The Role of AI in Agriculture

Author-1: Mr. Kamal Kishore (TMV Research Scholar)

Author-2: Prof. (Dr.) Pranati Tilak (Dean, Department of Management, TMV)

Abstract

India's agriculture has seen a gradual but significant increase in the number of AI applications, which significantly impacts our society. Despite being used for classification and prediction purposes for some time, including food grading and agricultural yield forecasts, the potential of AI has only just begun to be explored thanks to new deep learning algorithms. Even AI approaches outside of game AI are beginning to infiltrate other industries, including agriculture. The prospects of AI assisting and reshaping the public's mindset are offset by fears that AI could cause harm. AI systems cansignificantly help farmers in areas such as their social and economic health. Thus we should be open to using new technologies that rely on AI for the core of their function.

Introduction

Technology has proliferated that what has been achieved in the last 15 years.Sincethe early 2000s far exceeds what has been achieved in the 30 years since the 1970s. We now have computers in our pockets, connected to the internet, allowing us to stream film and music at any time. Let us apply this remarkable innovation leap to the creation of AI. With repeated instructions and experiences, AI can re-wire its thinking to enhance itself. Aside from the obvious use of AI in robots, scientists are continuously looking for ways to incorporate protections to ensure that AI, while enabling technologies, does not disrupt our daily lives by harming those around us. Nowadays, individuals casually discuss AI in daily conversations, and numerous general pieces appear in publications. We were talking about climate change earlier aided in making meaningful efforts to prevent it. Now people are talking about AI, which will dispel all doubts. So, if we want to do something, talking about AI more seriously might be an excellent start.

Microsoft's AI-based technologies include detecting dangerous diseases, lowering accident risks, anticipating customer behaviour, and helping farmers enhance agricultural yields. AI is fast evolving from Apple's Siri to Microsoft's Cortana to IBM's Watson to self-driving automobiles.

AI has become vital in the tech business. AI research is very technical and specialized. Programming computers for knowledge, reasoning, problem-solving, perception, learning, planning and the ability to manipulate and move objects are key AI issues. Machine Learning (ML) is a well-defined field of soft statistical computing. In recent years, Deep Learning techniques like Convolutional NN and Generative NN have emerged as critical components of AI. This includes learning without supervision to detect patterns in streams of inputs (text, numbers, photos, voices, videos, etc.) or learning with enough supervision to identify patterns in classification and numerical regressions. For example, classification establishes an object's category, whereas regression finds functions that enable suitable outputs from respective inputs. These ideas were used in ML before to emulate the human brain, but AI's powerful deep learning can improve accuracy even more.

AI in Indian Agriculture

AI can solve some of the most challenging problems of our time, and they are only a few of the broad categories. The NITI Aayog, India's policy think tank, has produced a discussion paper on AI solutions for agriculture and other vital industries. In agriculture, artificial intelligence robots can advise farmers on soil quality, the best time to sow seeds, and the best place to spray herbicide and how to combat pests. Agricultural AI could help change the face of Indian farming with its recommendations on optimal practices. Meanwhile, the next opportunity suffers from the shortcoming of scaling to cover the entirety of the value chain while improving capacity and cutting prices.

Agricultural monitoring, weather forecasting, predictive analytics, markets, and supply chain efficiency benefit from AI-driven technologies that are becoming increasingly popular worldwide. By implementing data ecosystems, Internet of Things (IoT), and artificial intelligence (AI), cloud computing infrastructure can support the creation of digital agriculture and bolster farmers' abilities to engage in intelligent farming, smart irrigation, intelligent fertilizer application, and disease/ pest diagnosis/ detection, intelligent spraying, and harvesting.

Machine learning and other soft computing approaches, which can identify patterns in picture and video data, are generally used worldwide for various agricultural activities, such as weather forecasting, predicting disease/pest occurrence, pesticide application timing, and the harvesting and storage of crops. Artificial neural networks are inspired by the structure and function of the brain and are a focus of research in Deep Learning (ANNs). An excellent example of a problem that deep learning can help with contains many features because more advanced models may be employed to do significant parallelization.

Data segmentation with image-based disease/variety identification and crop yield estimation and prediction is being carried out successfully with deep learning techniques.

The application of AI in agriculture will significantly improve it. The application of AI makes possibleequipment with intelligent systems capable of performing at a greater level of accuracyto be as quick as humans, yet be able to respond like humans AI; with the help of the Internet,Precision agriculture will benefit from sensor technology and IoT applications. AIalso plays a vital role in wide-scale applications and remote sensing technologiesClimate Smart Agriculture implementation. A few AI methods, such as mobile,the acceptance of Recommender Systems and Expert Systems can be dramatically improved.

Advanced agricultural technologies, such as high-yield and disease-resistant crops, will increase farmer income through its use. AI techniques like this can likewise bethe shifter of the paradigm that guides location-based advice services to individualize the catalyst of the transition of location-based advisory services to individualizeour country's millions of farmers, whose unique agricultural advice can be obtained by looking at. Machines and sensors. Using AI to enable IoT, drones, and solar power for energy offers new prospects for the business.

Agricultural farmers can get innovative solutions, which are delivered via a service at cheap pricing.In another field where we can benefit from AI to help farmers, precision farming is a strong option.To use the land to its fullest potential, to be specific about crop types and weather patterns, and where and when we should farm.

AI is the new Soil

As a research organization, ICAR's primary goal is to generate new information, and in order to do so, they must construct a knowledgebase that is understandable to humans and machines. While ontologies are a novel AI-based method of information representation, they play a vital role in the generation of scientific archives and applications capable of making intelligent judgments based on knowledge. In India, a society of multiple languages with a significant amount of its farmers being illiterate, the poor are aided by AI methods such as auto-translation and voice-to-text and text-to-voice in Indian languages when accessing the information generated by the National Agricultural Research and Education System (NARES).

A database and its associated procedures must be dependable, secure, and up-to-date for any AI application to be practical. The AI-based system must be able to provide intelligent decisions depending

on the database undergirding it. AI systems are voracious information devourers, drawing conclusions from massive databases of past information and discovering relationships in that data. If we want to see AI solutions applied to agriculture, we must undertake systematic efforts to better gather and digitize data under focused programmes. We must also think about what we will do with this data, where we will keep it, and how we will acquire insight from it. Since AI-enabled solutions can only progress if they are fed new data, they cannot survive without human sources of information. So, the knowledge engineering aspect of AI should be considered a core study topic.

Conclusion

AI is made up of both non-biological and human components. In addition, the wide use of AI in the agricultural sector will result in a transformation in the way we currently perform research and development. AI systems need an almost unlimited stream of new information, and more of the databases they utilize must be filled with information to successfully perform duties with high accuracy, including tracking the past and pointing the forecasts of these systems. In addition, AI systems will change through time, like humans, and adapt to new circumstances.

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