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Smart Agriculture Optimization for Sustainable Practices Using IoT and Machine Learning Techniques

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Abstract:

The transition toward sustainable agricultural practices necessitates the integration of intelligent technologies that enable efficient resource management and environmentally conscious decision-making. This research focuses on optimizing smart agriculture through the deployment of Internet of Things (IoT) technologies and machine learning (ML) techniques. By collecting real-time data on soil conditions, weather patterns, crop health, and irrigation needs, the system applies advanced ML models to predict optimal farming strategies. The proposed framework facilitates sustainable resource utilization, minimizes environmental impact, and enhances crop productivity. Furthermore, the study demonstrates how data-driven insights can support precision agriculture and long-term agricultural resilience in response to climate variability and increasing food demand.

Keywords:

Smart agriculture, sustainability, IoT, machine learning, precision farming, resource optimization

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