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Advanced Neural Networks for Renewable Energy Optimization in Smart Grid IoT Systems

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Abstract:

As the global energy landscape shifts toward sustainable practices, the integration of renewable energy sources into smart grid infrastructures has become critical. This paper investigates the deployment of advanced neural network models within IoT-based smart grid systems to enhance the optimization of renewable energy generation, distribution, and consumption. By leveraging real-time data streams from distributed IoT sensors, neural networks can predict energy demand, adapt to supply fluctuations, and automate control mechanisms across the grid. The proposed approach emphasizes the role of deep learning architectures such as LSTM and CNN in handling time-series and spatial data to achieve load balancing, peak shaving, and fault detection. The integration significantly improves energy efficiency, grid stability, and supports the transition to greener urban ecosystems.

Keywords:

Smart grid, renewable energy, neural networks, IoT, energy optimization, deep learning

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