Chapter 6
Cloud Computing–Based Smart Agriculture

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ABSTRACT

This development has also affected the studies of agriculture. Agriculture is an important source of income in the world's most populous countries. In countries like India, China, and others, it is a major source of wealth and livelihood. Cloud computing and the internet of things for agriculture will improve production cost management, performance tracking, and maintenance, benefiting both farmers and the country as a whole. The focus of this chapter is on the use of smart drones, and instant data from drones for crop management and computing technologies will help get it started. Despite the use of precision gardening in other countries, Indian agriculture needs to be modernized through the use of technology to increase productivity, wealth distribution, and cost management. In this chapter, the authors propose a comprehensive smart agriculture paradigm based on the following technological advances: sensors, internet of things (IoT), cloud computing, mobile computing, and big data analytics

INTRODUCTION

The agriculturalist's choice on what kind of crop to grow is frequently eclipsed by the thoughts he has on other minor factors such as generating rapid profits, a lack of knowledge regarding market demand, an excess of the earth's ability to sustain a specific crop, and so on. A poor judgement by the farmer might have serious consequences for the entire family's financial well-being. Apparently, this is one of the many factors leading to the many incidents of suicide among farmers reported in newspapers daily. In a nation like India, farming and associated industries account for around 20.4 percent of Gross Value Added (GVA). Such a mistaken judgement could have a detrimental impact not just on the farmer's

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family, but additionally on the entire area economy. As a result, we have discovered the agriculturalist's dilemma of determining which crop to cultivate at what time of year. The necessity of the hour is to create a system that can offer Indian farmers with predictable facts, allowing people to make educated choices about what kind of crop to plant.

With this issue in mind, we're suggesting an approach, an innovative one that pre-calculates environmental variables (temperature, precipitation, where you are as a matter of circumstance) and soil characteristics (pH value, soil type, and nutrients density) and recommend the best produce for the consumer.

Agricultural techniques and practices play a major role in connecting devices, collecting and distributing data amid expectations for the introduction of the Internet and cloud computing increasing speed, thereby offering farmers a new approach, farm health inspection. In recent years, interest in various fields has increased; Robotics is where we entered the field of technology that supports farm health. It is monitored and data is recorded, but it is not effective (Bac et al., 2014). Drone use starts here in agriculture; smart farming can offer a lot. Precision farming is a form of smart agriculture where farmers use data analytics and IoT devices to monitor soil moisture, nutrient levels, and other environmental conditions to optimize crop development. Drones, which may be used for agricultural monitoring and spraying, and autonomous tractors, which can be programmed to plough fields and sow seeds (Burkle 2009), are examples of other technologies.

Challenges

There are a number of obstacles that must be overcome in order for smart agriculture to reach its full potential, despite the fact that it has the potential to greatly benefit farmers and the food chain. Some of the main obstacles to smart agriculture are listed below:

- Cost: It may be expensive to put many of the technologies used in smart agriculture, including sensors, drones, and autonomous tractors, into use. For small-scale farmers with little resources, this may be a deterrent to adoption.
- Infrastructure: Smart agriculture needs a solid and dependable digital infrastructure, which may not be present in all rural locations. This includes high-speed internet connectivity. This could make it more difficult for farmers to embrace and use these technologies.
- Data management: In order to be effective, smart agriculture generates a lot of data that must be organised and analysed. For farmers who might lack the knowledge or resources to handle and interpret this data efficiently, this can be difficult.
- Privacy and security: Data on crop yields, soil quality, and weather patterns are among the sensitive information that is gathered and shared in the context of smart agriculture. It is crucial to make sure that this information is secure and that farmers have a choice over how it is put to use.
- Education and training: In order to engage in smart agriculture, farmers must possess a certain degree of technical skill, including an understanding of digital technology and data analytics. To assist farmers in acquiring these abilities, it is crucial to offer training and educational programs.
- Regulatory obstacles: Using some smart agriculture technology, including drones and autonomous vehicles, may present regulatory obstacles since they may be required to get specific permits or licenses.