1 Artificial Intelligence in Agriculture

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Abstract

This paper offers a thorough overview of artificial intelligence methods and their significance in agriculture. According to the Food and Agriculture Organization (FAO) of the United Nations, there will be an additional 2 billion people on the planet by 2050, but only 4% more land will be used for agriculture. Utilize the most recent technological advancements to improve farming efficiency in such situations. A direct application of AI or machine intelligence in the farming industry could be the pinnacle of a change in the way farming is done today. We can create intelligent agricultural methods using artificial intelligence to reduce farmer losses and demonstrate their excellent yield. AI-powered farming solutions allow farmers to achieve more with less, improving quality and guaranteeing a rapid (GTM) go-to-market strategy for crops. The current chapter presents a perspective of how AI can power several agricultural sectors. It also looks into the issues that agriculture may face in the future.

Keywords: Agriculture, Artificial Intelligence, Robotics, Smart Farming.

Introduction

Because of its wide range of applications and quick technological improvement, artificial intelligence is one of the main topics of computer science research. Agriculture is one of the primary fields where AI is crucial. Generally speaking, agriculture is a primary employment that requires a lot of effort, tenacity, and persistence along with a low salary and an uncomfortable lifestyle. Farmers are compelled to accept agriculture as their primary source of income because they work extremely hard to grow suitable crops, which takes a lot of time. However, due to low income and occasionally no land gain due to weather or resource scarcity, farmers must deal with loss and decline in financial conditions, which ultimately lead to depression-related suicide.

AI in agriculture will help solve these reasonable issues by cutting down on ti me and almost eliminating labour-intensive tasks. When used properly, AI will

undoubtedly lead to a higher yield with consistent plantations and healthy crop growth, improving farmers' quality of life.AI in agriculture will assist farmers in creating a backup source of income, boosting their morale and preventing suicides and depressions. In an effort to increase AI's dominance in agriculture, I conducted a survey on the subject and recorded responses along with evaluations from a few educators and students.

Importance of AI in Agriculture

In addition to having cross-disciplinary applications, artificial intelligence (AI) has the potential to completely change our understanding of farming. Farmers will be able to accomplish more with less thanks to AI-powered solutions, which will also help them increase their yield in line with the growing use of high-tech equipment in other spheres of life, like education, healthcare, and even government. Since artificial intelligence is centered on ease of use and intelligent labor, agriculture is the most affected of all. AI should be used to improve agricultural areas at low cost and with simple processing. Numerous agricultural issues are managed quickly thanks to artificial intelligence. Artificial intelligence uses a variety of methods, such as enhancing harvest quality and introducing indoor farming to increase crop productivity.

AI addresses labor issues. Since fewer individuals are entering this field, farmers are dealing with issues of Agriculture bots, who will collaborate with farmers, are a solution to the labor shortage. These bots harvest crops more quickly and in greater quantities. Blue River technology uses agricultural robots to manage weeds. Harvest CROO Robotics has developed a crop-picking and packing robot for farmers, leading to crop harvesting.

Additionally, AI does diagnostic analysis similar to that of satellites for crop sustainability and weather prediction; farmers who were previously aware of weather changes would greatly benefit from this. One AI technique that will lessen farmers' workloads is driverless tractors, which function without a human inside the tractor. One of the intriguing technologies that has to be emphasized is Farmer's Alexa, which can communicate with farmers in a manner similar to chatbots in order to solve challenging issues. Using drones for aerial spraying is five times faster than using conventional technology, which benefits farmers as well. Agri-E Calculator is one of the clever applications of AI for farming that assists farmers in selecting appropriate and reasonably priced crops and determines their cost. There are a lot more applications on the market, but they have expensive and challenging manuals. To put it simply, the application of AI in agriculture is making it possible for farmers all over the world to operate more effectively.

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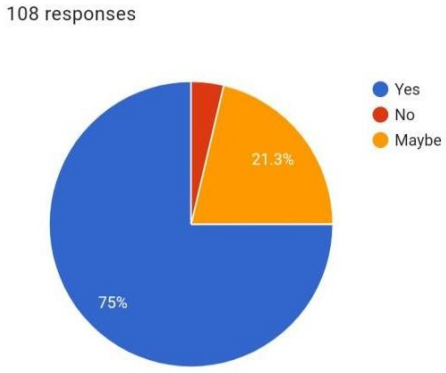
Survey on Smart Farming

I performed a survey, and the results were excellent. Over a hundred individuals reviewed and reacted. Three questions focused on the application, compatibility, and improvement of agriculture through artificial intelligence, according to the survey, and a study was conducted. The questions that follow are:

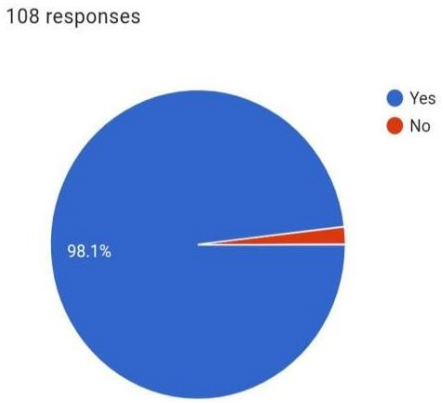
- **Do you genuinely believe that technology has the potential to completel y transform conventional farming?**



Nearly 75% of the replies are positive, 3.7% are negative, and 21.3% are indifferent.

