Photovoltaic panel defect dataset

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.

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 efficiencyof solar modules.

How to identify solar panel faults?
The methodology involved in the fault classification and early detection of solar panel faults begins with the selection of the dataset. Two types of image datasets are used in this case, namely the aerial image dataset of solar panels and the electroluminescence image dataset of solar panel cells.

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 detectionthat 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 accurate is the solar panel defect detection algorithm?
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 1.5%,the recall rate is increased by 2.4%,and the mAP is up to 95.5%,which is 2.5% higher than that before the improvement.

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.

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 ...

We applied the models on the 2,624 elpv benchmark images using both binary and four classifications. But due to limited defect classifications with elpv benchmark dataset, we extracted EL images from publicly available datasets of a total of 18,347 Photovoltaic (PV) cells images with 11 types of defects in addition to the non-defective PV cells.

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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, Clayton H. da Costa, Marcelo P. Rodrigues, Guilherme D.Yamada, Gilberto Lexinoski, Guilherme L. Moritz, Elder Oroski, Rafael E. de Góes, Robson R. Linhares, Paulo C. Stadzisz, Júlio S. Omori, and ...

We build a Photovoltaic Electroluminescence Anomaly Detection dataset (PVEL-AD) for solar cells, which contains 36,543 near-infrared images with various internal defects and heterogeneous backgrounds.

InfraredSolarModules is a machine learning dataset that contains real-world imagery of different anomalies found in solar farms. This dataset can be used for machine learning research to gain efficiencies in the solar industry. ... In order to combat the lack of publicly available data on infrared imagery of anomalies in solar PV, this project ...

In this project, we present the first convolutional neural network (CNN) based approach for solar panel soiling and defect analysis. Our approach takes an RGB image of solar panel and environmental factors as inputs to predict power loss, soiling localization, and soiling type. ... We create a first-of-its-kind dataset, Solar Panel Soiling ...

Data Description The dataset consists of thermal images of solar panels captured using FLIR C2 and E4 thermal cameras from different solar sites in India. ... Hotspot Identifier To identify the region of the hotspot in the solar panel, transfer learning on pre-trained Faster R-CNN [17] model is performed. ... Brettenny, W., Clohessy, C., van ...

Here, different types of defects can be found, including microcracks, cell cracks, finger-interruptions, disconnected cells, soldering defects, PID defects, diode failure, etc. Fig. 3 demonstrates illustrative examples on PV cells that are mainly defected with finger-interruptions and cracks in both mc-Si and pc-Si cells (taken form the ELPV dataset [34]). Apparently, some ...

These factors cause cracks and many different defects on PV panels over time (Deitsch et al., 2019, Zefri et al., 2022, Zefri et al., 2022). Some defects may occur during manufacturing such as finger interruptions, micro-cracks, and dislocation. ... The following subsections present the PV-EL dataset description, the framework of the improved ...

The dataset contains 2,624 samples of $300times300$ pixels 8-bit grayscale images of functional and defective solar cells with varying degree of degradations extracted from 44 different solar ...

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 defect images, including solar panel images. In the dataset used in this study, because black spots, dark spots, and dust would cause similar regional functions of photovoltaic panels to be ...

Photovoltaic panel defect dataset

Photovoltaic (PV) solar cells are primary devices that convert solar energy into electrical energy. However, unavoidable defects can significantly reduce the modules" photoelectric conversion ...

An IR dataset was collected with normal operation and artificially induced defects of PV modules. The fine-tuning of IR images achieved an accuracy of 99.23 % at a real-time ...

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) dataset for polycrystalline solar cell, which contains 36 543 near-infrared images with various internal defects and heterogeneous background. This dataset ...

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 1.5%, the recall rate is increased by 2.4%, and the ...

They have brought great help to our study and research work. The idea of collecting this data set originally came from reading an article on surface defect detection by SFXiang of "AI(AI_SuanFa)", which prompted me to organize a more comprehensive data set. The collection of papers comes from a CSDNer named "".

In general, the segmentation algorithms trained to detect solar panel defects would not be 100% accurate. As a result, some solar panels may be incorrectly classified as defective. ... Researchers used solar panel images before, but those datasets are either electroluminescence or thermal images captured from close views where the inspection is ...

Defects in photovoltaic (PV) panels can significantly reduce the power generation efficiency of the system and may cause localized overheating due to uneven current distribution. Therefore, adopting precise pixel-level defect detection, i.e., defect segmentation, technology is essential to ensuring stable operation. However, for effective defect ...

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 ...

In "Example_Prediction" this is the example of how to implement an already trained model, it can be modified to change the model you have to use and the image in which you want to detect faults.. In "Example Prediction AllInOne" this is the example of how implement all trained model, you can use this code for predict a folder of images and have a output image with detection ...

In Guo and Cai (2020), the authors suggest a step-by-step thermography of solar panel cell defects. Step-heating halogen lights were utilized to optically stimulate the photovoltaic panel"s front surface, while an

infrared camera monitored the front surface"s temperature evolution and acquired infrared image sequences.

This work builds a PV EL Anomaly Detection dataset for polycrystalline solar cell, which contains 36 543 near-infrared images with various internal defects and heterogeneous background and carries out a comprehensive evaluation of the state-of-the-art object detection methods based on deep learning. The anomaly detection in photovoltaic (PV) cell ...

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 is the traditional method of inspection, which can be time-consuming and costly. This study proposes a method for detecting and localizing solar panel damage using thermal images. The ...

Subsequently, 80% of the PV cell defects dataset was selected as the training set, 20% as the validation set, and stratified sampling was used to randomly divide the original data, while retaining ...

Based on this dataset, researchers have developed numerous algorithms 9,10,12 for photovoltaic panel defect detection. Deep learning, compared to traditional machine learning, has powerful feature ...

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