



Precision Agriculture Using Artificial Intelligence

ABHINAND NARAYANAN
TVE21MCA-2004

Contents



- INTRODUCTION
- OBJECTIVE
- EXISTING SYSTEM
- PROPOSED SYSTEM
- CONCLUSION
- FUTURE SCOPE

INTRODUCTION



- An approach to optimize crop production.
- Artificial intelligence (AI) is used in precision agriculture.
- It helps to process and analyze large amounts of data collected from various sources,
 - Sensors
 - Drones
 - Satellites
 - Weather stations

OBJECTIVE



- To optimize crop production.
- Improve farm efficiency using AI.
- Increased crop yields.
- Reduced costs
- Improved sustainability.

EXISTING SYSTEM



- Traditionally soil quality and crop health monitoring requires human observation.
- Frequent manual checks are required to find pests and other diseases affected.
- It is neither accurate nor timely.

PROPOSED SYSTEM



Precision agriculture is an advanced farming technique :-

- Soil quality and crop health monitoring is done realtime using sensors.
- Computer vision is used to find pests and other diseases affected.
- optimize crop yields by finding deficiency in crops at early stage using Artificial Intelligence.
- reduce resource waste by precisely delivering fertilizer and water to crops.
- minimize the environmental impact of farming practices

ARTIFICIAL INTELLIGENCE



Artificial intelligence is the simulation of the human intelligence processes by machines, and especially computer systems.

- expert systems
- natural language processing
- speech recognition
- machine vision

HOW AI IS USED IN AGRICULTURE ?

- To improve the overall harvest quality and accuracy.
- Detection of disease in plants, pests and poor nutrition of farms.
- Predictive analytics of crop yield, harvest time and price.
- Soil and crop analysis
- Advanced Crop monitoring

Crop Yield prediction & Price forecasts

Identify the output yield of crops and forecast prices for the next few weeks will help the farmer to obtain maximum profit

Intelligent spraying

AI sensors can detect weed affected areas and can precisely spray herbicides in the right region reducing the usage of herbicides

Predictive Insights

Insights on "Right time to sow the seeds" for maximum productivity. Insights on the impacts created by the weather conditions



Agriculture Robots

Using Autonomous robots for harvesting huge volumes of crop at a higher volume and faster pace

Crop and soil monitoring

Using ML/AI, we can monitor the crop health for diagnosing pests/soil defects, nutrient deficiencies in soil, etc.

Disease Diagnosis

Prior information and classification of Plant diseases help farmers control the disease through proper strategy.

SOIL QUALITY MONITORING

- Traditionally soil quality by human observation is neither accurate nor timely.
- IOT sensors can be used to collect real-time data on soil moisture, temperature, and other environmental factors.
- Train computer models to using this data for predicting soil conditions.



CROP MONITORING

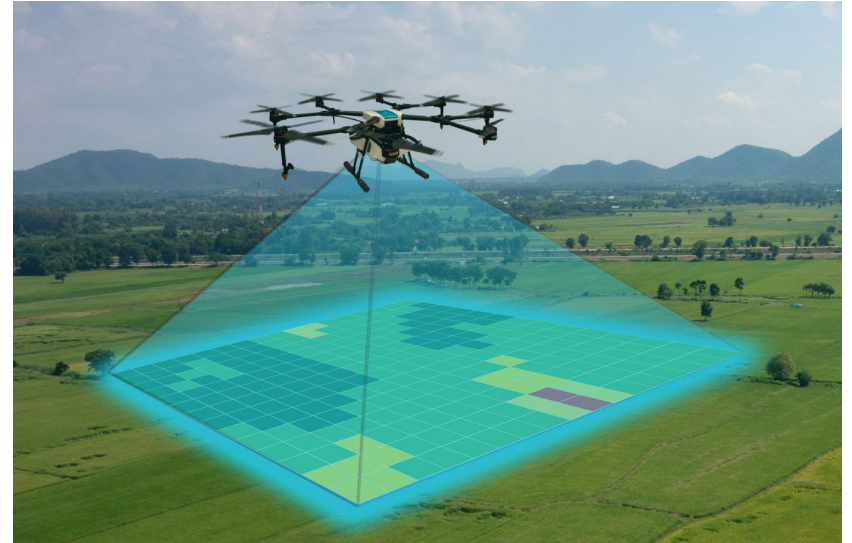


Crop health is monitored using visual sensors , drones & using AI to analyze and interpret this data

- Track crop health.
- Make accurate yield predictions.
- Detect crop malnutrition much faster than humans.
- 3d visualisation of crop field.

OBSERVING CROP MATURITY

- Computer vision model are able to outperform human observation in accurately identifying crop growth stages.
- Farmers no longer had to make daily treks into the fields to examine their crop.