It is evident from the comments that the majority of individuals can envision using AI as a tool to improve conventional farming. Few people disagree with the idea that artificial intelligence can be beneficial in agriculture. Some people are unable to make an appropriate decision about whether or not artificial intelligence should be used in agriculture. My personal position aligns with the majority's assertion that technology has the potential to significantly transform traditional farming.

- **Do you believe that farmers can actually increase their production with smart farming?**



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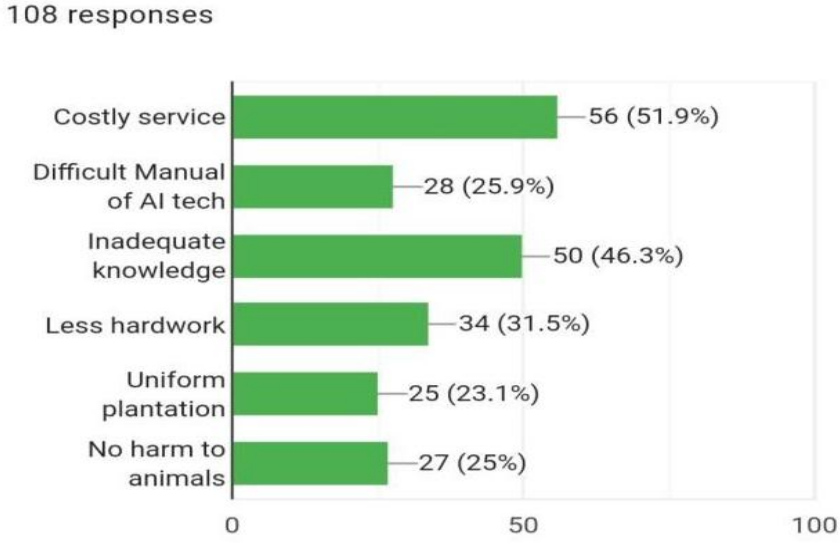
In actuality, the response was predictable—nearly 98% of the responses were positive, with the remaining responses being negative. The majority of votes support the idea that using artificial intelligence to modify farming methods can result in higher yields.

- **Will smart farming be advantageous, especially for small-scale farming? What elements may influence farmers' mindsets?**



Six elements that may influence farmers' mindsets are included in this question, according to the survey. As you can see from the bar graph, farmers typically favor traditional farming because of the high cost of AI services, which account for 56% of the total. With 50% of the vote, the second factor with a higher percentage is Inadequate Knowledge. The third factor, which accounts for 28% of respondents, is the Difficult Manual of Artificial Technology. In my opinion, these three things are the biggest obstacles to AI in agriculture, but if they are resolved, the farming industry will reach a new level. To educate farmers about these technologies, certain events and seminars should be held. Less effort is another element.

The next criteria, which received the fewest votes (25%), is uniform plantation; the final factor, which received 27% of the vote, is no harm to animals. Therefore, we learned that the cost of technology should be lowered if farmers wish to adopt AI in their daily lives.

- **An analysis of AI in Agriculture**

According to a poll conducted by more than fifty persons, the majority of resp ondents believe that AI offers many benefits and some drawbacks that should be rem oved in order for farming to advance to the next level, or "modern farmer."

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Future Scope

The future of artificial intelligence is difficult to forecast. Enhancing research and development was the main focus of artificial intelligence in the 1990s, but is that the primary objective going forward? Research focuses on comparing technologies or robots that resemble humans. The role of humans will undoubtedly alter if machines begin to perform human tasks. One day, our labor may be completed by machines, and a robot may stroll alongside us, thanks to the diligent efforts of researchers. Robots will be employed in agricultural fields in the future, producing higher-quality and larger yields.

Result

According to a poll, artificial intelligence is beneficial to farmers in terms of their labor and earnings. Although it may be expensive, farmers may survive natural disasters and profit wisely in the opposite situation. These innovations will increase efficiency and production. According to the review, AI greatly benefits farming by removing certain issues like expense and challenging technological manuals. Costs can be decreased by promoting the concept through government regulations and by showing farmers how to use it correctly. Artificial agriculture will benefit farming with practice.

Conclusion

The purpose of this study is to provide as much information as possible about the many AI methods used in agriculture. Rule-based expert systems were widely employed in the early 1980s and 1990s, but artificial neural network models and fuzzy inference systems have taken over since 1990. Many respondents to the study stated that they thought AI would be very helpful to farmers both now and in the future. More research is being done using more sophisticated instruments to help conventional agriculture transition to low-cost, precise agriculture.

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