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Artificial Intelligence for Soil Quality Monitoring

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Artificial intelligence (AI) which is a game-changer in other sectors, can be a potential tool and technology in agriculture also. A smarter, agile & environmentally sensible can be driven by big data, Internet of Things (IoT), artificial intelligence (AI), and machine learning. AI based techniques can be used in several aspect of natural resource management, especially in soil science. Artificial intelligence and machine learning (ML) technologies that monitor soil quality and fertility utilize different algorithms for agriculture analysis. With the help of artificial intelligence technologies, particularly electronic applications for deep learning, farmers can find potential nutrient deficiencies in soil quality.

Practical Applications of AI in Agriculture

- Crop and soil monitoring.
- Insect and plant disease detection.
- Livestock health monitoring.
- Intelligent spraying.
- Automatic weeding.
- Aerial survey and imaging.
- Produce grading and sorting.
- The future of AI in Agriculture: Farmers as AI engineers?

AI in Monitoring Soil Quality

Different agricultural technologies like Farm Beats have been built where farmers only need to take a picture with their smart phone and then upload the image to an AI development system. After assessing the problem, farmers are provided with restoration techniques and other solutions that will help improve the soil quality and quantity of the crop. Agricultural producers now have access to previously inaccessible agricultural data sources for making decisions, such as satellite and unmanned aerial vehicles (UAV), humidity sensor readings, and ground-based weather stations. Simultaneously, new monitoring and control systems are continually introduced to the market, providing more personalized, accurate analysis and predictions on soil quality.

AI Technologies to Monitor Soil Quality

An app that can predict soil quality and fertility based on soil application and nutrient uptake. The analysis is based on data on the chemical composition of the soil, weather conditions, crop types, and satellite images showing plant growth rates. From other soil quality analysis strategies, Varatharajalu and Ramprabu have presented an automated watering system that employs a soil moisture sensor, temperature sensor, pressure regulator sensor, and molecular sensor for enhancing crop growth.

Challenges that Face AI Systems in Agriculture

- Data preparation is a significant obstacle to forecasting and estimating variables like soil quality.
- Agricultural research is typically based on robust data sets that are reproducible and representative. As a result, even though we can create numerous Al models, temperature, soil moisture, photosynthetic rate, and ecological balance can all be affected by weather and climate change.
- It is inevitable that increased digitization across industries will be translated into agriculture. Intelligent machines like artificial intelligence and machine learning can transform basic data inputs into beneficial information.
- When applied to the agricultural sector, even to monitoring variables like soil quality, it could transform the global food supply chain.

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