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Scientific Vision in AI Applications in Agriculture

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Abstract:

Technology plays a very important role. Technology is used in each area to enhance work efficiency, to reduce time consumption and achieve optimal and better results. Food, shelter and cloth are three basic things for humans. An increase in the population ultimately increases the consumption of agricultural products. At present, farming techniques are improved using technology such as artificial intelligence that improves the quality of agricultural production. Research sheds a vision on how to feed the use of technology as a result of different agriculture sectors. has been clearly applied in the agricultural sector recently. The sector faces many challenges to maximize its yield, including inappropriate treatment of soil, disease and pest invasion, huge data requirements, low production, and the knowledge gap between farmers and technology. The main concept of artificial intelligence in agriculture is its concept, flexibility, high performance, accuracy and cost-effectiveness. This paper provides a review of AI applications in soil, crop management and weed and disease management. Special emphasis is placed on the strength and limitations of application and the way experts use higher production systems when the industrial revolution occurred, machines have been deployed as alternatives to humans that reduce human action.

Nowadays, AI enables human action. In agriculture there is a rapid adaptation of artificial intelligence in its various technologies. Effective agricultural practices that use technological developments and solutions are the need of the current situation. The use of technologies such as artificial intelligence will help farmers enhance crop quality. Human power has been one of the main factors of agriculture. Nowadays different techniques such as disease detection, determination of crop readiness, depending on the soil that fertilizer should use, field management and many more. At present, factors such as climate change, population growth and food security concerns in the industry are developing and improving more innovative approaches to crop protection and agro-industry use.

Agriculture is the bedrock of any economy's sustainability. It plays a key role in long-term economic growth. However, structural transformation may vary by country. In the past, agricultural activities were limited to food crop production. In the past two decades, however, it has evolved into crop processing, production, marketing, distribution and livestock products. Agricultural activities now serve as the primary source of livelihood, improving GDP, being the source of national trade, reducing unemployment, providing raw materials for production in other industries, and overall developing the economy. With global engineering, agricultural practices need to rise to provide innovative approaches to support and improve agricultural activities. The introduction of artificial intelligence in agriculture by others will be enabled by technological advances, including analysis of big data, robots, IoT, availability of cheap sensors cameras, drone technology and even large-scale internet on geographically spread fields. By analyzing soil management data sources such as temperature, weather, soil analysis, moisture, historical crop performance and artificial intelligence systems, you will be able to provide predictive insights into any crop grown in a given year and when optimal harvesting dates are grown in a specific area, thereby improving crop yields that reduce the use of water, fertilizer and pesticides. At present, factors such as climate change, population growth and food security concerns in the industry are developing and improving more innovative approaches to crop protection and agro-industry use.

Keywords: artificial intelligence -agriculture-future machines -robotics

Introduction:

The introduction of artificial intelligence in agriculture by others will be enabled by technological advances, including analysis of big data, robots, IoT, availability of cheap sensors cameras, drone technology and even large-scale internet on geographically spread fields. By analyzing soil management data sources such as temperature, weather, soil analysis, moisture, historical crop performance and artificial intelligence systems, you will be able to provide predictive insights into any crop grown in a given year and when optimal harvesting dates are grown in a specific area, thereby improving crop yields that reduce the use of water, fertilizer and pesticides.

IoT and sensing layer: This is the first interaction layer with areas. It uses and hosts various kinds of IoT devices (such as sensors), capable of collecting data from real-world objects, and sharing them to provide real-time data. Many sensors are hosted in the cloud and integrated within this layer, i.e. moisture sensors, moisture sensors and weather monitoring systems. Moreover, this layer is responsible for operating robotics and drone operators to help move smart machines within the agricultural area. Thus it allows smart machines to navigate between sites, in order to cover a wide area

Material Learning:

Ability to learn anything without being explicitly programmed is referred to as machine learning. It is a subset of artificial intelligence using techniques (such as learning depth) to allow the machine to classify and predict things like food classification, agricultural crop forecasts and soft computing methods while recognizing patterns via images and video (drone cameras, satellite data processing) worldwide in monitoring and managing various agricultural processes and predicting disease/pests, water and nutrient shortages, weather forecasts, application time and optimal dose of chemical sprays, and time of harvesting.

