

Use of AI in Horticulture crops

ARTICLE ID: 0133

Neha Jamwal¹, Akanksha Marwah²

¹Research Scholar at Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, H.P

²Research Scholar at Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, H.P

AI, often known as artificial intelligence, is a field of computer science that teaches robots to emulate human physical actions, and respond in humanlike ways. The term 'Artificial intelligence' given by John McCarthy in 1950.

Introduction

- Horticulture crops benefit India's economy by increasing rural incomes and creating work opportunities for young people.
- Intelligent systems can enhance horticulture crop growing and management through technological advancements and data analysis.
- It has numerous applications in the horticultural business.
- Machines can efficiently conduct tasks such as planting, watering, harvesting, and testing new systems, surpassing human capabilities.
- Horticulture requires AI experts to boost yield.
- AI technologies improve crop health, provide weather information (temperature, rain, wind speed,

wind direction, solar radiation, pest control, soil and growing conditions), organize data, reduce farmer workload, and improve the food supply chain.

Advantages of AI in Horticulture Crops

AI, often known as artificial intelligence, is a field of computer science that teaches robots to emulate human

physical actions, and respond in humanlike ways. The term 'Artificial intelligence' given by John McCarthy in 1950.

- Artificial intelligence improves crop production, harvesting, and sales efficiency.
- AI deployment prioritizes identifying and addressing crop defects to promote healthy output.
- Advancements in AI technology have improved the efficiency of agricultural operations.
- Applications include automatic machine changes for weather forecasts and disease or pest identification.
- AI can help crop management practices.



- AI technologies can address difficulties faced by farmers, like climate variability and pest and weed infestations, which can impact harvests.
- It would not eliminate human farmers' occupations, but rather improve their procedures.

Applications

Produce Maturity Identification

Identifying the stage of fruit ripening requires photographing crops under white/UV-A light. Farmers, particularly in the case of severely perishable horticultural items, may construct various maturity grades based on crop/fruit type and stack them separately before bringing them to market. Harvesting at the appropriate maturity will help extend post-harvest shelf life.

Automation system in Irrigation

The IoT-based smart irrigation system automates the irrigation process by monitoring soil moisture and weather conditions. Irrigation is one of the most labour-intensive farming operations, but artificial intelligence can avoid it because it is aware of past weather patterns, soil quality, and crop kind.

AI in Shaping the Future of Farms

Fruit/Vegetable Harvesting Robot: These robots have to collect fruits without injuring the tree's branches and leaves. The robots must be able to access all sections of the harvested tree and discriminate between fruits and leaves through



FRUIT HARVESTING ROBOT

video image capture. The camera is installed on the robot arm, and the colours detected are compared to the attributes stored in memory. The robot arm's camera recognizes colours and compares them to stored data in memory. If a matching fruit or vegetable is found, it is gathered. To observe fruit that is concealed by foliage, use an air jet to blow leaves away. The pressure used to the fruit is adequate to pull it from the tree but inadequate to bash it. The shape of the gripper depends on the fruit or vegetable being plucked.

- The employment of a robot for lettuce weeding and thinning increases output. The vision system inspects each plant and uses AI algorithms to determine which to maintain and which to remove for maximum productivity.

Automated tractors: Farmers will soon be able to automate their 100-year-old machines by merging intricate software with "off-the-shelf" technologies



AUTONOMOUS ROBOT FOR WEED CONTROL

such as sensors, radars, and GPS.

Drones: Drones assess soil condition and determine whether it requires irrigation or planting. Vegetables and fruits are watched by cameras that are taught to detect anomalies or problems such as dehydration and unwanted insects. Using all of this information, we can forecast the ideal time to harvest the crop. Drone technology has transformed

agriculture, making it more technologically advanced. More drones can scan the ground and spray uniformly in real time. Drones can speed up aerial spraying by five times compared to traditional methods.

AI In Horticulture: Current Approaches & Achievements

Blue River Technology

Weed Control: A California-based startup developed the "See & Spray" robot, which uses computer vision to precisely spray weeds. Herbicide resistance can be avoided with precision spraying.

Crop Harvesting: The workforce scarcity has led to reported income losses of millions of dollars. Wish Farms, situated in Florida, announced plans to employ a Harvest CROO Robotics strawberry harvester in the summer of 2017 to help strawberry growers with selecting and packing their products.

AI for Monitoring Crop and Soil Health: PEAT, a Berlin-based agricultural tech business, has developed Plantix, a deep learning application that can detect soil faults and nutrient deficiencies. PEAT, an agricultural technology company in Berlin, has developed Plantix, a deep learning algorithm that, according to sources, detects potential defects and nutrient shortfalls in soil.

Trace Genomics: Trace Genomics, a California-based firm, offers soil analysis services for farmers comparable to the Plantix app. Trace Genomics provides users with a detailed analysis of their soil's components after receiving a sample.

"aWhere" : It is a Colorado-based startup that uses

References

1. Kumar V, Jakhwal R, Chaudhary N and Singh S. Artificial intelligence in horticulture crops.2023. *Annals of Horticulture*.16(1):72-79.

satellites and machine learning to assess farms for disease and insect detection, weather forecasting, and agricultural sustainability analysis.

Limitation Of Artificial Intelligence In Horticulture

- In many regions of the world, farmers are unfamiliar with advanced machine learning technologies.
- Cost is a major challenge.
- AI systems also require a large amount of data to train machines and make exact forecasts.

Challenges And Future Scope

- AI technology can anticipate weather and agricultural factors, such as soil quality, groundwater, crop cycle, and pest attacks.
- AI sensors can be incorporated in robotic harvesting equipment to collect data. AI-based advisories might potentially enhance production by 30%. However, farmers are adapting to shifting conditions by applying AI to bring digital revolution to agriculture.

Conclusion

AI can help farmers increase production capacity and reduce costs. AI can revolutionize research and development in horticulture. Artificial intelligence-based products and services, such as training data for drones, automated manufacturing, and agriculture, will improve efficiency and offer new uses in the business. Artificial intelligence has the potential to revolutionize agriculture and help feed the world's growing population. Artificial intelligence will help farmers make better decisions.