

AI FOR ACCELERATING EVERGREEN REVOLUTION

Indian agriculture battles with numerous challenges. We have elevated dependency on monsoon, degradation of cultivable land, depleting soil fertility, intensive use of inorganic fertilizers and pesticides, and low yield per hectare among others. Further, when the crop is harvested yet another set of challenges appear such as quality testing before procurement, unfair return of their hard work and labour, lack of market linkages, and middlemen that eat into the farmer's earning.

AI FOR FARMERS

Till a few years back, Artificial Intelligence in agriculture was a theoretical promise but with very few on-ground applications. But today, the scenario is very different. AI can be a catalyst and positively impact the entire agrarian value chain. AI can help in improving:

- Farm productivity
- Eliminating supply chain constraints
- Expanding market access
- Enhanced Farmer Visibility to Retail or Customer

It is estimated that AI in global agriculture could be a \$4 billion opportunity by 2026. This boom is expected from interventions across the value chain.

An increasing number of Agtech start-ups are implementing AI-based solutions, using data science and machine learning algorithms for assessing crop damage to produce quality and everything in-between.

For example, crop modelling is an effective way to utilizing weather, soil, inputs, and other data about the crop environment. These models then simulate crop development, growth, yield, water and nutrient uptake. This predictive data-based decision-making is critical for the

crop and the farmers.

The remote sensing data provided by the satellites combined with the data on soil health (moisture and temperature), weather prediction, and analysis provides accurate information to farmers. Many districts across India in the states of Assam, Bihar, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh are implementing AI in agriculture.

Some Industry-Government partnerships in AI have been innovatively used to develop an AI-powered crop yield prediction model to provide real-time advisory services to farmers. The predictive tools use AI to select high yield seeds, improve crop productivity, boost soil yield, regulate the wastage of agricultural inputs and warn of pest or disease outbreaks. They also connect farmers with appropriate Agri-tech companies for remedial solutions for their crop.

DATA STACKS

Data is where the transformative power of AI lies. This data can come from multiple sources – sensors, drones, mobile devices, satellites, or even from other databases. How this data is processed to bring new insights is where the magic lies. For example, we have seen AI process data around the farm- farmer mapping, what is being grown, quality of soil, moisture levels, pests and diseases, and more.

Insights from these analyses can be useful to multiple stakeholders such as crop insurers, seed suppliers, compliance agencies, governments and donor organizations among others. As per farmers, AI helps them make better decisions and have access to cutting-edge information in real-time. Advisories for crop, good agricultural practices for pest and disease management to providing valuable weather advisory are few of the dominant use cases.

There are interventions in the case of input prices and suboptimal input utilization using predictive analytics, satellite imaging, and machine learning. Traceability solutions are being adopted for large-scale quality testing at the field and post-harvest produce handling and monitoring.

The massive amount of data being churned has created platforms for price transparency, quality including checking any malpractices in the supply chains. Similarly, for seamless execution of cultivation and harvesting, many large farms are using agricultural bots (ag bots) and drones for seeding, imaging and harvesting small perishables like berries, and grapes.

Benefits for Food Supply Chain

The numerous forms of Artificial Intelligence include natural language processing, machine learning, deep neural network learning, virtual reality,

Future of AI in Agri-Food Industry

Although large farms are adopting AI to help the start-ups scale their AI-enabled solutions, what is needed is to increase investments – both public and private – especially from venture capitalists.

TraceNext is one such commercial solution that combines the power of AI-based Rapid quality testing with Blockchain-based Traceability from farm-to-fork for over 23 commodities such as tea, coffee, spices, herbs, grains, nuts, and extracts or essences.

Rapid quality testing of farm produce is currently occurring in isolation, that too by a minority of the supply chains. The parameters that need to be checked for by the buyer before the harvest is moved from the field to the processing center usually take multiple days or even weeks, and they are costly. These result in loss of freshness of the crop and lower returns for the farmer. It is critical to shorten the cycle of testing critical trade parameters like moisture, color, uniformity, etc. so that these can be spontaneously measured by Rapid Quality Testing products, and the harvest moves relatively faster for processing – saving both time and costs.

Ultimately, as the food chains are yet fragmented, and MIS has driven the heightened adoption of both AI and Blockchain, the move will strengthen food safety infrastructure. It will also lead to more equitable and sustainable farming and indeed fewer mass recalls.

computer vision, and others. These methods provide an automated data analysis capability that supports human decision-making more accurately.

In combination, these tools function in a cloud-based environment and connect the farmers and food processors (suppliers) with multiple restaurants, grocery stores, food distributors, and direct-to-consumer (d2c). They enable the supply chain to divert food sources to the food needs without undue delay or excess cost.

Another main reason for adopting AI is food safety factors that affect the entire agricultural supply chain, whether we consider the use of chemicals on farms, unfair labor practices, and up to the challenge of food waste at the consumer and retail level.

The pressure to produce high-quality crops has accelerated globalization. It has multiplied the incidents of contamination leading to more foodborne illness, food safety scandals and health scares among consumers.

Food safety regulatory bodies such as EFSA, USFDA, CFIA are unique to each region and country. Yet they all are looking to provide access to safe foods. Ag-tech covers all critical events of the agriculture value chain from production and processing to packing and distribution, to storage and finally retail sales.

Recent research by Frost and Sullivan on technologies enabling food safety considers Artificial Intelligence (AI) and Blockchain as the most widely accepted and implemented technology. Others such as Gene editing, intelligent packaging, biosensors and more are applicable on specific case basis.



ABOUT THE AUTHOR

Dr Venkat Maraju is the CEO of SourceTrace, a SaaS Agtech company revolving around sustainable agriculture and empowering farmers across 32 countries, impacting over 1.5 million farmer livelihoods. During his prolific career, he has worked with NASA, BOSE, ComauPICO, founded a venture company, and led impactful agtech companies in the world

