sensor systems and observations in order to cover all 30 different kinds of sensors and to support the different requirements of users in the case of using sensor data in an interoperable way . SOS provides a functionality to insert observations and register sensors as a transactional model dynamically. SOS goes a long way in providing interoperability between repositories of heterogeneous sensor data and applications that use this data. The sensor data can be either observations or descriptions of the producing sensors containing metadata like calibration information, positions, etc.

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Crop yield forecasted:

photosynthetical:

Crop yield forecasted in photosynthetically achieving the maximum crop yield at the lowest investment is an ultimate goal of farmers in their quest towards an economically efficient agriculture production.

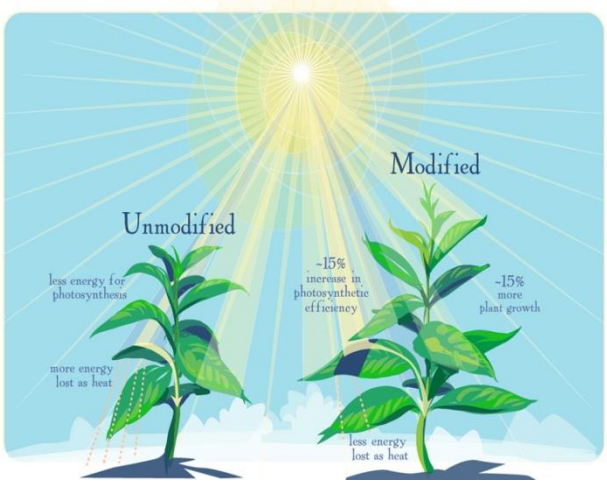

Figure: Photosynthesis to boost crop yield

The advances in remote sensing have enhanced the process of monitoring the development of agricultural crops and estimating their yields. It depends on rigorous field data collection of crop and yield, which is a costly and time consuming process.

Remote sensing (RS) data has become an important tool for yield modelling. RS data provide timely, accurate, synoptic and objective estimation of crop growing conditions or crop growth for developing yield models and issuing yield forecasts at a range of spatial scales. RS data have certain advantage over meteorological observations for yield modelling, such as dense observational coverage, direct viewing of the crop and ability to capture effect of non-meteorological factors. Recent developments in GIS technology allow capture, storage and retrieval and visualization and modelling of geographically linked data.

An integration of the three technologies, viz., crop simulation models, RS data and GIS can provide an excellent solution to monitoring and modelling of crop at a range of spatial scales.

Conclusion:

Agriculture is one of the most water-consuming activities. Today's large and local farms can leverage IoT to remotely monitor sensors that can detect soil moisture, crop growth and detect pest and control their smart connected harvesters and irrigation equipment's. Web map service specification protocols for the transfer of geospatial data from servers to client applications. SOS is a standard service by which a client can obtain observations from one or more sensors/platforms in a standardized way. Crop yield forecasted in photosynthetical achieving the maximum crop yield at the lowest investment is an ultimate goal of farmers in their quest towards an economically efficient agriculture production. The farm owner can monitor the process online through a website. Through this project it can be concluded that there can be considerable development in farming with the use of IOT.

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