HOW ARTIFICIAL INTELLIGENCE IS TRANSFORMING AGRICULTURE

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative technology in the agriculture industry, offering innovative solutions to address challenges and optimize farming practices. In this study, we examine the key AI applications that are disrupting the agriculture industry in areas such as precision agriculture, crop monitoring, disease detection, livestock management, and farm automation. This paper discusses three case studies of AI adoption in the agricultural industry. The first case explores the use of AI in chicken flocks' health monitoring, the second case focuses on AI application to prevent citrus greening disease, and the third case examines the adoption of AI in precision agriculture. These studies show that AI can significantly improve the efficiency, accuracy, and reliability of agricultural operations, leading to higher yields, lower costs, and increased sustainability. While the integration of AI in agriculture has the potential to revolutionize farming practices, promoting sustainability and efficiency, this paper will examine some of the challenges as well.

Keywords: *Artificial Intelligence Applications, Agriculture Industry*

1. INTRODUCTION

In our increasingly technologically advanced generation, AI has accelerated the pace of development in many industries, and agriculture is no exception. Prediction data on population and hunger from the United Nations indicates that by 2050, the global population will have increased by 2 billion people, necessitating a 60% increase in food productivity to feed them.

The Economic Research Service of the United States Department of Agriculture estimates that the food industry in the United States generates $1.7 trillion annually.

The potential for AI and ML to assist meet the projected food requirements of the world's extra 2 billion people by 2050 is already showing promise (Forbes, 2021). Among other things, the need to improve warehousing management, quality management, and production efficiency in agriculture has increased dramatically. AI will be a key tool to optimize farming operations, reduce food waste, increase productivity, and bring agriculture to a stage where it can handle the growing population (United Nations, n.d.).

The market for AI in agriculture is expected to grow at a CAGR of 23.1% between 2023 and 2028, from $1.7 billion to $4.7 billion (Markets and Markets(a), n.d.). This market is expected to reach $7.43 billion by 2030, with major tech companies investing heavily in applications such as crop management, irrigation systems, and food safety, fueling rapid growth in areas like agricultural drones (Vantage Market Research, 2022.).

AI applications started emerging in agriculture in the early 2000s. Initially, AI was mainly used to monitor soil quality, temperature, and humidity, among other uses of precision farming. Today, however, the application of AI is no longer confined to quality control; instead, the many agribusinesses are utilizing machine learning, robotics, natural language processing, and computer vision to improve their operations and development.