Artificial Intelligence in Agriculture

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Abstract: *Artificial intelligence is based on the principle that human intelligence can be defined so that a machine can easily imitate it and perform tasks, from the simplest to the even more complex implications in the areas of industry. Any industry that uses Specific jobs I want to automate smarter machines. Agriculture and livestock are one of the oldest and most important professions in the world. It plays an important role in the economic sector. Around the world, agriculture is a $ 5 trillion industry. The world population is expected to reach more than nine billion by 2050, which will require a 70% increase in agricultural production to meet demand. As the world's population grows, water and land resources will no longer be sufficient to continue the supply chain of demand. So, we need a smarter approach and be more efficient about how we grow and how we can be more productive. In this paper, I will address the challenges farmers face when using traditional farming methods and how AI is revolutionizing agriculture by replacing traditional methods using more efficient methods and helping the world to become a better place.*

Keywords: Precision, Robotics, Supply Chain, Traceability, AI.

I. INTRODUCTION

In agriculture, climatic factors such as precipitation, temperature and humidity play an important role in the life cycle of agriculture. Increasing deforestation and pollution are causing climate change, making it difficult for farmers to make decisions about soil preparation, planting and harvesting methods. Farmers face the following challenges:
Crop diseases infestations

- Lack of storage management
- Pesticide control
- Weed management
- Lack of irrigation and drainage facilities.

As we can see from the agriculture lifecycle that weed protection plays an important role. If not controlled it can lead to an increase in production cost and also it absorbs nutrients from the soil which can cause nutrition deficiency in the soil.
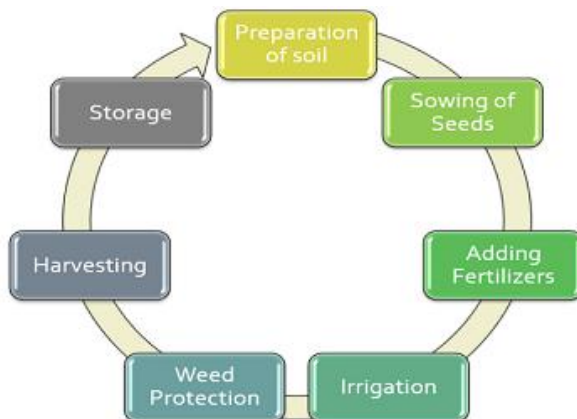

Figure: Lifecycle of Agriculture

1.1 Preparation of Soil

It is the initial stage of agriculture where farmers prepare the soil for planting. This process breaks up large clods of earth and removes debris such as sticks, stones, and roots. The addition of fertilizers and organic substances also depends on the type of crop, creating an ideal situation for the plants.

1.2 Sowing of Seeds

At this stage, attention should be paid to the distance between two seeds and the depth to plant the seeds. In this phase, climatic conditions such as temperature, humidity and rainfall play an important role.

1.3 Adding Fertilizers

Maintaining soil fertility is an important factor 2 in helping the farmer continue to grow nutritious and healthy crops. Farmers are turning to fertilizers because these substances contain phytonutrients such as nitrogen, phosphorus and potassium, which supplement the necessary elements found naturally in the soil. This phase also determines the quality of the harvest.

1.4 Irrigation

This phase will help keep the soil moist and maintain moisture. Insufficient or excessive watering can hinder plant growth and, if not done correctly, damage plants.

1.5 Weed Protection

Weeds are unwanted plants that grow near crops or farm borders. It is important to consider protection against weeds, as weeds reduce yields, increase production costs, interfere with the harvest and decrease crop quality

1.6 Harvesting

It is the process of harvesting mature crops from the fields. This activity is labor intensive, making it a labor-intensive activity. This phase also includes postharvest handling such as cleaning, sorting, packing and cooling.

1.7 Storage

This phase of the post-harvest system in which the products are stored in such a way that food safety is guaranteed outside the times of agriculture. It also includes the packing and transportation of the plants.

II. OBJECTIVES

- Understand the traditional method of farming
- Challenges in agriculture
- AI method to overcome challenges

III. OVERCOMING THE CHALLENGES USING ARTIFICIAL INTELLIGENCE

3.1 Precision Farming

AI applications in agriculture have developed applications and tools that help farmers with inaccurate and controlled farming by providing farmers with proper guidance on water management, crop rotation, timely harvest, types of crops to be grown, optimal crops, pest infestation, and nutrition management. From precision agriculture, drones can perform soil health scans, monitor plant health, help plan irrigation plans, apply fertilizers, estimate yield data, and provide valuable data for climate analysis.

