

Can machine learning improve solar power generation efficiency in a smart grid?

However, this research aims to enhance the efficiency of solar power generation systems in a smart grid context using machine learning hybrid models such as Hybrid Convolutional-Recurrence Net (HCRN), Hybrid Convolutional-LSTM Net (HCLN), and Hybrid Convolutional-GRU Net (HCGRN).

Can solar power be integrated into the grid?

Solar power is a clean and renewable energy source that has the potential to play a significant role in meeting the world's energy needs. However, the intermittent nature of solar power generation can make it difficult to integrate into the grid.

Can solar power generation forecasting be integrated into microgrid management?

The technical and operational challenges in this phase were not fully addressed, leaving a gap in understanding how these models can seamlessly integrate into the operational aspects of microgrid management. In summary, these limitations highlight the need for continuous research and development in solar power generation forecasting in microgrids.

What are integrated energy management systems?

Integrated energy management systems have multiple energy sources and controls. Efficient energy management involves predictive and real-time control of the system. Energy forecasting, demand and supply side management make up an integrated system. Renewable smart hybrid mini-grids suitable for integrated energy management systems.

Can machine learning improve solar power forecasting?

The findings of this study suggest several potential future research directions. First, exploring the use of alternative machine learning models or ensemble methods for solar power generation forecasting could potentially improve forecast accuracy and robustness against changes in the underlying data.

How can ANNs improve solar photovoltaic integration?

Optimizing includes identifying abnormalities inside smart-grid inverter systems. ANNs have the potential to capture complicated correlations within the dataset, which is crucial for enhancing solar photovoltaic integration. The selection of ANNs for this research is based on their flexibility for dynamics and nonlinear interactions in the data.

The principle for calculating distributed PV power generation is shown in Formula (6):
$$P_{V,t,d,y} = a \cdot R_{A,t,d,y} \cdot \eta_1 \cdot \eta_2$$
 where a represents the PV installation capacity of ...

The efficiency (η_{PV}) of a solar PV system, indicating the ratio of converted solar energy into electrical

energy, can be calculated using equation [10]: $P_V = P_{max} / P_{inc} \dots$

Due to weather and solar irradiation, photovoltaic power generation is difficult for high-efficiency irrigation systems. As a result, more precise photovoltaic output calculations ...

Due to the intrinsic intermittency and stochastic nature of solar power, accurate forecasting of the photovoltaic (PV) generation is crucial for the operation and planning of PV-intensive power ...

A solar power generation using photovoltaic system is one of the reliable alternative energy sources for conventional power generation system. ... Auto-Regressive Integrated Moving Average (ARIMA ...

Abstract: Due to the intrinsic intermittency and stochastic nature of solar power, accurate forecasting of the photovoltaic (PV) generation is crucial for the operation and planning of PV ...

This research tackles this issue by deploying machine learning models, specifically recurrent neural network (RNN), long short-term memory (LSTM), and gate recurrent unit (GRU), to ...

The solar radiation is converted into electricity using semiconductors and the current efficiency of PV panels is established between 5-20%, and PV is still requiring new ...

By incorporating machine learning-based approaches into the realm of solar power generation forecasting, researchers have unlocked the potential to harness solar energy resources more effectively. These ...