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AGRICULTURE FACILITATION USING CLOUD COMPUTING - SURVEY

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Abstract

India, the largest populated country, has Agriculture as a significant source to earn money and carry out their livelihood. In future, the farm will transform into more data-rich environment. Thus in order to successfully collect, stock, examine and to use this data in formulating and decision making are mandatory. Through improving the traditional agriculture management system, by evolution processes, which will lead to an raise in productiveness and commercial processes in farming can essentially assist by cloud computing technology. Based on this notion, in this paper, a cloud-based system that aides making a coordinated framework for making strides product quality and business advancement in the farm field. Farm workers cloud access different arrangement of data and information related to his farm, in a coordinated and unified approach with a specific end goal to take educated choices or to be supported in choice taking process.

Keywords: Agriculture ICT, Cloud computing, Crop infra, Data Storage, Farm Management System.

Introduction

There is a significant increase in an average farm size in the large number of countries and there is also a drop in number of people who directly engage in farming[1]. For example, in some countries, the number of farms and farm workers has constantly fall for a long time, whereas the entire amount of farming land has remained nearly exactly the same[2]. Thus, it has a significant raise in productivity of farm workers. The mechanization of farming is increased by increasing the productivity per farm workers. In crop cultivating, this advancement has prompted progressively vast machines with more extensive work widths, and along these lines the capacity to execute a farm operation on a field in less passes – and along these lines less time. In livestock it has prompted increasingly automated frameworks to handle the requirements of the creatures, and in addition to screen their prosperity.

Consolidated with the present low maker costs for some rural merchandise, such speculations might be past numerous agriculturists, bringing about a requirement for different ways to enhance agriculture work[3]. Besides, in some

nations, where the normal size and state of a agriculture field is with the end goal that bigger machines don't bring any efficiency increments, such strategies may not be material by any means. A promising approach to enhance farming practices is through digitization and new systems this makes conceivable. The lot of information assembled amid different farm operations, from the earth utilizing sensors, and picked up from outside computerized administration suppliers through the web, make it feasible for the farm workers to make more educated choices than some time recently[4]. For such, refined learning management[5] strategies to accumulate, store, oversee, examine and speak to this information are required with a specific end goal to help the farm workers to keep up the circumstance consciousness of the condition of their farm, and to help in basic leadership[6]. The digital data likewise empowers better approaches to work together through giving increased the value of the farm worker's produce, for instance in the type of more point by point data about the carbon impression of a specific cultivating process. A vital change that can be empowered by additional vigorous and exact data about status and operations at the farm is exactness cultivating. Successful utilization of accuracy cultivating requires itemized and exact information about the cultivating history; spatial information sets, for example, treatment, soil and yield maps, process information from cultivating operations, and so forth. This requires modern information gathering, store, and examine framework, and present day farm hardware that can be utilized to execute the accuracy operations, thus pushing cultivating towards the thoughts and techniques for modern web. In this work we will focus on the ICT framework necessities, and how this foundation should be associated with machines, sensor systems, and outer administrations to empower exactness cultivating[7]. While vital parts of such ICT frameworks are situated nearby at every farm, we no longer ought to handle such frameworks as being constrained to the farm. Progressively such frameworks are reliant on and take favorable position of services that are given off-site utilizing, for example, different cloud arrangements. For instance of such foundation, in this work we will examine how the Crop-infra research stage made at one research farm shows the need and the necessities for such services, what's more, the potential such work has for future cultivating exercises.

Techniques and Ideas

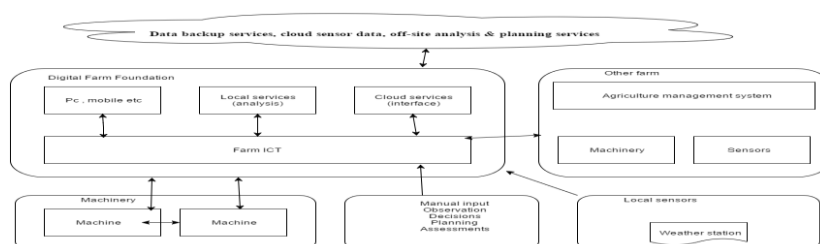


Fig. 1. Overview of farm ICT framework.

The undeniably advanced ICT foundations sent at farm environment require likewise watchful arranging also, plan.

