

## Application of Artificial Intelligence in Agriculture

Jay Krishna Solanki<sup>1</sup>, Pinky Yadav<sup>2</sup>, Gaurav Prakash<sup>3</sup>

M.Sc. Research Scholar (Agronomy)<sup>1</sup>

M.Sc. Research Scholar (Soil Science)<sup>2,3</sup>

Agriculture University, Kota (Rajasthan) 324001

### Introduction

According to the UN Food and Agriculture Organization, the population will increase by 2 billion by 2050. However, only 4% of additional land will come under cultivation by then. In this context, the use of the latest technological solutions to make farming more efficient remains one of the greatest imperatives. While Artificial Intelligence (AI) sees a lot of direct applications across sectors, it can also bring a paradigm shift in how we see farming today. AI-powered solutions will not only enable farmers to do more with less, it will also improve quality and ensure faster go-to-market for crops.

Artificial intelligence technology is supporting different sectors to boost productivity and efficiency. AI solutions are assisting to overcome the traditional challenges in every field. Likewise, AI in agriculture is helping farmers to improve their efficiency and reduce environmental hostile impacts. The agriculture industry strongly and openly embraced AI into their practice to change the overall outcome. AI is shifting the way our food is produced where the agricultural sector's emissions have decreased by 20%. Adapting AI technology is helping to control and manage any uninvited natural condition.

### Importance of implementing AI in Agriculture

The use of Artificial intelligence in agriculture helps the farmers to understand the data insights such as temperature, precipitation, wind speed, and solar radiation. The data analysis of historic values offers a better comparison of the desired outcomes. The best part of implementing AI in agriculture is that it won't eliminate the jobs of human farmers rather it will improve their processes.

- AI provides more efficient ways to produce, harvest and sell essential crops.
- AI implementation emphasizes checking defective crops and improving the potential for healthy crop production.



- The growth in Artificial Intelligence technology has strengthened agro-based businesses to run more efficiently.
- AI is being used in applications such as automated machine adjustments for weather forecasting and disease or pest identification.
- Artificial intelligence can improve crop management practices thus, helping many tech businesses invest in algorithms that are becoming useful in agriculture.
- AI solutions have the potential to solve the challenges farmers face such as climate variation, an infestation of pests and weeds that reduces yields.

The areas where the use of Artificial Intelligence can benefit agriculture are given below:

## **1. Drone technology**

Drone technology in development involves machine learning. Improving Artificial Intelligence (AI) in drones is important to be able to make them more useful to smaller farmers in developing nations. Current drone technologies are more effective in monitoring well-known crops like corn which are planted in large monocultural field patterns. Drone monitoring programs, as they stand, have a hard time recognizing areas with increased crop diversity, less well-known produce, and grains that look similar throughout their growth stages and so are less effective in monitoring crop growth and health. More work is needed to be able to train AI systems to recognize less common crops and more diverse planting patterns.

## **2. Precision Farming**

The phrase “Right Place, Right Time, Right Product” sums up precision farming. This is a more accurate and controlled technique that replaces the repetitive and labor-intensive part of farming. It also provides guidance about crop rotation. Key technologies that enable precision farming are given below:

- High precision positioning system
- Automated steering system
- Geo-mapping
- Sensor and remote sensing
- Integrated electronic communication
- Variable rate technology

### **3. Robotics**

Agricultural robots automate slow, repetitive, and dull tasks for farmers, allowing them to focus more on improving overall production yields. Some of the most common robots in agriculture are used for:

- Harvesting and picking
- Weed control
- Autonomous mowing, pruning, seeding, spraying, and thinning
- Phenotyping
- Sorting and packing
- Utility platforms

Harvesting and picking is one of the most popular robotic applications in agriculture due to the accuracy and speed that robots can achieve to improve the size of yields and reduce waste from crops being left in the field.

#### **Limitation of AI adoption in Agriculture**

Though Artificial Intelligence offers vast opportunities for application in agriculture, there still exists a lack of familiarity with high-tech machine learning solutions on farms across most parts of the world. Exposure of farming to external factors like weather conditions, soil conditions, and the presence of pests is quite a lot. So, what might look like a good solution while planning during the start of harvesting, may not be an optimal one because of changes in external parameters.

AI systems also need a lot of data to train machines and to make precise predictions. In the case of vast agricultural land, though spatial data can be gathered easily, temporal data is hard to get. For example, most of the crop-specific data can be obtained only once a year when the crops are growing. Since the data infrastructure takes time to mature, it requires a significant amount of time to build a robust machine learning model. This is one reason why AI sees a lot of use in agronomic products such as seeds, fertilizer, pesticides, and so on rather than in-field precision solutions.