Article: RT0331

Biotica Research Today

Vol 2:9 927/929

2020

Future of AI in Agriculture

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Open Access

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Keywords

Artificial intelligence, Climatic varieties, IoT, Precipitation

How to cite this article?

Karnawat *et al.*, 2020. Future of AI in Agriculture. Biotica Research Today 2(9): 927-929.

Abstract

Worldwide populace is relied upon to arrive at in excess of nine billion by 2050 which will require an expansion in horticultural creation by 70% so as to satisfy the interest. Just about 10% of this expanded creation may originate from accessibility of unused terrains and rest of 90% ought to be satisfied by increase of current creation. In this, utilization of most recent innovative answers for make cultivating more productive, stays probably the best need. The shortage and expanding work costs, raising expense of development and harvest disappointments related with flighty yield because of ailments, disappointment in precipitation, climatic varieties and loss of soil ripeness. Using artificial intelligence we can develop smart farming to minimize loss of farmers and provide them with high yield. Using artificial intelligence, one can gather large amount of data from government and public websites or real time monitoring of various data is also possible by using IoT (Internet of Things).

Introduction

Global population by 2050 is expected to reach more than nine billion. Raise in population may create a huge food demand and to fulfil the food security which will require an increase in agricultural production by 70%. So we have to get more produce from limited land and also by reducing the cost of cultivation.

New technologies will be needed to ease the workload on farmers. Field operations will be remotely controlled and automated risk will be identified throughout the crop cycle. This machine learning also develops farmers' friendly apps to ease the workload of farmers and to improve a wide range of agriculture related risk.

The raise in cost of cultivation, crop failures due to unpredictable diseases, loss of soil fertility and labour shortage has significant negative impact in agriculture. Increasing in demand and shortage of supply adversely affect the socio-economic status. Machine learning and artificial intelligence attain its importance to overcome this strategy.

Artificial intelligence is the intelligence exhibited by machines, rather than human or other animals. The action to maximize the success will be carried out by using the intelligent agents which perceives its environment (Ekta *et al.,* 2020). Artificial intelligence pave the way towards drones, robotics and sensor based technologies. Certain apps like plantix, ICRISAT sowing app, etc. guides farmers throughout the process of sowing, disease and pest management, harvesting and sale of produce.

AI Based Machines in Agriculture

Drones

Drones have the potential to address major challenges in agriculture. It gives a high tech makeover in agriculture. It is used throughout the life cycle of crop. Crop will

Article History

Received in 12th September 2020

Received in revised form 16th September 2020

Accepted in final form 17th September 2020

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be scanned using both visible and near infrared light drone-carried devices can help track changes in plants and indicate their health and alert farmers to diseases.

Planting and spraying is faster with drones than traditional machinery. Drone is one platform that allows the field to be sensed multiple times throughout the growing season for identifying the ideal timing for in-season fertilizer application (Thompson *et al.,* 2017). Piloted agricultural aircraft like unmanned aerial vehicles are remotely controlled for crop production.

Robotics

Robotics is a new trend in agriculture. It is performing various agricultural operations autonomously such as spraying, weed control, fruit picking, and manage individual plants in novel ways. Blue River technology is founded in 2011. It is a California-based startup combines artificial intelligence, computer vision and robotics.

Computer vision system identifies each individual plant, and robotics enables smart machines to work. See and spray is robot developed by blue river technology for efficient weed management the use of sensors that detect weeds, the type of weeds and the right herbicides are sprayed precisely as per encroachment area.

Robots are also used in lawns to cut the grass (Demeter). The higher quality products can be sensed by machines (colour, weight, density, ripeness, size, shape) accurately. More than 90% of the fruits were detected to harvest by robot moreover, the robot could harvest a fruit in 16s (Onishi *et al.,* 2019).

Wireless Sensor Network

Network of devices that can communicate the information gathered from a monitored field through wireless links. Various sensor nodes will be placed in the field for monitoring the operations. Sensor based irrigation scheduling can be done according to the sensor data.

The moisture percentage will be available in smart phones of farmers automatically through message. Gravimetric method is cumbersome. So by sensor data it is ease to farmers to schedule the irrigation according to the depletion of moisture content.

Mobile Apps

Plantix: Berlin based start up to detect the defects and nutrient deficiencies. This app uses images to detect the diseases and then a diagnosis of the plant health is provided. It is initially launched in the Indian regional languages of Telugu and Hindi. 30 crops and offers prescriptions for over 120 crop diseases.

Prospera: This Israeli based startup was founded in 2014. It guides the farmers by collecting the data that farmers have like soil/ water sensors, aerial images and so on. The Prospera device can be used in green houses also.

The Sowing App: Microsoft in partnership with ICRISAT developed sowing app. It uses artificial intelligence and crop modelling tools provide farmers customized real time advisories. It helps to define optimal sowing timings. Customized messages will be sent to the farmers that advise them on farm operations to carry out.

Smart greenhouses: Smart greenhouses manipulate the environmental parameters thru manual intervention or proportional control mechanisms. A smart greenhouse can be designed with internet of things; this format intelligently displays video units.

Challenges

Even though machine learning has vast opportunities there still exists a lack of familiarity with machines. Lot of data is required to train the machines for precise predictions but it's very hard to get the temporal data. To explore the enormous scope of artificial intelligence in agriculture, applications need to be more robust.

The solutions need to become more affordable so that the technology will reach the masses. The solution will be more affordable in open source platform; the greatest challenge is to make the solutions having higher penetration among the farmers.

Conclusion

Smart farming practices can be developed using artificial intelligence to minimize cost of cultivation, loss of farmers and to provide them with high yield. Crop production may be done better and cheaper by using artificial intelligence based technologies. Such technologies will reduce labor efforts and also it guides farmers throughout the crop cycle. AI technologies help farmers to analyses land/ soil/ health of crop etc. and save time and allow farmers to grow right crop in each season that has best yield. Vertical cropping can reduce water usage, make efficient land usage, can be cultivated in urban areas in buildings. It can reduce the problems with labour unavailability. It allows prediction of next year crop seasons/ weather/ climate/ rainfall etc. AI based predictions enable suggesting appropriate pesticides/ crops/ place at right time before large scale incidence of disease. With a huge spaces till untouched in agriculture for the intrusion of automatic response systems, there is a vast opportunity for the agriculture industry to leverage emerging technology of catboats for assisting farmers with the answers to all their queries and giving relevant advice and recommendations to their specific farm related problems. This in turn propels the growth of the AI market in agriculture.

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