Emerging Technology

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Track: IOT(Internet of Things)

"Internet of Things (IoT) And Big-data Analytics In Smart Agriculture Management"

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❑ Introduction

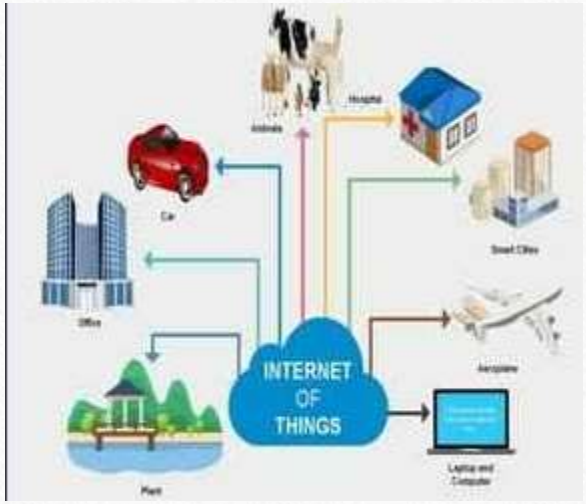
- ✓ **Internet of Things (IoT)**
- ✓ **Big Data and Analysis Methods**
- ✓ **Smart agriculture**

❑ Problem Statement

- ✓ Research Methodology
- ✓ Results Analysis
- ✓ Future Application
- ✓ Implementation challenges
- ✓ Conclusion

INTERNET OF THINGS (IOT)

- ✓ The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDS)
- ✓ An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments
- ✓ IoT devices share the sensor data they collect by connecting to an IoT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally



BIG DATA AND ANALYSIS METHODS

- ✓ Big Data is a collection of data that is huge in volume, yet growing exponentially with time.
- ✓ It is a data with so large size and complexity that none of traditional data management tools can store it or process it efficiently
- ✓ Following are the types of Big Data:

  • Structure • Unstructured• Semi-structured

- ✓ Agriculture date also consider as unstructured data sets

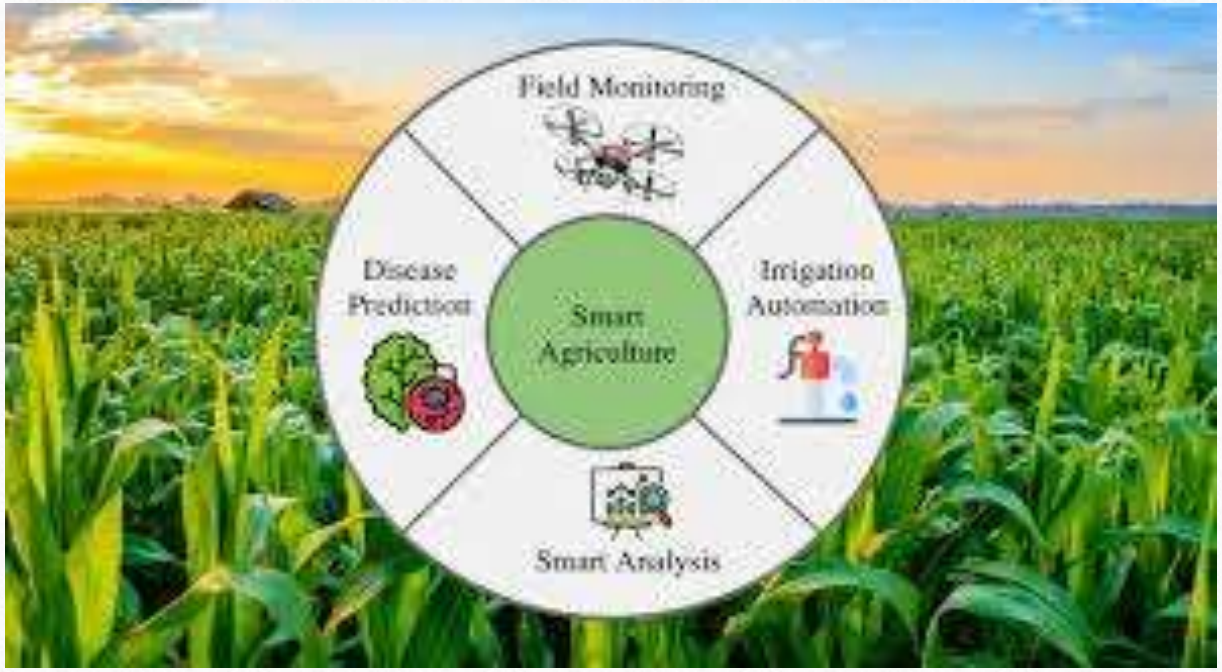
  • Apache Hadoop ecosystem is an open source framework use for big data analysis:

  • Data management • Data access • Data processing • Data storage

SMART AGRICULTURE

- ✓ The term smart agriculture refers to the usage of technologies like Internet of Things, sensors, location systems, robots and artificial intelligence on your farm.
- ✓ The ultimate goal is increasing the quality and quantity of the crops while optimizing the human labor used
- ✓ Following process are using smart agriculture:
- ✓ Agriculture data collection
  - • Diagnostics• Decision-making• Actions
- ✓ Technologies that used in smart agriculture are:
  - • Greenhouses - climate management and control
  - • Sensors for measure soil = PH level, water, moisture and temperature management.
  - • LoRa WAN mobile based long distance low power consumption wireless networks.
  - • Analytics and optimization planforms = for data processing and decision making

Why Smart Agriculture Needs over Traditional farming?



❑ Traditional Agriculture

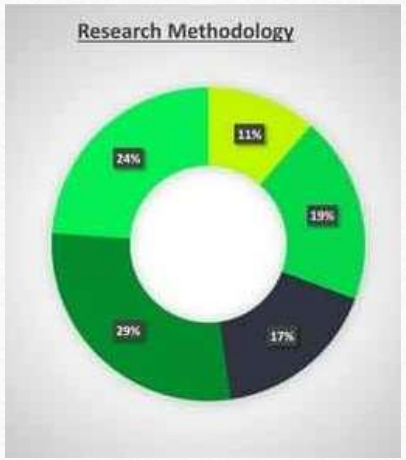
- ✓ Weather. Harvesting success has always been dependent on the weather. A good harvest requires a balance of rainy and sunny days, comfortable temperatures, and the avoidance of weather-related disasters.
- ✓ Aging workforce. Farming is not a career path that many young people pursue. Instead, they choose more promising occupations.
- ✓ Routine and time-consuming tasks. Many of the processes in agriculture are regular and manual.
- ✓ Lack of water.
- ✓ Unpredictability. The actual amount of food harvested is challenging to predict because it depends on many external factors
- ✓ Global hunger. 10% of the global population still suffers from starvation even though the agricultural industry produces enough food to feed every person on the planet

❑ Smart Agriculture

- ✓ Better weather prediction, weather data analytics to build decision-making models for farmers based on weather data, harvest specifics, and the current health of the crop.
- ✓ Smart water and pesticide consumption. One of the goals of digitization in agriculture is to help farming businesses effectively use their resources
- ✓ Careful crop planting.
- ✓ Livestock tracking and management. Drones are the primary tools that assist with this
- ✓ Streamlined sales of farming products. Directly connect with farmers and consumers.
- ✓ Supply chain optimization. Digital farming solutions can help with the problem of food waste by optimizing agriculture supply chains

RESEARCH METHODOLOGY

- ✓ Research Methodology Based On Following Parameters
- Historical flats It consist unstructural data of soil and other environments such as crop patterns, weather conditions climate condition and labor data.
- I. Agricultural Equipment and sensor Data It consist data from remote sensing device such as soll temperature, farmers call.
- C. Social and web based dit it includes farmers and customers. feedback
- Publication. It includes agriculture research and agriculture reference material such as text-based practice guidelines and agriculture requirements
- Business Industries and External Data The data from billing and scheduling systems, agriculture departments, and other agriculture equipment manufacturing companies.



RESULTS ANALYSIS

- ✓ A. Farming Decision Support Big data analytics and ICT technology support to acquire, understand, categorize and discover information from large amounts of data. Also, it can predict future or recommended decisions to farmers and vendors at the point of precision agriculture
- ✓ B. Water Management Predictive data mining or analytic solutions over ICT can leverage water management and automatic irrigation
- ✓ C. Increase Productivity Web and mobile-based applications visualize information from historical data, crop patterns and weather data
- ✓ D. Big data analytics and ICT solutions can also support agriculture equipment companies and departments to perform analysis over agricultural growth and productivity, to support and identify future farming trends.
- ✓ E. Agriculture Disaster Management Big data analytics and ICT applications can take initiatives such as real-time management in precision agriculture, where it can mine knowledge from historical unstructured data, discover patterns to predict events that are harmful in farming.
- ✓ F. Patterns and decisions may help farmers in the disaster management in agriculture
- ✓ G. Policy, Financial and Administrative. The analysis supports policy makers, service providers, companies and government departments for deciding future varieties, pesticides and fertilizers.