Agriculture remains a fundamental consideration for any country, and it is one of today's major challenges. Moreover. In addition, the gap between increasing demand for water and available water supplies is expected to widen and millions of people are likely to experience water stress. Except for traditional measures, scientists and the government recognize the important role AI plays, despite its relatively short history of development. It uses the expert system to improve cotton production under the influence of irrigation, fertilization, weed cultivation, climate and other factors.

Agriculture is our country's largest industry and plays a key social and economic role in the country's growth. Before adapting technology in agriculture, agriculture is done using traditional techniques and modern methods. Agriculture depends on many factors There are many factors affecting agriculture. Farmers are used to harvest a certain type of crop or cycle of crops. Agriculture is adopted in most areas when rainfall or water is available. The eight main steps farmers select crops, prepare land and seed selection, plant seeds, irrigation, crop growth, fertilization and harvesting. All these steps are done only manually, requiring more human and animal action.

The importance of artificial intelligence in agriculture:

AI can be applied via discipline and can also make a qualitative shift in how we do. Not only will AI-powered solutions enable farmers to do less, but it will also help farmers gain more revenue, according to the increasing use of technical mechanisms in public life, such as education, hospitals, and even governance. AI focuses on ease and intelligence. Agricultural fields must be strengthened with artificial intelligence, low costs and easy processing. Through artificial intelligence different farming problems are controlled in a fast time period.

In AI various techniques such as improving harvest quality, introducing indoor agriculture for better crop production rate. There are many AI applications that will really help farmers farm data by improving crop quality and accuracy can detect AI sensor targeted weed assistance, also can detect diseases in plants, pests, etc. Artificial intelligence deals with labor challenges, as we know fewer people enter this profession, so farmers face problems of lack of manpower, lack of manpower, so the solution to this is agricultural robots that will work with farmers. This robot harvest crops in larger and faster quantities as well. There is an agricultural robot that is used in blue river weed control technology. Harvesting robots that harvest crops, robots have developed a robot for farmers that will pick and pack the crop.

applications in agriculture:

This study aims to present the current state of AI in agriculture by highlighting three important considerations and achievements of soil management, weed control management and IoT use. It also assesses the pressing challenges faced in this area, such as the projected uneven distribution of mechanization in various areas, security and privacy issues, and the flexibility of algorithms in practical applications. The study shows that the development of agricultural robots provides the background for this specific area, giving special examples and then indicating key challenges. Identifies prospects for future

application and also takes into account the diverse circumstances in different countries.

The current state of application of artificial intelligence in agriculture and soil management is one of the most important successful agricultural factors, and as the original source of nutrition, soil stores water, nitrogen, phosphorus, potassium and proteins that are essential for the proper growth and development of crops. Soil condition can be enhanced by fertilizer and fertilizer, which improves soil porosity and collection, and by an alternative tillage system to prevent the physical degradation of the soil. Soil management, for example, can minimize negative factors, such as pathogens and soil-borne contaminants. Another example is that artificial intelligence can be used to map soil, helping to demonstrate relationships between soil and landscape and different layers and ratios of soil underground.

The challenges of applications of artificial intelligence technologies in agriculture:

Many experts are conducting AI research and future machines will become more powerful. But anything with advantages there are also disadvantages so that there can be ethical problems with machines. Artificial intelligence is deep learning models that predict output. It needs a specific set of inputs to devise a solution to different kinds of problems that are difficult to understand for an ordinary man. Many people in the world don't even know the use or existence of artificial intelligence. Most people are unaware of it, which makes it difficult for them to trust it. Most AI systems are based on the Internet, they may be difficult to use in remote or rural areas with no Internet service and knowledge of dealing with AI processes. Therefore, a slower and unevenly distributed adoption of artificial intelligence in agriculture should be expected, while at the same time, whether or not the adoption would increase food production beyond certain natural land limits remains uncertain.

