



Artificial Intelligence: Towards the Future Farming

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Introduction:

Over time, technology has changed how farming is done, and it has had a wide range of effects on the agriculture sector. There will be increasing pressure on the land because only an additional 4% of the planet's surface will be cultivated by 2050, when the population is projected to rise from 7.5 billion to 9.7 billion. Agriculture is the primary occupation in many nations across the world. Farmers will consequently need to work harder with fewer resources. The same report estimates that in order to feed an additional two billion people, food output must rise by 60%. Traditional approaches, nevertheless, are unable to meet this enormous demand. This is pushing farmers and agricultural businesses to develop fresh strategies for raising output and cutting waste. As a result, Artificial Intelligence (AI) is progressively becoming a part of the technical advancement of the agriculture sector. By 2050, the world's food output must rise by 50% in order to feed an additional two billion people. AI-powered solutions will help farmers increase

productivity while also enhancing crop quality, quantity, and ensuring a quicker time to market.

Artificial intelligence is founded on the idea that human intelligence can be described in a way that makes it simple for a computer to imitate it and carry out tasks of any complexity. Artificial intelligence has three main objectives: learning, reasoning, and perception.

Some examples include speech and language recognition in the Siri virtual personal assistant on the Apple iPhone, vision-recognition systems in self-driving cars, and recommendation engines that make product suggestions based on what you've previously purchased.

Challenges faced by farmers who practice traditional farming methods:

- Climate variables including rainfall, temperature, and humidity are crucial to the agriculture lifecycle in farming.

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Farmers find it challenging to make judgments on how to prepare the soil, plant seeds, and harvest as a result of rising deforestation and pollution.

- Every crop needs a particular type of soil nutrition. Three essential minerals are needed in soil: nitrogen (N), phosphorous (P), and potassium (K). Poor crop quality may result from nutritional insufficiency.
- Weed protection plays a significant part in agriculture, as can be seen from the lifespan of the industry. Unless it is regulated, it can raise production costs and deplete the soil of nutrients by absorbing nutrients from the soil.

Applications of Artificial Intelligence in Agriculture:

In order to improve a wide range of agriculture-related tasks throughout the entire food supply chain, the industry is turning to Artificial Intelligence technologies. These technologies can help produce healthier crops, control pests, monitor soil and growing conditions, organize data for farmers, ease workloads, and help with a variety of other tasks.

Utilization of weather forecasts:

Farmers find it challenging to determine the best time to sow seeds due to climate change and rising pollution. With the aid of artificial intelligence, farmers can

analyze weather conditions by using weather forecasting, which helps them plan the type of crop that can be grown and when seeds should be sown.

System for assessing the health of crops and soil:

The kind of soil and nutrition of the soil have a significant impact on the crops that are grown and their quality. The quality of the soil is deteriorating as a result of growing deforestation, making it difficult to assess.

An AI-based tool called Plantix that can detect nutrient deficits in soil as well as plant pests and illnesses, giving farmers the knowledge they need to utilize fertilizer to increase the quality of their harvest. Utilizing picture recognition-based technology, this app. using smart phones, the farmer can take pictures of his or her plants. Through brief movies on this programme, we can also view soil restoration methods with advice and other alternatives.

In a similar vein, Trace Genomics is another machine learning-based business that aids farmers in doing a soil study. With the aid of these kinds of apps, farmers can monitor the quality of their soil and crops, resulting in healthier, more productive crops.

Drone-based crop health analysis Crop health monitoring solutions based on drone-based Ariel imaging have been introduced by Sky Squirrel Technologies. This method uses a

drone to collect data from fields, which are subsequently sent by USB drive to a computer for expert analysis. This business analyses the photographs it has collected using algorithms and then provides a thorough report on the state of the farm. It aids in the identification of pests and germs, enabling farmers to utilize pest control measures and other approaches when necessary to take the necessary action.

Precision farming and predictive analytics are two examples of how artificial intelligence in agriculture has created tools and applications that assist farmers in conducting accurate and controlled farming by giving them the right advice regarding water management, crop rotation, timely harvesting, and the type of crop to be grown, optimal planting, pest attacks, and nutrition management. AI-enabled systems make weather predictions, monitor agricultural sustainability, and assess farms for the presence of diseases or pests and undernourished plants using data like temperature, precipitation, wind speed, and sun radiation in conjunction with photographs taken by satellites and drones.

With equipment as basic as an SMS-enabled phone and the Sowing App, farmers without connectivity may profit from AI right away. Farmers with Wi-Fi connectivity can utilise AI apps to get a constantly AI-tailored plan for their farms, in the meantime. Farmers

can meet the increased demand for food while growing output and revenues responsibly and without diminishing priceless natural resources with the help of IoT and AI-driven technologies. AI will assist farmers in the future as they become agricultural technologists, utilising data to maximize yields down to individual plant rows.

Robotics for Agriculture:

AI firms are creating robots that can effortlessly carry out a variety of activities in agricultural settings. When compared to people, these robots are trained to harvest crops more quickly and in greater quantities while controlling weeds.

These robots are taught to harvest and pack crops while simultaneously inspecting the crops' quality and looking for weeds. These robots can also overcome the difficulties experienced by agricultural laborers.

AI-powered pest detection system:

One of the deadliest enemies of farmers who cause agricultural damage is pests. AI systems employ satellite photos and historical data to determine whether any insects have landed and, if so, which species—such as locusts, grasshoppers, and others—have done so. AI aids farmers in their battle against pests by sending alerts to their smart phones so that farmers may take the necessary precautions and employ the necessary pest management. With the aid of artificial



intelligence, farmers may automate their operations while also switching to precise cultivation for improved crop quality and production while consuming fewer resources.

Companies working to advance machine learning or AI-based goods and services, such as training data for agriculture, drones, and automated manufacturing, will benefit from future technological advancements that will bring more beneficial applications to this industry, assisting the world in addressing issues related to food production for the expanding population.



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