Perspectives on Artificial Intelligence in Agriculture

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Article History

Published on : 03 March 2024

The global populace is predicted to surpass 10 billion by 2050, putting an enormous burden on farming to increase food yields and exploit the best yields. Two probable solutions to projected food scarcities have arisen: expanding land usage and implementing comprehensive farming, or approving ground-breaking practices and leveraging technological revolutions to upsurge yield on existing agricultural land. The contemporary agrarian landscape is expanding, branching out in a variety of inventive ways, despite numerous barriers to accomplishing anticipated agricultural output, including inadequate land holdings, labour scarcities, climate alteration, environmental problems, and decreased soil productiveness, to name a few. The agricultural industry has come a long way since the days of labour-intensive ploughing and horse-drawn machinery.[1]

Using the terms AI and agriculture in the same phrase may have seemed strange until recently. Agriculture, after all, has been considered the foundation of human civilization for millennia, providing sustenance and contributing to financial advancement; however, even the most primitive AI emerged only a few years ago. Agriculture technology has grown fast in recent years, transforming farming methods all around the world. Climate change, population growth, and resource scarcity all pose threats to the long-term viability of our food system, making these technologies increasingly crucial. AI solves a variety of difficulties and helps to address many of the flaws of traditional farming.[2]

The Major Advantages

Artificial intelligence in agriculture can help researchers analyse soil health, monitor climatic conditions, and make fertiliser and pesticide recommendations. Farm management software improves productivity and profitability by enabling farmers to make better decisions at each stage of crop development.

AI in agriculture provides farmers with real-time crop understanding that helps them determine whether regions necessitate irrigation, fertilization, or insecticide treatment. Autonomous tractors, intelligent irrigation and fertilization systems, Internet of Things-enabled agricultural drones, intelligent spraying, vertical farming software, and artificial intelligence (AI)-driven greenhouse robots for harvesting are a few instances of automated agricultural equipment. Compared to human farm laborers, AI-powered agricultural instruments are significantly more accurate and efficient.

An intelligent agriculture system can assist with a range of tasks by enhancing existing technologies. AI can collect and assess massive volumes of data while also determining and implementing the best course of action.

Computer vision models can follow soil conditions and gather exact data, but human observation is not flawless. After that, the data pertaining to plant science is utilized to evaluate crop health, forecast yields, and pinpoint any particular anomalies. In actuality, AI has outperformed humans in tracking the phases of tomato ripeness and wheat development.

In addition to tracking crop growth and soil quality, computer vision can detect diseases and pests. This works by using artificial intelligence to scan photographs for mould, rot, insects, and other crop-related dangers. AI and machine learning technologies are used to examine the impact of nutrition and environmental variables on livestock, providing useful insights. This knowledge can help farmers improve the health of their animals in order to produce more milk.

Even though automated pesticide spraying is quicker and requires less labour, it is typically imprecise and harms the environment. AI-powered drones combine the best features of each technology while minimising its drawbacks. Drones use computer vision to calculate the amount of pesticide to spray at each place.

Utilizing sensor and drone data in conjunction with 3D mapping techniques, farmers may estimate soil yields for specific crops. Data is collected from several drone flights, permitting for more precise analysis using algorithms. With the help of these techniques, farmers can predict agricultural yields in the future with accuracy, which helps them decide when and where to plant seeds and how to divide their belongings for the highest return on investment.

These technologies can be used to programme robots to do robotic process automation (RPA) tasks such as autonomous weeding. In actuality, such a robot has already proven useful.

In harvested crops, computer vision can detect both pests and sickness. Produce may also be graded based on its size, colour, and form. Farmers may sell to a range of clients at different prices by rapidly classifying their produce. Traditional manual sorting methods, on the other hand, can be extremely labor-intensive.[3]

Agriculture's AI challenges
Many people feel that AI only applies to the digital environment and has no application in practical farming operations. This notion is primarily based on a lack of awareness about AI tools. Most individuals, particularly those in non-tech areas, do not fully understand how AI works, which leads to poor adoption in the agriculture industry. The vast majority of farmers are unlikely to have contributed to AI-related projects. Furthermore, AgTech providers frequently fail to effectively communicate the advantages of new technology and how to implement it.[1]

The vast majority of farmers are unlikely to have contributed to AI-related projects due to a lack of effective communication about the advantages of new technology and how to implement it. Technology companies need to put in a lot of work to help customers comprehend how artificial intelligence is being used in

agriculture. Using artificial intelligence in farming may seem like the right move for any farmer, considering its advantages for sustainable farming. However, there are a few challenges to overcome, which include:

1. high initial expense,
2. unwillingness to embrace new technologies and ways,
3. inadequate practical experience with developing technology,
4. a time-consuming technology adoption process;
5. technological restrictions, etc.[2,3]

Conclusion

The agricultural industry faces numerous challenges; nevertheless, through the application of technology, performance can be enhanced. Artificial intelligence has revolutionised agriculture. AI has now overcome many of agriculture's challenges, and it is expected that the utilization and practicality of AI in agriculture will totally revolutionise in the future. Traditional agriculture has long needed to be improved to satisfy the demands of a growing human population, and artificial intelligence will help agriculture.

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