A. Cases of Precision Farming Management

The detection of different levels of stress in a plant via high resolution images and multiple sensor data by AI. This entire set of data generated from multiple sources needs to be utilized as an input data for AI machine learning. This

enables fusion of these data and features identification parameters for plant stress recognition. AI machine learning models developed are trained on a wide range of plant images and could recognize the different levels of stress in plants. This total approach can be categorized into four sequential stages of recognition, categorization, quantification and forecasting to take better and improved decisions. Using weather forecasts: With changing weather conditions and increasing pollution, it is difficult for farmers to determine when to plant and when to sow seeds.

3.2 Soil Monitoring

Drone Plant Health Analysis: SkySqurrel Technologies has developed Ariel drone-based imaging solutions for plant health monitoring. With this technique, the drone collects data from the fields and then transfers the drone data to a computer via a USB drive and is analyzed by experts. Soil robots like Bonior provide farmers with detailed observations because they can get very close to crops. Some of these agricultural robots can also be used for various other tasks, such as fertilizing and weeding algorithms to analyze the captured images and provide a detailed report with the current status of the farm. It helps the farmer to identify pests and bacteria, and helps farmers to use pest control and other methods in a timely manner to take necessary action.

3.3 Crop Seeding

Autonomous precision seeding will help combine robotics with geomapping, a map will be generated which will provide information on all soil properties such as soil quality, soil density, etc., at each of the points on the earth. The agricultural field A tractor with a robotic seeding attachment will start placing the seeds in precise places and at the correct depth so that each seed has a better chance of growth.

3.4 Pest Detection

Pests are one of the worst enemies of farmers that damage crops. Artificial intelligence systems take satellite images and use artificial intelligence algorithms to compare them with historical data and recognize if an insect landed and what kind of insect landed like grasshopper, grasshopper, etc. and send alerts to farmers on their smartphones with it, farmers can take the necessary precautions and apply the necessary pest control. In this way, AI helps farmers fight pests.

3.5 Agricultural Robotics

Artificial intelligence companies are developing robots that can easily multitask in agricultural fields. This type of robot is trained to fight weeds and harvest crops faster, recognizing this by picking and packing crops at the same time as humans and weeds. These robots can also cope with the challenges of forced agricultural labor. The robot patrols farmland and uses computer vision to detect weeds. When the robot finds a weed, it can spray herbicides directly on the invading plant. The company estimates that its precision spray technology can reduce the amount of herbicides used on farms by about 80%.

IV. LIMITATIONS OF AI

- The use of robotics in agriculture is very expensive.
- The complexity of the farm increases and there is the same risk if the controller does not exercise the necessary care.
- The exertions hired to attend to the farm need to be properly professional in technology.
- The energy reduce hassle in India could be a primary nightmare for the farmers the use of robotic generation because the robots run via electricity.

V. CONCLUSION

Adopting artificial intelligence in agriculture is beneficial to farmers as it will improve agricultural production Most industries working in AI-based agriculture use image recognition method to analyze soil nutrients, diseases, crop

health, etc. manpower and provides the best result in agriculture. Future agriculture will use sophisticated technologies such as robots, temperature and humidity sensors, aerial imagery and GPS technology. These advanced devices and precision farming and robotic systems will enable farms to be more profitable, efficient and safer and more environmentally friendly.

REFERENCES

[1]. Artificial Intelligence in Agriculture: A Literature Survey: - International Journal of Scientific Research

[2]. Getting value from artificial intelligence in agriculture https://www.publish.csiro.au/an/AN18522

[3]. https://www.sciencedirect.com/journal/artificial-intelligence-in-agriculture

[4]. Special issue. Artificial intelligence in agriculture.

[5]. https://www.cropin.com/blogs/futuristicfarming-a-look-into-artificialintelligence-in-farm-machinery/

[6]. http://www.keaipublishing.com/en/journals/artificial-intelligence-in-agriculture/

[7]. https://customerthink.com/the-role-ofartificial-intelligence-in-agriculturesector/

[8]. https://www.forbes.com/sites/louiscolumbus/2021/02/17/10-ways-ai-has-thepotential-to-improve-agriculture-in-2021/?sh=50fe19f87f3b