BIG DATA IN AGRICULTURE

Dr. K. Madhuri and Dr. G.J. Prathiksha
Assistant Professor, Dept. of Agricultural Extension and Dept. of Agronomy, Malla Reddy University, Hyderabad.

INTRODUCTION

Agriculture has conventionally been treated as an intuitive space with wisdom passed down from one generation to another. But today's problems like the changing climate and depletion of viable farm land are more complex and urgent in nature. The United Nations estimates that the global population will reach 9.8 billion by 2050, a 2.2 billion increase from now. This means that we need to step up our crop production significantly to cater to the growing number of people. Unfortunately, rapid urbanization and climate changes have claimed a major share of farmlands. Today there is an urgent need to produce more food for the growing population – with less land to grow it on. We need innovative solutions that are sustainable and minimize the environmental footprint of farming. Big Data analytics can be one of them.

The collection of large, complex, and unprocessed data is called 'big data'. Due to complexity, big data cannot be processed by conventional data processing and data management applications and requires advanced tools that can analyze and process large volumes of data. Big data is characterized by some unique features – volume, variety, velocity, variability, veracity, and complexity. This vast reservoir of information must be studied, stored, and processed systematically for its applications in the public sector, scientific research, agriculture, industry, etc. Big data applications in agriculture are a combination of technology and analytics. It entails the collection, compilation, and timely processing of new data to help scientists and farmers make better and more informed decisions. Farming processes are increasingly becoming data-enabled and data-driven, thanks to smart machines and sensors that generate vast amounts of farm data.

Big Data is different from this historic information gathering in terms of the volume and the analytical potential embedded in contemporary digital technologies. Big Data proponents promise a level of precision, information storage, processing and analysing that was previously impossible due to technological limitation. Compare a notebook wherein a farmer might log information about his or her crop performance with a digital phone 'app' used to predict and direct future production practices. Logging information using the application can be done more efficiently (even by voice recognition) and the volume of information the farmer may access is profound: agricultural management tools provide access to interacting with datasets that stretch way beyond the individual farm.

Traditional tools are being replaced by sensor-equipped machines that can collect data from their environments to control their behaviour – such as thermostats for temperature regulation or algorithms for implementing crop protection strategies. Technology, combined with external big data sources like weather data, market data, or standards with other farms, is contributing to the rapid development of smart farming.

HOW BIG DATA CAN HELP AGRICULTURE?

To counter the pressures of increasing food demand and climate changes, policymakers and industry leaders are seeking assistance

from technology forces such as IoT, big data, analytics, and cloud computing. These patterns and insights assist in controlling the problem. They help to pinpoint existing issues, like operational inefficiencies and problems with soil quality and formulate predictive algorithms that can alert even before a problem occurs.

USES OF BIG DATA IN AGRICULTURE

The scope for big data applications is large, and we've only just begun to explore the tip of the iceberg. The ability to track physical items, collect real-time data and forecast scenarios can be a real game changer in farming practices. Let's take a look at a few use cases where big data can make a difference.

1. Feeding a growing population

This is one of the key challenges that even governments are putting their heads together to solve. One way to achieve this is to increase the yield from existing farmlands. Big data provides farmers granular data on rainfall patterns, water cycles, fertilizer requirements, and more. This enables them to make smart decisions, such as what crops to plant for better profitability and when to harvest. The right decisions ultimately improve farm yields

2. Using pesticides ethically

The administration of pesticides has been a contentious issue due to their side effects on the ecosystem. Big data allows farmers to manage this better by recommending what pesticides to apply, when, and by how much. By monitoring it closely, farmers can adhere to government regulations and avoid the overuse of chemicals in food production. Moreover, this leads to increased profitability because crops don't get destroyed by weeds and insects.

3. Optimizing farm equipment

Companies like John Deere have integrated sensors in their farming equipment and deployed big data applications that will help better manage their fleet. For large farms, this level of monitoring can be a lifesaver as it lets users know of tractor availability, service due dates, and fuel refill alerts. In essence, this optimizes usage and ensures the long-term health of farm equipment.

4. Managing supply chain issues

McKinsey reports that a third of food produced for human consumption is lost or wasted every year. A devastating fact since the industry struggles to bridge the gap between supply and demand. To address this, food delivery cycles from producer to the market need to be reduced. Big data can help achieve supply chain efficiencies by tracking and optimizing delivery truck routes.

CONCLUSION

The big data revolution is in its early days and most of the potential for value creation is still unclaimed. But it has set the industry on a path of rapid change and new discoveries. Stakeholders committed to innovation will likely be the first to reap rewards. If the farmers would have been concerned about the infirmities in terms of data-based farming, production could be increased.