Chapter 18
Applications, Advantages, and Challenges of Artificial Intelligence in Agriculture

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ABSTRACT

The economy is significantly influenced by agriculture. Globally, the primary issue and burgeoning topic is agriculture mechanization. The population is growing at an exponential rate, which is simultaneously driving up demand for jobs and food. For the farmers to meet these needs, the conventional techniques they employed were insufficient. New automated techniques were consequently introduced. The utilization of Artificial intelligence technique has protected agricultural productivity from various threats, such as rising populations, changing climates, employment difficulties, and problems with food safety. Architectures based on machine learning have been confirmed to be among the best regarding precision and resilience. By using systems based on AI, crop yields can be increased while using less water, fertilizer, and pesticides. Besides improving worker safety, intelligent expertise can support in

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reducing its consequence on expected ecosystems, which will help keep food costs low and ensure more crops are grown to feed the world's expanding population.

1. INTRODUCTION

Among the earliest and biggest industries in the entire globe is agriculture. The need for food and jobs is rising due to the worldwide increase in population. Therefore, to meet the globe's food requirements—which also happen to create jobs for billions of people—new automated ways are being implemented in place of the conventional farming methods.

Due to a lack of labor, tighter laws, rising worldwide population, and dwindling farming population, producers are compelled to look for new alternatives. Almost every sector is impacted by technologies like the Internet of Things, Big Data & Analytics, Artificial Intelligence (AI), and Machine Learning (ML). Research and efforts are being made to enhance the caliber and output of food products by utilizing "smart farming," which involves connecting and adaptive farming practices (Jha et al, 2019, Smith, 2018).

By 2050, there will likely be close to 10 billion people on the planet, which would increase agricultural productivity by almost 50% compared to 2013—all while maintaining modest levels of economic growth (FAO, 2017). Currently, crops are grown on around 37.7% of the land surface. Agriculture has a momentous impression on the nation's economy and creates jobs. It is actively influencing the economies of developing countries while also heavily adding to the financial stability of industrialized nations. The farming community's disposable revenue has considerably augmented because of the extension of agriculture.

Hence, it makes sense and is suitable to concentrate more on the agriculture sector. In countries like India, the agricultural sector employs half of the labour force and contributes 18% of the GDP. Agriculture-related expansion will accelerate rural growth, which will then propel change in the countryside and, ultimately, a structural shift (Mogili and Deepak, 2018; Shah et al., 2019).

Numerous segments worldwide have seen a noteworthy shift in response to the introduction of know-how (Kakkad et al., 2019). Interestingly, regardless of being the most digitalized industry, agriculture has experienced a surge in the creation and monetization of agricultural innovations. AI has started to become a significant part of what we do every day, expanding our perspectives and giving us the potential to alter our surroundings. As a result, a system for harvest scheduling that combines crop allocation with routing of vehicles is provided. The workforce, who was once limited to a few business sectors, has since contributed to many industries thanks