

Early fault detection and diagnosis of grid-connected photovoltaic systems (GCPS) is imperative to improve their performance and reliability. Low-cost edge devices have emerged as innovative ...

The shortage of fossil fuels and environmental pollution have promoted the rise of renewable power generation. The solar energy is one of the famous renewable resources. The defect detection of photovoltaic (PV) panels is of great significance to improve the power generation and the economic operation of PV power plants. At present, few studies focus on the relationship ...

Solar energy has received great interest in recent years, for electric power generation. Furthermore, photovoltaic (PV) systems have been widely spread over ... and other factors that could detect a failure of the system. The current-voltage curve is monitored and measured when the voltage or the current across the module changes with the ...

Photovoltaic (PV) panels are prone to experiencing various overlays and faults that can affect their performance and efficiency. The detection of photovoltaic panel overlays and faults is crucial for enhancing the performance and durability of photovoltaic power generation systems. It can minimize energy losses, increase system reliability and lifetime, and lower ...

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Photovoltaic (PV) systems are the most popular solar technologies, in which solar energy is converted to electrical energy. The PV system consists of many PV cells arranged in series and/or parallel connections. The PV systems are subject to ...

Solar energy devices convert the solar radiation into heat or electric power. 4-6 Despite the technical and economic advantages of the concentrated solar energy, 7, 8 photovoltaic (PV) solar energy is being the ...

The development of new power sources together with improvements in maintenance and performance is essential to reduce CO<sub>2</sub> emissions and minimize environmental damage. Renewable energy sources are expected to lead global electricity generation, accounting for more than 86% by 2050 [].Solar photovoltaic (PV) is increasing its sustainability and ...

Detecting and replacing defective photovoltaic modules is essential as they directly impact power generation efficiency. Many current deep learning-based methods for detecting defects in ...

Common PV electrical data used for diagnosis include different types: output power, output voltage or current

at DC or AC side, and current-voltage characteristic (I-V curve) [5]. Since an I-V curve generally embeds rich information about the health status of PV modules, I-V curve-based diagnosis is a popular topic [6]. As for acquiring I-V curves, common I-V ...

We have collected data from our setup in solar lab from solar technology trainer kit as shown in Fig. 2, which is having a setup of halogen lamp, power supply and solar panel of 20 W. Solar panel is kept horizontal to halogen lamp, voltage and current generated were recorded through voltmeter and ammeter connected with the setup. Data was collected by ...

The project "Solar Panel Damage Detection and Localization of Thermal Images" aims to use object recognition algorithms to detect and classify damage in regular thermal shots of solar panels (Fig. 4 shows localization well). Two sets of data are collected and recorded description, two object recognition models are trained, using a well-known framework ...

The simulation results showed that their proposed method is effective in detecting faults and tracking the maximum power of the PV panel. An intelligent algorithm for automatic defect detection of photovoltaic modules using electroluminescence (EL) images was proposed in Zhao et al. (2023). The algorithm used high-resolution network (HRNet) and ...

In light of the continuous and rapid increase in reliance on solar energy as a suitable alternative to the conventional energy produced by fuel, maintenance becomes an inevitable matter for both ...

For the defect detection of solar panels, the main traditional methods are divided into artificial physical method and machine vision method. Byung-Kwan Kang et al. [6] used a suitable temperature control procedure to adjust the relationship between the measured voltage and current, and estimated the photovoltaic array using Kalman filter algorithm with a ...

This paper presents an innovative approach to detect solar panel defects early, leveraging distinct datasets comprising aerial and electroluminescence (EL) images. The decision to employ separate datasets with different models signifies a strategic choice to harness the unique strengths of each imaging modality. Aerial images provide comprehensive surface ...

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