Solar Power Tree Intelligence

Overview

Solar trees are innovative structures that mimic the appearance of trees while utilizing solar panels to generate electricity. This paper addresses detecting and diagnosing faults from a dataset representing a 250 kW PV power plant with three types of faults. A comprehensive dataset analysis is conducted to improve the dataset quality and uncover intricate relationships between features and the target variable. By. This paper explores the application of Explainable AI (XAI) through the proposed SPXAI model to enhance the efficiency and reliability of solar energy systems.

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[Explainable AI and optimized solar power generation forecasting ...]

This paper proposes a model called X-LSTM-EO, which integrates explainable artificial intelligence (XAI), long short-term memory (LSTM), and equilibrium optimizer (EO) to reliably ...

[Tree-Based Forecasting of Day-Ahead Solar Power Generation from]

Accurate forecasts for day-ahead photovoltaic (PV) power generation are crucial to support a high PV penetration rate in the local electricity grid and to assure stability in the grid.

[Tree-Based Algorithms and Incremental Feature Optimization for Fault]

Despite their significant environmental benefits, solar photovoltaic (PV) systems are susceptible to malfunctions and performance degradation. This paper addresses detecting and ...

[Artificial intelligence based hybrid solar energy systems with smart]

This study provides a paradigm for an artificial intelligence-driven hybrid solar power system, including optimized solar tracking with advanced technology, advanced photovoltaic (PV)

[These remarkable 'solar trees' use AI to charge electric vehicles -- ...]

The technological underpinnings of solar trees hinge on advanced engineering and artificial intelligence. Solar panels mounted on the branches of these structures capture sunlight ...

[SPXAI: Solar Power Generation with Explainable AI Technology]

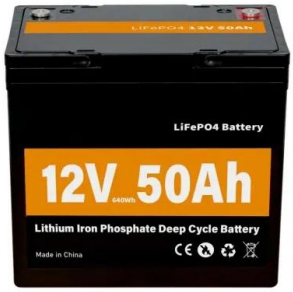
The SPXAI architectural framework is designed to optimize solar panel power production through advanced data collection, machine learning, and explainable AI technologies, ensuring a highly ...

[Explainable artificial intelligence of tree-based algorithms for fault]

Despite these advantages, this environmentally friendly energy solution is still susceptible to downtimes and faults. This study utilizes advanced machine learning tree-based algorithms for fault detection ...

[Solar Irradiance Forecasting With Deep Learning and Ensemble ...]

In particular, the utilisation of long short-term memory (LSTM), random forest and extra trees in conjunction with multivariate meteorological data is investigated to enhance the accuracy ...



[Explainable artificial intelligence of tree-based algorithms for fault]

Tree Features Average Importance: In this study, a novel tree-based feature importance averaging technique was implemented. The approach aggregated the feature importance scores ...

[Artificial intelligence models development for profitability factor]

Therefore, the current study developed three tree optimizers (fine, medium, and coarse) to predict the profitability factor (PF) for hybridized CSP combined with TES and biomass technologies.

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