

Use of Artificial Intelligence in Agriculture and Allied Sectors

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Artificial intelligence is based on the principle that human intelligence can be defined in a way that a machine can easily mimic it and execute tasks, from the simplest to those that are even more complex. The goals of artificial intelligence include learning, reasoning, and perception. By 2050, the world population is expected to reach 10 billion. According to the Food and Agriculture Organization of the United Nations (FAO), crop yields need to increase by 60% to meet the demand for food by 2050. But the growing population is putting considerable pressure on the agricultural sector to increase crop production and increase yields. To address the looming food shortage in the coming days, two approaches are in sight. One is to expand land use and encourage large-scale farming and the other is to adopt innovative practices and leverage technological advances to increase productivity in existing agricultural lands. Only if these two programs reach the farmers at the field level can we provide food to the people in the coming days. Every season new technologies are designed to improve crop efficiency and capitalize on the crop. Apart from this, using the power of artificial intelligence in agriculture, cultivation methods, innovative machines and technologies are becoming available to the farmers. Such artificial intelligence should also reach small and marginal farmers, which will be more favorable to cultivation of crops and everyone will get enough food.

Benefits of Artificial Intelligence in Agriculture

Day by day the cultivation sector breaks new ground. Every industry has opportunities for innovative ideas. The world is making rapid progress in agricultural technology. In addition to this, artificial intelligence is also coming closer to cultivation, and revolutionary changes are being seen in cultivation. Analysts predict that the introduction of this artificial intelligence will solve many farming challenges and helps to reduce many of the disadvantages of traditional agriculture.

Planning in agriculture with artificial intelligence data base

Artificial intelligence based predictive analytics is already paving the way for agri-based businesses. It predicts the prices of national and international markets by processing more data in less time with the power of artificial intelligence. Ensures access to precision agriculture products to farmers. It advises the farmers from time to time on the right from seed sowing to harvesting. It also helps in monitoring weather conditions and recommending doses of fertilizers and pesticides. Irrigation, timing of harvest, pesticides, helps identify areas in the crop that require treatment. Minimizes resource usage along with innovative agricultural practices, reduced use of herbicides, improved crop quality and significant cost savings will contribute to higher profits.

Cost savings through artificial intelligence

Artificial intelligence aims to improve agricultural yields. Combined with AI, precision agriculture can help farmers grow more crops with fewer resources. In agriculture, Ux uses best soil management practices, technology and highly effective data management techniques to increase yield and reduce cost.

Impact of Automation in Agriculture

Labor shortage is not new as agricultural work is difficult. Automation provides a solution without the need to hire more people. The new wave of digital automation will once again revolutionize the sector.

AI systems are being used from cultivation to harvesting

There are many benefits of implementing an artificial intelligence programme. Implementation of already developed programs will facilitate many tasks in the agricultural sector. AI can collect and process big data to determine and initiate best practices in cultivation through AI. Let's look at some common use cases for AI in agriculture, for example.

Optimizing Automated Irrigation Systems

Combined with AI (Internet of Things) sensors that monitor soil moisture levels and weather conditions, they can determine how much water to provide to crops at what time. An autonomous crop irrigation system is designed to conserve water while promoting sustainable agricultural practices. Analyzing the data through an AI algorithm, the leak can be quickly detected to reduce water losses to a large extent. Machine learning models can detect specific signatures of leaks, such as changes in water flow or pressure. AI incorporates weather data along with crop water requirements to identify areas of high-water use. By automating leak detection and providing alerts, AI technology can help farmers conserve resources by increasing water efficiency.

Role of Artificial Intelligence in Crop and Soil Monitoring

Excessive use of fertilizers harms not only the soil, but also the crops and the people who eat them. AI knowledge of such imbalances in soil and cultivated crops can identify nutrients and determine their effects on yield so that farmers can easily make necessary adjustments, computer vision models can monitor soil conditions to collect accurate data. Recently, AI has been able to accurately track the stages of wheat growth and the ripeness of tomatoes with a speed and accuracy that no human can match.

Detection of diseases and pests in cultivation by AI

A computer vision of soil quality and crop growth can detect the presence of pests or diseases. AI is used to scan images to find threats to crop health such as pests, diseases and viruses. It also helps farmers to eradicate or prevent the spread of disease. But for this to work, first of all, detailed images of all kinds of insects, diseases and pests are required.

AI helps to spray fertilizers and pesticides

Recently, pesticides and fertilizers can be sprayed, helping to target specific areas. Powered by AI, drones use computer vision to indicate how much pesticide and liquid fertilizer to spray in each area.

Weeding and harvesting

Robots can be programmed for robotic process automation (RPA) tasks such as weeding, using

computer vision to analyze the size, shape and color of leaves to identify and separate weeds in cultivated crops through machine learning. The robot is already used effectively.

Method of reporting crop yields

Yield mapping uses your algorithms to analyze large datasets in real time, helping to understand crop patterns and characteristics. 3D mapping takes techniques like data from sensors and drones and provides more accurate analysis with the use of algorithms. Where and when to sow seeds for future farmers. Also helps in knowing how to allocate resources for best return on investment.

Processing and Grading

After achieving the yields, good quality must be graded to fetch higher prices in the market. But it's sorting and grading processes are time consuming and costly. However, AI can make this process more precise. Computer vision can grade crop products based on shape, size and color. It enables farmers to divide their produce into grades.

Challenges of AI in Agriculture

AI and computer vision technologies are changing the way we grow crops and improving crop yields. While potentially revolutionary, there are also challenges and limitations to consider. Many people believe that AI only applies to the digital world, regardless of physical farming tasks. This assumption is usually based on a lack of understanding of AI tools. I believe many people don't fully understand how AI works, especially those in technology-related fields, leading to slow adoption of AI across the agricultural sector.

Monitoring Livestock Health with Artificial Intelligence

Health problems are easier to identify in livestock than in crops. Yes, it is possible through AI. For example, a company called Jeff Srivajueva has developed a solution that uses drones, cameras, and computer vision to remotely monitor livestock health. It uses Cattle Eye AI and ML solutions to identify typical cattle behavior, calving, environmental conditions on cattle as well as the impact of feed and provide valuable insights. This knowledge can help

farmers improve livestock welfare to increase milk production. Cattle Eye is the world's first hardware-independent autonomous cattle monitoring platform. It uses a low-cost security camera to capture video footage and provide insights into the health and productivity of your livestock.

Challenges and limitations

- ✓ High cost of technology system. This is burdensome for small farmers.

- ✓ Significant investments in technology, infrastructure and training are required.
- ✓ Data on crop growth and weather conditions are not available in all regions. This limits the effectiveness of AI-based solutions.
- ✓ For example, it can be used to track farmers' activities as drones and satellite imagery are used to collect data on crop health and growth. Thus, raising privacy concerns.

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