FUTURE APPLICATION

A. Easy farm monitoring: In the agriculture sector, factors affecting the farming and production process can be monitored and collected, such as soil moisture, air humidity, temperature, pH level, etc.

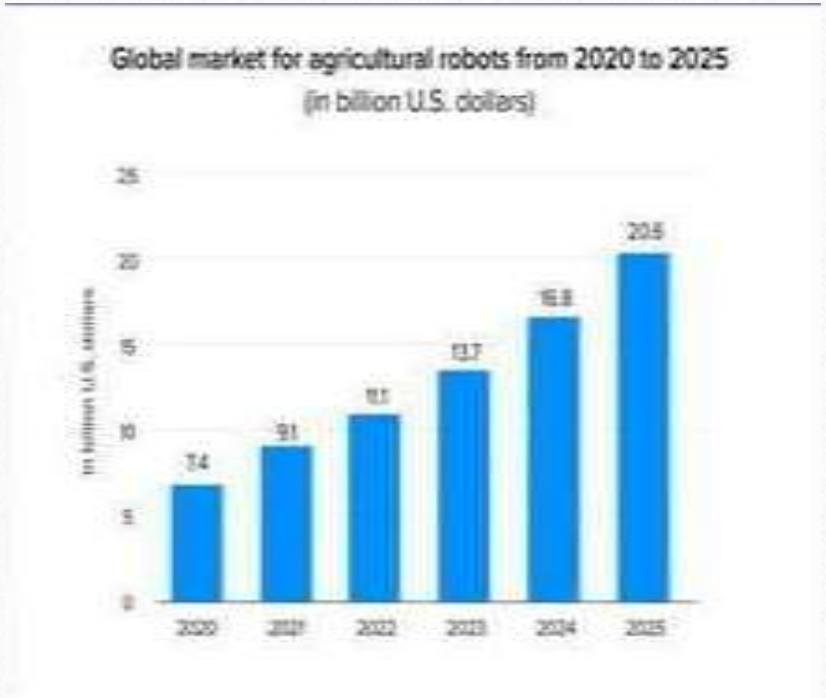
B. Tracking and Tracing: In order to meet the needs of consumers and increase profit value, in the future, farms need to demonstrate that products offered to the market are clean products and can be tracked and traced conveniently, thereby enhancing the trust of consumers in product safety and health-related issues.

C. Smart Precision Farming The advent of the GPS (global positioning system) has created breakthrough advances in many fields of science and technology. The GPS provides the most important parameters for locating a device, such as location and time. GPS systems have been successfully deployed in many fields, such as smartphones, vehicles, and loT ecosystems

D. Greenhouse Production: A greenhouse consists of walls and a roof, which are usually made from transparent materials, such as plastic or glass. In a greenhouse, plants are grown in a controlled environment, including controlling for moisture, nutrient ingredients of the soil, light, temperature, etc. Figure: by 2025-20.6 market cap.

IMPLEMENTATION CHALLENGES:

- ✓ B. Technical Complexity:
- 1. Interference: lot devices for smart agriculture can cause interference to different network systems, especially some lot networks using short spectrum bands LoRa WAN. Interference can degrade system performance as well as reduce the reliability of IoT ecosystems
- 2. Security and Privacy: problem, including the protection of data and systems
- from attacks on the Internet. In regard to system security, lot devices' limited capacity and ability led to complex encryption algorithms that are impossible to implement on loT devices.



CONCLUSION AND FUTURE WORK

- 1. The lot sensor device gathers real-time unstructured data of soil such as PH level, humidity, nutrition level moisture level etc. and send to the big data server.
- 2. According to the big data analysis algorithm, this processes the data and provides the accurate knowledge to the farmers and farming communities through the cloud-based service and mobile apps application.
- 3. big data analysis techniques it deals with the concerned issues like how to increase the
- agriculture productions and how to reduce the productions costs. Similarly, it addresses the time management during the process, emphasizing the less use of chemicals and fertilizers. Moreover, it takes the scientific efforts of agriculture to take over the trends of traditional and manual techniques of doing agriculture and modeling it to smart agriculture model.
- 4. Model aims to reduce the manual and traditional efforts to 90% with the real-time information basis using artificial intelligence and image processing technique through which problems can be detected analyzing aroused images

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