Frameworks that are worked without any large plan or ultimate objective regularly soon achieve their constraints as they keep on growing[9]. At the highest point of the figure are different off-site benefits that are given to the farm through web. These could incorporate direct sensor nourishes from off-site sensors, or more refined information nourishes, for example, climate data, investigation the administrations for information assembled on the farm, for example, turning the consequences of an ethereal hyper-spectral imaging done by an automaton into usable maps of the farm, reinforcement and facilitating administration for the farm's own information. What's more, different administrations that furnish the farm with data or Information they require[10].

A midst the figure is the principle ICT base of the farm. The principle reason for the farm ICT framework is to accumulate and store the information made at the farm, to speak with and coordinate the different on location administrations what's more, information sources, to speak with the different cloud administrations, and above all to give the agriculturist the data they require with a specific end goal to settle on educated choices.

In the Figure, the most vital component of the ICT base is the Farm ICT spine, which comprises of the parts of the framework that assemble, store and exchange information. At the base of the figure are different nearby information sources: field apparatus, manual contribution by farm work force, and nearby sensor systems manual contribution by farm faculty, and neighborhood sensor systems. In the figure farm hardware are portrayed to likewise devour information. With cutting edge apparatus all field operations depend on assignments that are planned already and transferred to the machine for execution, subsequently field apparatus likewise devour information with every field operation. Later on the measure of information utilized as a part of apparatus is expected to increment quickly. Hardware will have the capacity to speak with each other and, for instance, collaborate in field errands. Along these lines, a future farm needs a refined framework all together take full preferred standpoint of the potential outcomes given by complex ICT devices. Be that as it may, the base also, the information gathering, stockpiling, administration, and investigation usefulness empowered by it are insufficient in themselves. In request to use the potential, the utilization of ICT must fit into existing cultivating procedures and improve these procedures.

Basic leadership on a farm can be separated into four levels of deliberation that all work in a cyclic way, where periods of choice levels take after each other in a persistent cycle. The four levels are the key, strategic, agent and official levels. Key level controls the general cultivating system and incorporates choices that influence the long haul deal with the farm, for example, what plants are developed.

The strategic level incorporates choices that influence deal with one developing season, for example, what is developed on every field on a given year. Agent and execution level choices then work on the level of single field operation and amid the execution of that operation, for example, at the point when and how to splash a given field. In Figure, the emphasis is on the stream of the information both expressly between parts of the farm ICT framework, and additionally in a roundabout way through changes in the environment that affect the framework. In the Figure operations and choices that incorporate client association are set apart with bold-ed outskirts, the rest are either occasions or components that can be computerized.

In the Figure the stream of information begins from the left, with the physical environment of the farm, the hardware, and different off-site administrations. Information is assembled from these either through sensors, or utilizing different information floods of the suppliers, and enters the ICT frameworks of the farm.

The information is put away in databases that can be either nearby or off-site – and refined for different utilization both consequently and intelligently. The refined information is then used to bolster basic leadership and operations on diverse levels of deliberation. The information can likewise be conveyed to outsiders. The choices influence the farm, the farm ICT frameworks, and the cultivating environment and hence give new information for the framework.

This sort of utilization of information in all farm exercises both gives the farm work force more data about the consequences of the different operations, and can empower new method for working. Adequately exact and precise information, progressed choice bolster instruments, and cutting edge hardware able to do variable rate application are the innovative necessities of accuracy cultivating, for instance. Other conceivable applications incorporate harvest fraction and also create trace-ability.

Study and Analysis

At a research farm of Normal Assets Organization, a model of future farm ICT base has been executed in the Crop infra ICT stage. The objective of the framework is to serve as an exploration stage and model execution for the ICT foundation of a future farm. The Crop infra framework contains general and open approaches to assemble information from field hardware and sensors and additionally implies for putting away this information either locally or inside a cloud base. Therefore it right now executes just parts of the base appeared in Figure. Fundamentally, associations with ICT base of different farms is missing, as are refined neighborhood investigation administrations.

In more detail, the Crop infra stage, appeared in Figure, comprises of a physical stage and ICT stage. The physical stage catches fields, backwoods, streets, hardware, structures what's more, frameworks. It includes information

gathering and Internet of Things (IoT) and machine-to machine(M2M) correspondence. The ICT stage contains farm information, neighborhood and cloud administrations for information putting away and sharing, information accumulation, IoT counting sensor systems, and M2M functionality. Substances, functionality and information streams of Crop infra ICT stage are shown in Figure. The information assembled amid field operations is put away in the errand controller of the machine implement utilized. From that point, the information is exchanged through the neighborhood access point to the farm center or specifically to a cloud administration. It can then be further utilized either locally or by third parties through general society information taking care of system. These assets are executed utilizing a REST-interface.

