Detector Solar Cell

A solar cell, also known as a photovoltaic cell (PV cell), is an electronic device that converts the energy of light directly into electricity by means of the photovoltaic effect. [1] It is a form of photoelectric cell, a device whose electrical characteristics (such as current, voltage, or resistance) vary when it is exposed to light. Individual solar cell devices are often the electrical ...

Electroluminescence (EL) imaging provides a high spatial resolution for inspecting photovoltaic (PV) cells, enabling the detection of various types of PV cell defects. Recently, convolutional neural network (CNN) based automatic detection methods for PV cell defects using EL images have attracted much attention. However, existing methods ...

Abstract: A solar cell defect detection method with an improved YOLO v5 algorithm is proposed for the characteristics of the complex solar cell image background, variable defect morphology, and large-scale differences. First, the deformable convolution is incorporated into the CSP module to achieve an adaptive learning scale and perceptual ...

Defects of solar panels can easily cause electrical accidents. The YOLO v5 algorithm is improved to make up for the low detection efficiency of the traditional defect detection methods.

As a result, various photonic devices such as laser diodes (LDs), light-emitting diodes (LEDs), solar cells, and photodetectors using III-V semiconductors have been developed for use in power generation, optical communications, displays and solidstate light sources, data transmission, and signal processing. Depending on the device structures and operating modes, photonic devices ...

In this paper, addressing the challenges of low accuracy in detecting small surface defects on solar cells and limited defect categories, a lightweight solar cell detection model named YOLOPL is proposed. The contributions of this study are as follows: The introduction of YOLOPL, an optimized and improved solar cell defect recognition model ...

Stoicescu, " Automated Detection of Solar Cell Defects with Deep Learning," in 2018 26th European Signal Processing Conference (EUSIPCO), 2018, pp. 2035-2039.

Automated defect detection in electroluminescence (EL) images of ...

Solar cell defects are a major reason for PV system efficiency degradation, which causes disturbance or interruption of the generated electric current. In this study, a novel system for discovering solar cell defects is proposed, which is compatible with portable and low computational power devices. It is based on K-means, MobileNetV2 and linear discriminant ...

In this paper, data analysis methods for solar cell defect detection are categorised into two forms: 1) IBTs, which depend on analysing the deviations of optical properties, thermal patterns, or other visual features in images, and 2) ETTs, which depend on comparing the deviations of the module"s measured electrical parameters from the ...

EL imaging is a widely used technique in the photovoltaic industry for identifying defects in solar cells. The process involves applying a forward bias to the solar cell and capturing the emitted infrared light, which reveals defects such as ...

The surface of solar cell products is critically sensitive to existing defects, leading to the loss of efficiency. Finding any defects in the solar cell is a significantly important task in the quality control process. Automated visual inspection systems are widely used for defect detection and reject faulty products. Numerous methods are proposed to deal with defect ...

Solar cell defect characterization: Generally, the local defects are shown up as dark spots in solar cell EL images, other defect shapes such as micro-crack, large-area failure, break, and finger-interruption are simply regarded as continuous dark spots [20, 21, 51, 53]. However, the recognition of defects in EL images is strongly dependent on the injection ...

Abstract: The multiscale defect detection for photovoltaic (PV) cell electroluminescence (EL) images is a challenging task, due to the feature vanishing as network deepens. To address this problem, an attention-based top-down and bottom-up architecture is developed to accomplish multiscale feature fusion. This architecture, called bidirectional ...

Abstract: Traditional vision methods for solar cell defect detection have problems such as low accuracy and few types of detection, so this paper proposes an optimized YOLOv5 model for more accurate and comprehensive identification of defects in solar cells. The model firstly integrates five data enhancement methods, namely Mosaic, Mixup, hsv transform, scale ...

Many methods have been proposed for detecting defects in PV cells [9], among which electroluminescence (EL) imaging is a mature non-destructive, non-contact defect detection method for PV modules, which has high resolution and has become the main method for defect detection in PV cells [10].However, manual visual assessment of EL images is time ...

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