

Artificial Intelligence in Futuristic Agriculture: An Insight

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Abstract

India, with the highly variable and unpredictable weather condition, is faced with a severe challenge on how to manage the vast agricultural farming which is one of the most uncontained environments to manage. Computer and network technologies are widely applied in agriculture, which is a greatly encouraging field. Tremendous achievements have been made in agriculture production, research and education in developed countries at present, but there is still a long way to obtain a great development for developing countries such as India. Artificial intelligence (AI) is an area of computer science that draws attention towards the creation of intelligent machines that work and reacts like humans. The principle of Artificial Intelligence is one where machine can perceive its environment and take action to address a specified goal related to that environment. Utilization of machine learning and AI will help the farmer to gain a better understanding of the field condition. It will provide information to the farmers such as the amount of rainfall and moisture required for a good crop and also estimate the best time of seed sowing. AI is the future of agriculture since it provides several ways where agricultural productivity, sustainability and profitability can be improved.

Keywords: artificial intelligence, machine learning, computer science etc.

Agriculture being one of the oldest and most important profession has seen many changes with the introduction of various technologies. More than three-quarters of the poor people in the world are farmers. They are faced with a very tough problem. They have to grow enough food to feed their families every year. With an increasing population and decreasing land resources, one needs to be creative and efficient in farming practices. Nearly 50% of India's land is tilled. Agriculture directly employs 41% of India's working-age population. China, a country that faces nearly the same challenges as India does, is rapidly increasing the use of AI in agriculture. AI is having the way towards helping in achieving healthier crops,

controlling pests, organizing data, monitoring soil and growing conditions which in turn positively affect the efficiency in crop growth and management. Crop-protection chemicals are used during pre sowing, sowing, and post sowing stages of farming. The use of crop-protection chemicals across the value chain can increase the overall yield of crops, not only resulting in rise in incomes for the farmers but also boosting their profitability with significant cut-down in crop losses in which AI can immensely contribute (Panda, 2019). In order to improve productivity and efficiency, technologies like machine learning, image recognition, and predictive modeling are being administered in the agriculture sector. Through these approaches farmer

could produce more food for a growing global population by reducing chemical inputs, could detect diseases as well as pest sooner and quickly respond to variable and unpredictable weather conditions. Worldwide it is a great challenge to farmers, agricultural specialists and scientists to feed the growing population and the irony is that agricultural lands are diminishing and getting squeezed in between whimsical weather and unpredictable commodities market of farm produces. The Social Internet of Things (SIoT) which is the ability of gathering and exchange of data over a network without human-to-human or human-to-computer interface rather it makes use of social objects creating a social network (Panda and Bhatnagar, 2020).

Analyzing farm data

AI is working to improve agriculture. With the help of AI, farmers can analyze parameters such as weather conditions, air temperature, soil conditions etc. to rationalize their decisions. With the help of AI farmer can easily develop an understanding of soil's strengths and weaknesses. India's oldest tea company Assam Company India Limited (ACIL), which has depended on laborers for 180 years has begun the process of deploying AI to help take the industry to a sustainable future from its 'past perfect' present state. For tea plantations, they are working on two types of drones- one that analyses plant health, soil conditions and other natural factors and the other that sprays fertilizers or targets pests from 6-8 ft with precision so that other bushes are not affected. The emphasis is on preventing diseased and defective crops and optimizing the potential for healthy crop production. By analyzing farm data it is possible to reduce the amount of fertilizer and pesticide required to achieve the same yield results as of today's conventional approaches to crop management.

Improving harvest quality and accuracy

AI helps to reduce herbicide use. Through precision agriculture based on AI, farmers can detect and target weeds and subsequently decide the right herbicides. With the usage of computer vision and machine learning farmers can precisely manage weeds. Instead of spraying an entire field, the system can find and spray only where the weeds are. This

prevents bioaccumulation and biomagnifications. AI can also predict upcoming weather patterns which are especially helpful for developing countries like India where farmers lack data, and their knowledge can be limited in certain cases. Also, unmanned drones can analyze the field in real-time and suggest problem areas.

Tackling labor challenges

With the decreasing workforce in the agriculture sector, workers on farms have decreased. Thus, AI agriculture bots can be a solution when it comes to harvesting crops at a higher pace as well as weed elimination. Additionally, chatbots can be used to answer a variety of questions and assisting with specific farm problems. The world will need to produce 50% more food by 2050. This target will be faced with challenges such as decreasing workforce, land scarcity and climate change. Climate change is going to make the farmer's job a lot harder, and just closing that yield gap, even a modest amount would make a huge difference for all those farmers. AI can assist with the entire food supply chain which can tackle the above challenges in an efficient manner.

CONCLUSION

Traditional concepts of farming are still usually followed in the field in India, but AI-based agriculture has not been well developed. Therefore, Indian Farmer must utilize the AI model for their agricultural practices from the existing traditional concepts. The rise of digital agriculture and its related technologies has opened a wealth of new data opportunities for farmers this usually results in better understanding of the situation on the ground through advanced technology that can tell farmers more about their field condition that they can see with the naked eye. And not just more accurately but also more quickly than seeing it walking through the field. There is huge potential for AI and machine learning to revolutionize agriculture on a global level. Only then can it make a difference to the farmer, where it really counts.

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