

Artificial Intelligence: A Revolution in Agriculture

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Artificial Intelligence in simpler terms, is the intelligence that is displayed by machines, specifically computer systems, as an alternative to the intelligence owned by living beings. It is capable of executing every task that is either simple or complex. This technology is nowadays being used in every sector, including agriculture. Due to the rapid enhancement in the global population which is expected to reach 10 billion by 2050, the pressure on agriculture to generate more food is real. In the present time, agriculture faces a lot of hurdles that include, limited land, shortage of labor, climate change issues, and soil fertility problems. Due to all these, various innovative developments in agriculture have taken place. Technology helps to forge each season to enhance the efficiency and harvests. Yet, many farmers cannot utilize the benefits of artificial intelligence in agriculture.

AI in the Agriculture Sector

Being the oldest and most important profession in the world, agriculture has a vital role in the economic sector too. Worldwide, agriculture is a \$ 5 trillion industry. Due to an increasing world population, land and water resources are becoming scanty to fulfill the demand-supply chain. Hence, there is a need to follow a smart approach so to increase the efficiency of farm and the produce.

Applications of AI

With the help of AI, a farmer can yield healthier crops, control the pest effectively, monitor soil and growing conditions, cope with the workload, and revamp a wide range of agricultural-related tasks in the whole food- supply chain. The following are some applications where artificial intelligence is taking its place in agriculture.

1) Operate for Weather Forecasting

AI technology uses advanced algorithms and vast datasets to significantly increase the accuracy of weather predictions. With this accurate data on the weather, the farmer can make well-informed decisions in planting, managing, and harvesting the crops, hence reducing the risks linked with unpredictable weather patterns.

2) To Maintain Soil and Crop Health

With the advent of sensors and imaging capabilities of AI, farmers now have many new ways to increase yields and lessen crop damage. Examples include unmanned aerial vehicles onto which these sensors are placed, with high-tech cameras that analyze the ground for survey.

3) Optimizing Irrigation Systems

Smart irrigation involves the idea of minimizing the use of water, reducing human efforts, and enhancing long-term landscape health along with cost savings. In the present time, irrigation systems in agriculture utilize IoT sensors and AI systems to attain these benefits. For instance, in sprinkler irrigation, an AI technology-fitted system collects data from thermal and acoustic rain sensors that measure the intensity of rainfall to schedule the subsequent irrigation. By doing so, the system then sends the information to the sprinklers to avoid over-watering.

4) Detecting Diseases and Pests

AI-powered systems are used to detect insects and pest infestation more rapidly than humans can ever do. For instance, an AI-powered system can

identify the aphid infestation on strawberries or any other crop followed by sending the data to the farmer's mobile phone along with a suggestion or idea that can be implemented to avoid the severe case.

5) Monitoring Livestock Health

The health monitoring system with AI technology analyzes data from sensors and cameras to recognize the symptoms of illness, injury, and stress in livestock at an early stage. This early detection helps to mitigate the spread of disease and improve animal welfare.

6) Using Drones for Pesticide Applications

Drones are another revolutionizing component in agriculture particularly in the domain of crop spraying. These UAVs are equipped with advanced technologies making pesticide application more feasible along with minimizing waste and environmental impact. These are equipped with GPS and navigation systems that allow them to fly on a predefined path. Ultimately, this ensures proper coverage of the entire field with a subsequent pesticide application.

7) Yield Mapping

It utilizes a combination of techniques like 3-D mapping, data from sensors, and drones through which farmers can estimate soil yields for specific crops. Multiple drone flights are collecting data that permit accurate analysis via algorithms. This data also assists farmers in where and when to sow the seeds, and allocation of the inputs to gain the best returns from investment.

8) Automated Weeding and Harvesting

Machines and computer vision altogether help to examine the size, shape, and color of the leaves to differentiate the weeds from the crops. This type of solution can be utilized in robots for their robotic process automation (RPA) tasks like automated weeding. Smart bots are more accessible in the present time in developed countries for carrying out weeding and harvesting crops.

9) Categorizing the harvested Produce

With the help of AI, the sorting process of the harvested produce becomes easy and quick. Computer vision finds out the pests and diseases in the produce and even grades it according to shape, size, and color more precisely. This ultimately gives benefits to farmers to sell produce to different customers at varied prices.

10) Surveillance

Since it is hard for farmers to protect their farms from burglars or attacks of animals on farm livestock, the use of video surveillance systems along with computer vision can quickly pinpoint security breaches. Some of these systems are so advanced that they can even differentiate the employees from the unauthorized visitors.

In conclusion, the use of artificial technology represents a transformative leap forward in modern agriculture. While there are some challenges also but with the majority of advantages in shaping the future of the farm, increasing the yields, reduction in environmental factors, AI will become a more sustainable approach in agriculture.

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