

## Artificial intelligence: Role in Agriculture GDP during Covid-19

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### Introduction

Agriculture is a major industry and foundation of the economy of a country like India. India's gross domestic product (GDP) declined sharply by 23.9 per cent during the April-June, 2020-21 (Anonymous, 2020a). Only the agriculture, forestry and fishing industry witnessed a growth of 3.4 per cent in this period. The Covid-19 pandemic induced economic turbulence along with measures to curb its outbreak, heavily dented India's economy. Factors such as climate change, population growth and food security concerns have propelled the industry into seeking more innovative approaches to protecting and improving crop yield. As a result, AI is steadily emerging as part of the industry's technological evolution. Global population is expected to reach more than nine billion by 2050 which will require an increase in agricultural production by 70% in order to fulfil the demand. Only about 10% of this increased production may come from availability of unused lands and rest of 90% should be fulfilled by intensification of current production (Panpatte, 2018). In this context, use of latest technological solutions to make farming more efficient, remains one of the greatest necessities.

The scarcity & increasing labour costs, raising cost of cultivation and crop failures associated with unpredictable yield due to diseases, failure in rainfall, climatic variations and loss of soil fertility, fluctuating market price in agriculture commodities etc., has made significant negative impact on the socio-economic status on this backbone population. AI based equipment and machines, has taken today's agriculture system to a different level. This technology has enhanced crop production and improved real-time monitoring, harvesting, processing and marketing. The latest technologies of automated systems using agricultural robots and drones have made a tremendous contribution in the agro-based sector and GDP of

a country. Artificial Intelligence (AI), along with other digital technologies, will play a key role in modernizing agricultural activities and realising the goal of doubling the farmer's income by 2022. The global 'AI in agriculture' market size is expected to be worth USD 2.6 billion by 2025 (Anonymous, 2020b).

### **Impact of AI techniques in Agriculture**

AI based techniques help to improve efficiency in different fields in the agricultural sector like the crop yield, irrigation, soil content sensing, crop- monitoring, weeding, crop establishment. Agricultural robots are designed to determine various important parameters like weed detection, yield detection and crop quality and many other techniques. AI based technological solutions has enabled the farmers to produce more output with less input and even improved the quality of output, also ensuring faster go-to- market for the yielded crops.

### **Importance of Artificial Intelligence in Agriculture**

Artificial Intelligence (AI) can be applied cross disciplinary and it can also bring a paradigm shift in how we see farming today. Today's technology advancement in Artificial Intelligence, Big Data, IoT are becoming the major drivers for providing the Digital IT solution almost in all the fields and business sectors.

#### **1. Image-based insight generation**

Drone-based images can help in in-depth field analysis, crop monitoring, scanning of fields and so on. Feeds from drone image data can generate alerts in real time to accelerate precision farming. Given below are some areas where computer vision technology can be put to use:

#### **2. Identification of optimal mix for agronomic products**

Based on multiple parameters like soil condition, weather forecast, type of seeds and infestation in a certain area and so on, cognitive solutions make recommendations to farmers on the best choice of crops and hybrid seeds. External factors like marketplace trends, prices or consumer needs may also be factored into enable farmers take a well-informed decision.

- Disease detection
- Crop readiness identification

- Field management

### 3. **Health monitoring of crops**

Remote sensing techniques along with hyper spectral imaging and 3d laser scanning are essential to build crop metrics. This technology will also be used to monitor crops along their entire lifecycle including report generation in case of anomalies.

### 4. **Automation techniques in irrigation and enabling farmers**

Machines trained on historical weather pattern, soil quality and kind of crops to be grown, can automate irrigation and increase overall yield. With close to 70% of the world's fresh water being used in irrigation, automation can help farmers better manage their water problems.

### 5. **Drone Based Technology**

One of the most promising areas is agriculture, where drones have the potential to address major challenges. Drone technology is giving agriculture a high-tech makeover. Here are six ways drones will be used throughout the crop cycle:

- **Soil and field analysis:** By producing precise 3-D maps for early soil analysis, drones can play a role in planning seed planting and gathering data for managing irrigation and nitrogen levels.
- **Planting:** Drone planting systems decrease planting costs by 85 percent. These systems shoot pods with seeds and nutrients into the soil, providing all the nutrients necessary for growing crops.
- **Crop spraying:** Drones can scan the ground, spraying in real time for even coverage. As result, aerial spraying is five times faster with drones than traditional machinery.
- **Crop monitoring:** Inefficient crop monitoring is a huge obstacle. With drones, time-series animations can show the development of a crop and reveal production inefficiencies, enabling better management.
- **Irrigation:** Sensor drones can identify which parts of a field are dry or need improvement.

- Health assessment: By scanning a crop using both visible and near-infrared light, drone-carried devices can help track changes in plants and indicate their health and alert farmers to disease. The biggest obstacle to that becoming a reality is sensors capable of collecting high-quality data and number crunching software that can make that high-tech dream a reality.

### **Artificial intelligence and its challenges in Agriculture**

AI systems need a lot of data to train machines and to make precise predictions. In 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 in 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.

### **Conclusion**

There is huge potential for artificial intelligence and machine learning to revolutionize agriculture by integrating these technologies into critical markets on a global scale. AI technologies help farmers to analyse soil, crop, irrigation etc. and save time and allow farmers to grow right crop in each season that has best yield. AI based predictions enable suggesting appropriate pesticides in crops at right place and right time before large scale incidence of disease. With a huge space still untouched in agriculture, there is a vast opportunity for the agriculture industry to leverage emerging technology for assisting farmers with the answers to all their queries and giving relevant advice and recommendations to their specific farm related problems.

### **References**

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