Images taken when applied differ from images used in control environments due to some factors such as the variation of lighting and complexities in the background and angle when taking photos etc. In addition, grains grown in the field, even at the same location, are materially heterogeneous as a result of the influence of other elements, such as insects, soil and inert material. In this case, the physiological properties of individuals increase the complexity of variables to be considered when processing images. The need for a larger and more diverse set of control data to improve the accuracy of the current classification. However, with the help of computer vision, algorithms such as DBN (Deep Faith Networks) and CNN (Neural Circumvention Network), regardless of the small number of

case studies, indicate promising applications in the future to process large sets of complex data. Furthermore, in order to shorten the system's response time, the data processed should be the most appropriate. The system's ability to carry out tasks specifically in a short period of time is critical in determining its commercial value, which significantly affects users' choice.

Agricultural robots:

Companies are moving towards the development and programming of autonomous robots to deal with farming tasks of greater size and faster frequency than humans. The development of agricultural robots has been attempted one of the areas of applications in which artificial intelligence plays an important role is the robotics system, integrating robots into agriculture and improving efficiency, reliability and accuracy for years, which would significantly replace manual work needed with intensive automated work in the laboratory. But the ability to deliver the delicate and complex processes that farmers have traditionally done to maintain good quality always remains a major challenge.

The primary motivation for the design of robotics for the biological control environment was that human operators were exposed to pesticides, fungicides and other chemical products especially in the warm and vulnerable greenhouse environment, which caused skin diseases and chronic diseases. An automated weed cluster mapping platform has been designed, focusing on mobility and ease of use of the four-wheel system, whose function is mostly implemented using built-in controllers and standardized communications protocols. The challenge of agricultural robots Although the study of agricultural robots has made tremendous progress, applicable robots to operate in a complex agricultural environment are still not available on the market. The main reason was that algorithms that can handle the real uncontrolled and unpredictable agricultural environment have not yet been developed, and other factors, such as the seasonality of agriculture, also indicate the difference between the real environment and the experimental environment in laboratories. Dynamic and rapid change in the time and location of the agricultural environment is almost inevitable, regardless of unregulated environments, such as military and space environments, or in an environment where atmospheric conditions are inherently uncertain, such as rugged terrain, vision and lighting. However, partial independence would still benefit technology production. The principle applies to many tasks, which basically means that automation can be applied in 80% of the task, leaving the remaining 20% extremely difficult.

Monitoring of crops and soils:

Drone crop monitoring and soil health Software-based technology is used to collect/capture data and use computer vision and deep learning algorithms to address that data.

Analytics to predict:

Models used for artificial intelligence are used to track and predict various factors affecting crops such as weather change.

Detection of diseases:

Through remote sensing images are studied and analyzed and images of plant leaves are divided into surface areas such as the sick area, and the unsick area is the field of basic information. For further diagnosis, images of the sick or infected area have been sent to the laboratory that results in identification of lesions and nutrient deficiencies.

Weed Control Department:

Weed management is one aspect that reduces the expected profit of farms: for example, if the weed invasion is not under control, a loss of dried beans and corn crops can occur, and weed competition can cause a decrease in wheat crop. Herbs compete with crops for resources, such as water, nutrients and sunlight, no matter that some of them are toxic and even threaten public health. Excessive use of pesticides can contaminate the environment. Therefore, AI weed detection systems have been tested in laboratories to accurately calculate the exact amount of spray to be used and spray on the target site, also reducing costs and the risk of crop damage.

