

# **Photovoltaic panel defect detection dataset**





## Overview

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What is PV el anomaly detection dataset?

We build a PV EL Anomaly Detection (PVEL-AD 1, 2, 3 ) dataset for polycrystalline solar cell, which contains 36 543 near-infrared images with various internal defects and heterogeneous background. This dataset contains anomaly free images and anomalous images with ten different categories.

Is this the first public dataset for PV solar cell anomaly detection?

To the best of our knowledge, this is the first public dataset for PV solar cell anomaly detection that provides box-wise ground truth. Furthermore, this dataset can also be used for the evaluation of many computer vision tasks such as few-shot detection, one-class classification, and anomaly generation.

How are defects detected in photovoltaic models?

The detection of defects in photovoltaic models can be categorized into two types. The first type involves analyzing the characteristic curves of electrical parameters, such as current, voltage, and power of the photovoltaic system.

Does varifocalnet detect photovoltaic module defects?

The VarifocalNet is an anchor-free detection method and has higher detection accuracy 5. To further improve both the detection accuracy and speed for detecting photovoltaic module defects, a detection method of photovoltaic module defects in EL images with faster detection speed and higher accuracy is proposed based on VarifocalNet.

Are defective solar cells affecting the power efficiency of solar modules?

The dataset contains 2,624 samples of 300x300 pixels 8-bit grayscale images of functional and defective solar cells with varying degree of degradations extracted from 44 different solar modules. The defects in the annotated images are either of intrinsic or extrinsic type and are known to reduce the power efficiency of solar modules.



How to detect a defect in solar panels?

In order to avoid such accidents, it is a top priority to carry out relevant quality inspection before the solar panels leave the factory. For the defect detection of solar panels, the main traditional methods are divided into artificial physical method and machine vision method.



## Photovoltaic panel defect detection dataset



### Multi-resolution dataset for photovoltaic panel segmentation ...

Our experiments demonstrate that there are inherent defects in the cross application at different resolutions, but these defects can be compensated for by fine-tuning ...

### [RentadroneCL/Photovoltaic\\_Fault\\_Detector](#)

Model-definition is a deep learning application for fault detection in photovoltaic plants. In this repository you will find trained detection models that point out where the panel faults are by ...



### Solar Panel Damage Detection and Localization of Thermal ...

Solar panels have grown in popularity as a source of renewable energy, but their efficiency is hampered by surface damage or defects. Manual visual inspection of solar panels ...

### PVEL-AD: A Large-Scale Open-World Dataset for Photovoltaic Cell ...

We build a PV EL Anomaly Detection (PVEL-AD 1, 2, 3) dataset for polycrystalline solar cell, which contains 36 543 near-infrared images with various internal defects and heterogeneous ...



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### A review of automated solar photovoltaic defect detection ...

Potential future directions are identified to address the limitations of PV defect detection systems as illustrated in Fig. 12. As defect detection algorithms can be ...



### Defect detection of photovoltaic modules based on improved

This paper uses the PVEL-AD dataset 36 to train and test different photovoltaic module defect detection methods. The PVEL-AD dataset comprises over 4,0000 near-infrared ...



### Solar panel defect detection design based on YOLO v5 algorithm

With the deepening of intelligent technology, deep learning detection algorithm can more accurately and easily identify whether the solar panel is defective and the specific ...





### Detection and classification of photovoltaic module defects ...

This section presents two parts: The first is PV panel defect detection, while the second is the research contributions and paper organization. In this paper, a dataset of 44 ...



### Enhanced Fault Detection in Photovoltaic Panels Using CNN ...

The CNN model works by processing large datasets of solar panel images to identify unique features and patterns associated with anomalies, such as cracks, dirt, or ...

### E-ELPV: Extended ELPV Dataset for Accurate Solar Cells Defect

For this reason, we propose a new dataset and a preliminary benchmark to make an automatic and accurate classification of defects in solar cells. The dataset includes ...



### An efficient and portable solar cell defect detection system

The photovoltaic (PV) system industry is continuously developing around the world due to the high energy demand, even though the primary current energy source is fossil ...



### Photovoltaic cell defect classification based on integration of

Therefore, a comprehensive, large-scale, and publicly available EL dataset namely the PV-EL anomaly detection dataset (PV-EL-AD) (Su et al., 2022, Su et al., 2019, Su ...



### Solar panel hotspot localization and fault classification using deep

Best defect detection accuracy is 91.2% and classification accuracy is 89.5% from the implemented models. Data Description The dataset consists of thermal images of ...

