# Photovoltaic cell automatic detection system

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

Deep learning methods of PV defect detection. Convolutional neural networks (CNNs) have become a prominent tool in the automatic detection of surface defects in photovoltaic (PV) cells.

Therefore, it is crucial to identify a set of defect detection approaches for predictive maintenance and condition monitoring of PV modules. This paper presents a comprehensive review of different data analysis methods for defect detection of PV systems ...

To address this issue, we propose a novel method for efficient PV cell defect ...

CNN based automatic detection of photovoltaic cell defects in electroluminescence images. Energy, 189 (2019), Article 116319. View PDF View article View in Scopus Google Scholar. Alec et al., 2015. R. Alec, M. Luke, C. Soumith. Unsupervised representation learning with deep convolutional generative adversarial networks. Comput. Sci. ...

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 algorithms to cluster solar cell images and develop a detection model for each constructed cluster.

Deitsch et al. proposed two deep-learning-based methods for the automatic detection of PV cell defects with convolutional neural networks (CNNs) and SVMs; the results showed that CNN classifier detection has higher accuracy.

Automated defect detection in electroluminescence (EL) images of photovoltaic (PV) modules on production lines remains a significant challenge, crucial for replacing labor-intensive and...

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 ...

M. Y. Demirci, N. Besli, A. (2019) Gümüsçü, Defective PV cell detection using deep transfer learning and EL imaging, Int Conf Data Sci, Mach Learn and Stat 2019 (DMS-2019) 2019. Google Scholar M. W. Akram et al (2019) CNN based automatic detection of photovoltaic cell defects in electroluminescence images. Energy 189.

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The method is based on the following three steps, whose output is shown in Fig. 1: (i) during the Preprocessing step, the lines in the images (white lines in Fig. 1b) are extracted and used to align the image and to (ii) find out the panels in the modules (identified by the white rectangles in Fig. 1c). Finally, for each detected panel, the (iii) detection of the hot spots is ...

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Monitoring systems (MS) are crucial for controlling, supervising and performing fault detection of photovoltaic plants, so many systems have been recently proposed aiming to perform a real-time monitoring of PV plants (PVP); in this context the common reference documents are the standard IEC 61724 [47], titled: Photovoltaic system performance ...

Solar cells have the option to be linked either in a series or in parallel with basic electrical protections such as bypass diodes to form a complete photovoltaic module. To ensure long-term functionality, solar cells are encapsulated in a secure environment with additional protection, known as a photovoltaic module [8].

Therefore, it is crucial to identify a set of defect detection approaches for predictive maintenance and condition monitoring of PV modules. This paper presents a comprehensive review of different data analysis methods for defect detection of PV systems with a high categorisation granularity in terms of types and approaches for each technique.

Early detection of faults in PV modules is essential for the effective operation of the PV systems and for reducing the cost of their operation. In this study, an improved version of You Only Look Once version 7 (YOLOv7) model is developed for the detection of cell cracks in PV modules. Detecting small cracks in PV modules is a challenging task.

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