Crops and weeds are distinguished to determine the exact spots of herbicides. Image recognition of plant-shaped species is one of the most reliable ways: if properties such as leaf rim, boundary patterns and general shape are identified, the plant type should be interpreted. However, due to varying measurements, such as lighting conditions, deformation of the shape of the leaf and location, and the fact that small plants vary in the form of growth rate and variability in growth environments, such as temperature and humidity, to distinguish between weeds and crops. It also explains that the device needs to learn important features for itself ba sed on neural network approaches.

Applications of artificial intelligence in agriculture:

Identification of homosexual models of agricultural products that are common in many developing countries is the management of agricultural land as a single unit without considering the disparity within the area that leads to reduced inputs efficiency, increased pollution environment and reduced returns to farms.

- Selection of crops and varieties

Emerging technologies helped to get the best crop so they improved hybrid selection. Seed options are best suited to farmers' needs based on many characteristics such as soil condition, weather forecasting and seed diversity. Artificial intelligence can identify itself using data available online, how seeds interact for various weather conditions and soil types.

- Monitoring crop health:

Various sensors were developed for factories to track plant growth as well as identify plant diseases. Health monitoring crop (nutritional disorders, insect's/irrigation equipment monitoring, weed identification, livestock and animal monitoring, and now disaster management using drones in agriculture. This helps identify the problem even before the plant produces a visual display of deficiency or infection.

Smart irrigation or automation of irrigation:

Irrigation is a particularly business-intensive process in high water that requires crops such as rice, sugarcane, banana, etc. Automation in agriculture gaining importance worldwide. With the use of sensors (humidity, temperature and humidity), IoT devices, irrigation machine learning techniques can automate systems to suit varied crops and soils climatic conditions, etc. Automation of irrigation system improve irrigation efficiency, crops, economic product quality and provide irrigation water, time, cost and electricity.

Increase smart irrigation technology:

Agricultural production by detecting water level, soil temperature, nutrient content and forecast weather. However, the installation of the sensor plays a crucial role in the successful implementation of the irrigation system automation system. Sensors must be placed in the crop area (ensuring there are no gaps in the air around the sensor) where the crops extract water.

Automation:

The problem of scarcity of labour in agriculture, especially during the peak period of the season leads to a rise in wages, thereby increasing the cost of inputs has led to a lack of employment and a heavy loss of revenue in key crops such as fruit vegetables. Agricultural robots are preparing to become the industry's most valuable AI application. As machine vision technologies and robots revolutionize agriculture. New robotic harvesters and perform a range of tasks such as harvesting fruits and thin berries, weeding, pest control (shape). Autonomous robots, capable of sensing processing and performing a range of tasks in the field also with greater volume and faster frequency compared to humans. Some of their examples include Oz, Other robots can uproot or burn herbal plants using lasers.

Conclusion:

AI's future is not easy to predict. AI focused on promoting research and development, but is this the only goal in the future? Research on human-like disparate machines or robots. If the machine begins to do a job for humans, the roles of humans will certainly change. Hard work critique researchers pay them one day and we will findThe work done by the machines and the robot walks with us. We will see the future robots working in the agricultural field and will have a greater quantity of agricultural production with quality.

Artificial intelligence techniques such as remote sensors to detect soil moisture content and automated irrigation with the help of GPS. The problem faced by farmers was that micro-weeding techniques overcome the large number of crops lost during weeding. These autonomous robots not only improve efficiency, but also reduce the need for unnecessary pesticides and herbicides. Besides, farmers can effectively spray pesticides and herbicides on their farms with the help of drones, and plant surveillance is no longer a burden. For beginners, lack of resources and functions can be understood with the help of man-made brain power in agribusiness issues. According to an AI survey useful in farmers regarding their hard work and profits, it can be expensive but farmers can survive an atmospheric disaster and can intelligently earn a profit in an adverse state. These will enhance productivity and effici ency. Review says artificial intelligence is very useful in agriculture by eliminating some factors such as cost and difficult technology guide. Cost reduction can be achieved by promoting the idea by demonstrating government policies. Farmers' demonstration of proper use and practice will be a promising future for agriculture.

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