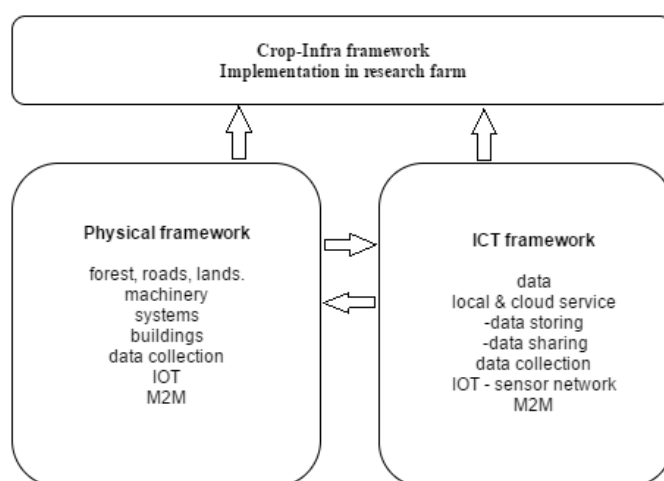


Fig. 2 overview of crop-infra stage.

The information is principally put away to a cloud administration, and suitable parts of it are constantly put away locally so as to ensure that farm operations can be executed regardless of the possibility that there are issues with the web association. A non-social archive database is utilized as the essential information stockpiling stage. Sensor information are taken care of in the same way same as process information, and are put away utilizing the same means. Furthermore, the sensor information can be straightforwardly given to outsider IoT structures. For examination purposes, the Crop infra framework incorporates a neighborhood cloud framework for putting away and breaking down the information. This cloud, available through the URL, is physically the premises of the examination farm, yet consistently separate from whatever remains of the farm ICT framework.

The framework is likewise created further, chiefly to incorporate more information, more examination usefulness, and to have more vigorous associations with outside systems[8]. Crop infra can be considered as a sort of an early exemplification of Industrial Internet in cultivating. To use completely the chances of this novel innovation in cultivating the improvement work must proceed. Intriguing future exploration issues incorporate the utilization of

cloud advancements in machines, expanding their ability to cooperate with other machines and frameworks in adaptable, non specific and cost proficient way, and also chip away at dispersed databases to permit field hardware to store required field information locally[1].

Outcomes

The improvement of modern web advances in cultivating will, later on, present increasingly computational capacities in the sensors and in the field hardware and executes utilized. Consequently, it is likely that the qualification between a field machine and a (universally useful) PC will begin to obscure later on. On the off chance that, later on, the implanted frameworks in the apparatus can freely access web or ready to make advanced examinations locally, they can successfully supplant a portion of the usefulness now incorporated into programming or cloud administrations.

Expanding sums and assortment of farm procedure information containing data about area, timing and span of cultivating errands, utilization of inputs and picked up yields, and so on are an essential asset to enhance cultivating execution. A few computerization frameworks running in farms produce this kind of information, however it is right now put away to an information stockpiles claimed and kept up by different framework suppliers. There is a probability that from various farms gathered information is utilized to purposes that the farmers don't know about, or imparted to gatherings that may utilize the information against farmers' interests. A conceivable question between the performing artists in quality chains may ruin the adaption of these new advancements, and hence it is vital to have clear understandings about the responsibility for information and business morals concerning the utilization of gathered farm process information.

It would be amazingly testing to attempt to make any kind of general response to the information possession issue. As each case has a few novel perspectives, and the issue is generally non-specialized in nature, we expect that later on a few diverse sorts of information proprietorship arrangements will be made. Be that as it may, regardless of how the responsibility for is chosen, intends to store, get to, and exchange information are required. In the event that the information is to be isolated from the frameworks kept up by particular sellers, all these require open principles and collaboration between various performers.

Conclusion

In this work we have talked about the future difficulties in ICT frameworks and information administration in future farms. The expanding measures of information together with the developing advances identified with modern web offer an incredible guarantee. Numerous thoughts that have beforehand been considered as well hard to use by and by,

for example, numerous parts of accuracy farming, may at last be accomplished. Be that as it may, a lot of work is required, particularly in framework incorporation. The future ICT foundation on a farm can incorporate nearby sensors, field hardware, PCs and neighborhood programming frameworks, and also different cloud administrations and applications. Making this all usable for the normal farmer requires refined innovative arrangements and also propelled method for information gathering, capacity, and presentation. A critical angle will likewise be institutionalization. In this work we have likewise presented the Crop infra stage that is a model of a future ICT base on a farm. The framework is under steady improvement and is utilized as a part of a few progressing research ventures.

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