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Optimization of Water Resource Management Using Deep Learning Applications in Smart Agriculture Systems

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Abstract:

Efficient water resource management is a critical component of sustainable agriculture, particularly in regions facing increasing water scarcity. This study presents a deep learning-based approach for optimizing water usage within smart agriculture systems. By integrating sensor-generated data on soil moisture, weather conditions, and crop type, deep learning models—such as long short-term memory (LSTM) networks—are trained to predict irrigation needs with high precision. The proposed system enables real-time decision-making for automated irrigation control, reducing water wastage and enhancing crop yield. Simulation results demonstrate the model's effectiveness in adapting to dynamic environmental conditions and improving overall water-use efficiency. This approach offers a scalable and intelligent solution for sustainable agriculture in data-driven smart farming environments.

Keywords:

Water management, smart agriculture, deep learning, irrigation optimization, LSTM, sustainability.

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