

Use of Artificial Intelligence in Agriculture and Farming

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Abstract: *Recently, the agriculture industry has demonstrated the use of artificial intelligence (AI). In order to increase yield, the industry must overcome a number of obstacles, such as poor soil treatment, insect and disease infestation, the need for huge data, low output, and a knowledge gap between farmers and technology. The key ideas of AI in agriculture are its cost-effectiveness, precision, high performance, and flexibility. An overview of AI's uses in crop, weed, disease, and soil management is provided in this study. Particular attention is paid to the application's advantages and disadvantages as well as how to use expert systems to increase output and reduce cultivation costs.*

Keywords: Artificial intelligence (AI); agriculture; soil management; crop management; disease management; weed management; yield

I. INTRODUCTION

Any economy's foundation for sustainability is agriculture [1]. Although it may differ from nation to nation [5], it is crucial for long-term economic growth and structural change [2-4]. Agriculture used to be restricted to the production of crops and food [6]. However, it has changed over the past 20 years to include the production, distribution, marketing, and processing of agricultural and livestock goods. Nowadays, agriculture provides the primary means of subsistence, boosts GDP [7], contributes to national trade, lowers unemployment, supplies raw materials for other industries, and advances the economy as a whole [8–10]. Reviewing agricultural methods in order to provide creative solutions for maintaining and enhancing agricultural activities is essential given the exponential increase in the world's population. Other technological advancements such as big data analytics, robotics, the internet of things, the availability of inexpensive sensors and cameras, drone technology, and even widespread internet connectivity on geographically separated fields will make it possible to introduce AI to agriculture. Artificial intelligence (AI) systems will be able to generate predictive forecasts by evaluating soil management data sources such temperature, weather, soil analysis, moisture, and previous crop performance.

Knowledge about the best crops to plant in a given year and the best times to plant and harvest in a particular location, which can increase crop yields and reduce the use of pesticides, fertilizers, and water. AI applications have the potential to improve worker safety and lessen their impact on natural ecosystems, which will help to keep food prices low and guarantee that food production can keep up with population growth.

Agriculture has always been a crucial sector, contributing significantly to economic stability, employment, and food security. However, traditional agricultural methods often face challenges such as unpredictable weather conditions, soil degradation, inefficient resource utilization, and pest infestations. With the growing global population, there is an increasing demand for food production, making it imperative to adopt advanced technologies for improved efficiency and sustainability. In recent years, Artificial Intelligence (AI) has emerged as a transformative tool in modernizing agricultural practices. AI-driven solutions provide farmers with data-driven insights, precision farming techniques, and automation, ultimately optimizing crop yields and reducing costs.

The integration of AI in agriculture is enabled by advancements in big data analytics, cloud computing, machine learning, and the Internet of Things (IoT). AI-powered sensors, drones, and smart irrigation systems can analyze soil health, monitor crop conditions, and predict optimal planting and harvesting times. Additionally, AI-driven predictive