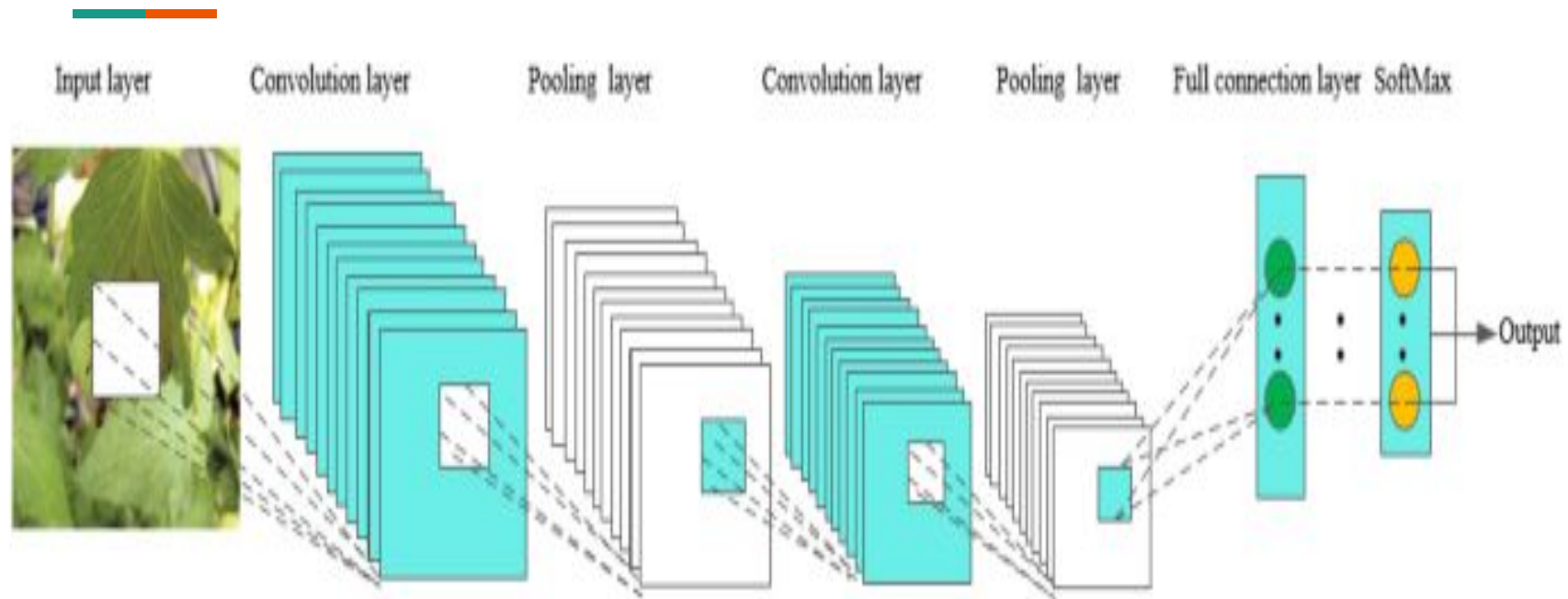


INSECT AND PLANT DISEASE DETECTION

Image recognition technology based on deep learning, we can now automate detection of plant diseases and pests.

This works using classification, detection, and image segmentation, methods to build models that can "keep an eye" on plant health.





INTELLIGENT SPRAYING



- Using computer vision AI makes it possible to automate spraying of pesticides or fertilizer uniformly across a field.
- A camera mounted on the sprayer records the geo-location of weeds and analyzes the size, shape, and color of each pesky plant.

Smart Spraying

System overview



AERIAL SURVEY AND IMAGING



Computer vision can be for surveying land keeping an eye on crops and livestock.

- AI can analyze imagery from drones and satellites to farmers monitor crops and herds.
- That way they can notified immediately if something looks amiss.
- Can be used to map the entire farm.



LIVESTOCK HEALTH MONITORING

Use overhead cameras and computer vision algorithms to monitor cattle health and behaviour.

- Count animals, detect disease, identify unusual behaviour, and monitor significant activities such as giving birth.
- Combine with other technologies to keep farmers informed on animal health and access to food or water
- Use RFID Tags for identifying each livestock.



CONCLUSION



Precision agriculture is a process that analyses data and use the information to improve agriculture quality & production.

- The Precision agriculture are proven to increase the sustainability and productivity of the crops.
- The initial implementation cost may be higher but this system can improve efficiency and increase yield.

The future of AI in Agriculture



AI can further improve efficiency and reduce amount of intensive human labor involved in farming.

The growing and increasingly affordable availability computer vision will further improve its involvement.

Computer vision and agricultural robotics are just latest way farmers can adopt new technology to IT growing global food demands and increase food security

The future of AI in Agriculture



- Increasing efficiency of time, labor, and resources.
- Improving environmental sustainability.
- Making resource allocation "smarter".
- Providing real-time monitoring to promote greater health and quality of produce.

References



- S. G and K. Rajamohan, "Image Processing and Artificial Intelligence for Precision Agriculture," *2022 International Conference on Innovative Computing, Intelligent Communication and Smart Electrical Systems (ICSES)*, Chennai, India, 2022, pp. 1-8, doi: 10.1109/ICSES55317.2022.9914148.
- UferahShafi et al., "Precision Agriculture Techniques and Practices:From Considerations to Applications, Sensors, 2019
- YorghosVoutosetal., "A Survey on Intelligent Agricultural Information Handling Methodologies", Sustainability 2019