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Advanced Neural Networks for Sustainable Potato Farming Optimization in IoT-Based Agriculture Systems

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Abstract:

The integration of artificial intelligence in precision agriculture has significantly enhanced crop yield prediction and resource management, particularly in high-demand crops like potatoes. This study presents a sustainable potato farming framework utilizing advanced neural networks within IoT-based agriculture systems. Real-time data on soil conditions, climate variables, irrigation levels, and crop health are collected via IoT sensors and processed using deep neural network (DNN) architectures, including convolutional neural networks (CNNs) and long short-term memory (LSTM) models. These models predict optimal irrigation scheduling, detect early signs of disease, and recommend nutrient management strategies. The system promotes sustainable practices by minimizing water usage, enhancing soil health, and reducing chemical inputs. Experimental results demonstrate substantial improvements in yield efficiency and environmental sustainability, offering a scalable solution for smart agriculture initiatives.

Keywords:

Smart agriculture, neural networks, potato farming, sustainability, IoT systems, crop optimization.

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