### Improved Solar Photovoltaic Panel Defect Detection

The above research has greatly improved the speed and accuracy of solar photovoltaic panel defect detection, but due to the complex background of photovoltaic panel ...



### LEM-Detector: An Efficient Detector for Photovoltaic Panel Defect Detection

In summary, the primary challenges faced in photovoltaic panel defect detection include the following: (1) limited and imbalanced defect samples in the dataset, (2) strong ...



### A photovoltaic cell defect detection model capable of ...

The process of detecting photovoltaic cell electroluminescence (EL) images using a deep learning model is depicted in Fig. 1 initially, the EL images are input into a neural ...



### Prominent solution for solar panel defect detection using AI ...

In solar panel defect detection, YOLOv7 is the enhanced detection of multiple defects such as linear cracks, point cracks, tree cracks, and dark spots. The dataset i.e. ...

### Investigation on a lightweight defect detection model for photovoltaic ...

The detection of PV panel defects needs imaging-based techniques [6]. Currently, the primary imaging methods include infrared thermography (IRT), ...



### A benchmark dataset for defect detection and classification in

Electroluminescence (EL) images enable defect detection in solar photovoltaic (PV) modules that are otherwise invisible to the naked eye, much the same way an x-ray ...



- IP65/IP55 OUTDOOR CABINET
- OUTDOOR CABINET WITH AIR CONDITIONER
- OUTDOOR ENERGY STORAGE CABINET
- 19 INCH



### A photovoltaic surface defect detection method for building ...

As shown in Fig. 4, we selected 1550 panel cracks and spot images from the dataset to conduct this experiment; thus, the overall defect dataset consisted of 1550 specific ...



### Improved DenseNet-Based Defect Detection System for Photovoltaic Panels ...

In this paper, we propose a defect detection system for PV panels based on an improved DenseNet neural network. The system model dataset is first established by dividing ...

[clayton-h-costa/pv\\_fault\\_dataset](https://github.com/clayton-h-costa/pv_fault_dataset)

The following dataset was used in the paper submitted to Sensors MDPI: Monitoring System for Online Fault Detection and Classification in Photovoltaic Plants by André E. Lazzaretti, ...



### Photovoltaic Panel Defect Detection Based on Ghost ...

the task of detecting defects on PV panels. This study utilizes the fast inference speed and high detection accuracy of YOLOv5 to obtain a combination of detection speed and accuracy on ...



### CNN VGG16 used for Solar panel fault detection , Kaggle

Explore and run machine learning code with Kaggle Notebooks , Using data from Solar Panel Images Clean and Faulty Images CNN VGG16 used for Solar panel fault detection? , Kaggle ...



### Classification and Early Detection of Solar Panel Faults with Deep

This paper presents an innovative approach to detect solar panel defects early, leveraging distinct datasets comprising aerial and electroluminescence (EL) images. The ...



### Deep-Learning-Based Automatic Detection of ...

Photovoltaic (PV) cell defect detection has become a prominent problem in the development of the PV industry; however, the entire industry lacks effective technical means. In this paper, we propose a deep ...



### Photovoltaic cell defect classification using convolutional neural

However, the dataset used in this method is small. In another research, the author employs a deep belief network for defect detection in PV cells. In, the authors ...





### Solar panel defect detection design based on YOLO v5 ...

The results of comparative experiments on the solar panel defect detection data set show that after the improvement of the algorithm, the overall precision is increased by ...



### Defect detection of photovoltaic modules based on ...

This paper uses the PVEL-AD dataset 36 to train and test different photovoltaic module defect detection methods. The PVEL-AD dataset comprises over 4,0000 near-infrared images featuring a

### PVEL-AD: A Large-Scale Open-World Dataset for Photovoltaic ...

Many researchers are committed to solving this problem, but a large-scale open-world dataset is required to validate their novel ideas. We build a PV EL Anomaly Detection (PVEL-AD 1, 2, 3) ...



### Defect Detection of Photovoltaic Panels Based on Deep Learning

The article proposes a high-precision algorithm for detecting defects in photovoltaic panels, which can detect and classify damaged areas in the images. The algorithm uses a parallel cross ...



## PA-YOLO-Based Multifault Defect Detection

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With the continuous development of artificial intelligence and machine learning technologies, automated PV panel defect detection methods have become a hot area in research and industry. These methods utilize ...



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