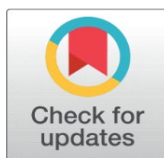


USE OF CLOUD COMPUTING IN SMART FARMING

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ABSTRACT

In case of agriculture our country has a great potential of development. Broadly speaking cloud computing is nothing but a highly 'utilitarian' orientation of IT services where users benefited on a pay-as-you go basis. In smart farming all agricultural data such as soil, weather, research, crop, farmers, agriculture marketing, fertilizer, and pesticide information may now be consolidated in the cloud. According to an analysis performed by McKinsey, if agricultural connectivity is successfully implemented, the industry might add \$500 billion to the global gross domestic product by 2030. With close to 7.8 billion people inhabiting this earth and enjoying tasty food, it's inevitable to consider ways to meet the rising demand. In fact, estimates show the demand for food is expected to increase anywhere between 59% to 98% by 2050, but unfortunately, places to farm are scarce. As a result, agriculture need to be smarter about finding innovative ways to get more out of each piece of land. In modern era of cloud computing technology very helpful for centralized the all agricultural related data bank (Soil-related, weather, Research, Crop, Farmers, Agriculture marketing, fertilizers and pesticide information) in the cloud.

Keywords: Cloud Computing, Smart Farming, Weather, Crop

1. INTRODUCTION

Agriculture is crucial to the world economy. Online shared resources, software, applications, and services are made available to meet the customer's elastic demand with the least amount of effort or engagement from the service provider. India is a leading global food and grain exporter, but the country's agriculture is still largely conducted using outmoded, traditional methods. Farmers also impose many restrictions on their operations, so modernization is moving at a glacial pace. The result is a severe mismatch between the channels of supply and demand for agricultural products. Smart agriculture using IoT makes use of several sensors for monitoring the climate conditions of the surroundings. The task of the sensor is to collect the data across the field send it to the cloud. The cloud is loaded with some basic measurements which will then be compared with the sensed data.

India is one of the world's major producers of foods, grains, and other items, but agriculture and its production process are still decentralized, with farmers using primitive and antiquated methods, as well as various restraints, and modernization is gradual. Cloud computing can be used to remotely monitor soil moisture and crop growth and to take preventive actions to identify crop damages and dangers. This makes it possible for farmers to engage in "Smart

Agriculture,” which involves using new technologies based on cloud computing and IoT to remotely manage and automate agricultural tasks.

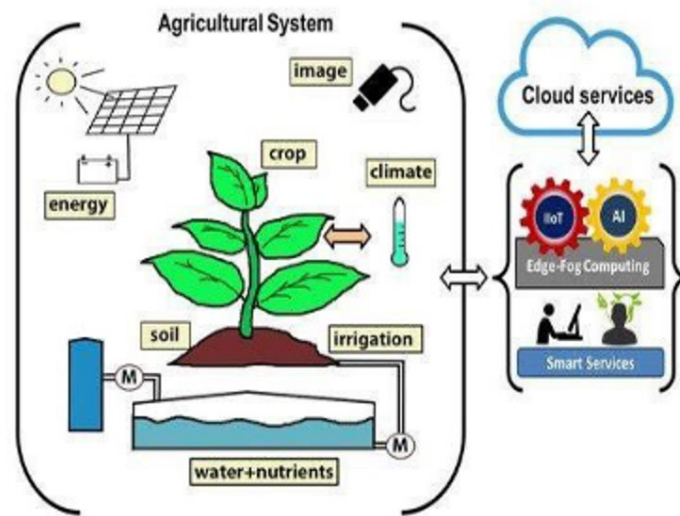


Figure 1 Agriculture system in cloud computing [1]

Smart agriculture creates a vast amount of data on the farm, every day. The average estimated number of data points generated on the farm has over doubled between 2012 and 2022. By 2034, an estimated 4 million data points will be generated on the average farm, every single day. That vast amount of data requires top-notch data tools to manage and unlock its full potential. Without proper data support, all of those valuable data points generated on the farm will never contribute to agriculture in the meaningful way they need to.

2. MOBILE APPS FOR SMART FARMING

Mobile apps can help farmers manage their farms more efficiently by providing real-time information on weather, soil quality, and crop management. This information can help farmers make better decisions about when to plant, fertilize, and harvest their crops.

Some advantages of mobile apps in agriculture include:

1) Record keeping

Farmers can record land data, such as fertilizers, pesticides, locations, weeds, and diseases, on their phones instead of using paper-based records. They can also maintain a digital farm journal to manage resources.

2) Access to information

Farmers can use mobile apps to access information about weather, new technologies, marketing, and proper fertilizer and pesticide usage.

3) Remote monitoring

Farmers can use mobile apps to monitor and control farm equipment, such as irrigation systems and autonomous machinery, from anywhere. This can increase efficiency and reduce the need for manual intervention.

4) Real-time pricing information

Farmers can use mobile apps to access real-time pricing information to help them decide whether to sell or hold their crops, and to identify the best crop to grow.

5) Reduced waste

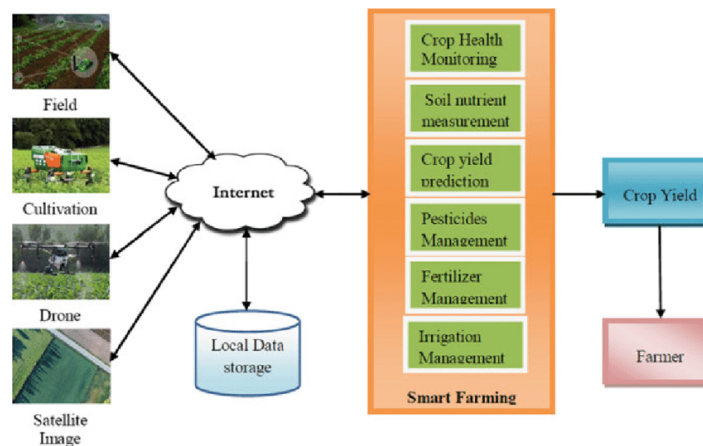
Mobile apps can help reduce transportation, transactional, and corruption waste.

Table 1 Top Mobile Applications to increase the productivity [2]

My Agri Guru	Machinery guide
Iffco Kisan	Uzhavan (Tamil App)
Agriplex	Kisan Suvidha
Market yard	Agrowon
Indian Satellite Weather	Shetkari
Zero Budget Natural Farming	Kisan Yojana
Kisan Space	Krishi Network
Crop Insurance	MSAMB
e-Gram	Fasal Salah
Farm Bee	KVSMT
Coconut expert (Tamil)	Napanta
CCMobile	Bijak
Agromedix	Bajar Bhav
Agriculture Business	Agri Live
Agri App	
e-Gram	Fasal Salah
Farm Bee	KVSMT
Coconut expert (Tamil)	Napanta
CCMobile	Bijak
Agromedix	Bajar Bhav
Agriculture Business	Agri Live
Agri App	Tumaini

3. METHODOLOGY OF SMART FARMING

Smart farming, also known as precision agriculture or digital agriculture, is a management concept that uses technology to improve farming. It combines machinery and software to track, monitor, automate, and analyze agricultural operations.

**Figure 2** Methodology of Smart Farming

Precision farming relies on technology to analyse and improve machinery, fertiliser, water, and soil. Collecting, analysing, and storing agribusiness data is a common use case for distributed computing. Through the use of cloud-connected remote sensors that constantly gather data from the field and artificial intelligence calculations that analyse that data, ranchers can gain a deeper understanding of harvest conditions. Soil conditions such as moisture, pH, protein content, supplements, and temperature can be continuously monitored by sensors [3].

3.1. BENEFITS OF CLOUD COMPUTING IN AGRICULTURE:

- Data Readiness any time & any where
- Local and global communication
- Improve economic condition of the Nation
- Enhanced the GDP of the nation
- Ensure food security level
- Motivation of farmers and researchers
- Reduction of technical issue
- Rural-Urban movement
- Data availability at any time and at any location without delay
- Improve market price of Food, seeds, other product

“Through smart farming, we can better adapt to the uncertainties brought by climate change, mitigate environmental impacts and promote resilience in agricultural production” [4].

Several agricultural robots, such as robots for harvesting, seedling, weed detection, irrigation, and pest infestation, livestock applications, etc., each robot can do one or more functions, as shown in 3, 4 (Darwin et al.,2021) [5].

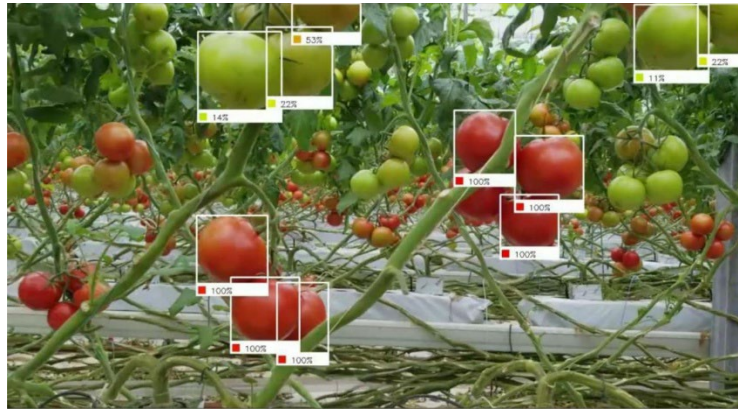


Figure 3 Tomato harvesting by Robots (Postscapes 2020, <https://www.postscapes.com/agriculture-robots/#autosteering>) [6]



Figure 4 An autonomous agricultural robot for weed removal uses.

4. CONCLUSION

Smart farming is not only a trend but it also a technology of itself. The move to become more environmentally friendly is more than just a means to a better corporate image, it is also a means to cost reduction in an ever inflating IT budget. New and improved ways of using this technology seem to appear every day. Smart Farming is aiming to be the new revolution in the agriculture domain and bring significant changes in how agriculturists and agronomists work on the field.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

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