Solar cell defect dataset

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.

Can deep learning detect defects in crystalline silicon solar cells?
This paper presents a benchmark dataset and results for automatic detection and classification using deep learning models trained on 24 defects and features in EL images of crystalline silicon solar cells. The dataset consists of 593 cell images with ground truth masks corresponding to the pixel-level labels for each feature and defect.

What is automatic defect detection & classification in solar cells?
Automatic defect detection and classification in solar cells is the subject of many publications since EL imagingof silicon solar cells was first introduced by Fuyuki et al. for detection of deteriorated areas in solar cells in 2005.

How are solar cell images annotated?
Every image is annotated with a defect probability(a floating point value between 0 and 1) and the type of the solar module (either mono- or polycrystalline) the solar cell image was originally extracted from. The individual images are stored in the images directory and the corresponding annotations in labels.csv.

Can El models detect defects in solar cells?
The models tested are effectivein detecting,localizing,and quantifying multiple features and defects in EL images of solar cells. These models can thus be used to not only detect the presence of defects,but to track their evolution over time as modules are re-imaged throughout their lifetime.

What are the defects in El images?
The defects in the annotated images are either of intrinsic or extrinsic typeand are known to reduce the power efficiency of solar modules. All images are normalized with respect to size and perspective. Additionally,any distortion induced by the camera lens used to capture the EL images was eliminated prior to solar cell extraction.

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 field size; then, the feature ...

Solar cell defect dataset

In this study, a novel system for discovering solar cell defects is proposed, which is compatible with portable and low computational power devices. ... It consists of 2,426 solar cell images and is used to detect solar defects automatically. The dataset images contain both defective and nondefective solar cells with varying degrees of ...

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.

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

(1) Because there are few publicly available solar panel defect detection datasets, three solar cell datasets with refined defect labels are proposed to provide a benchmark for subsequent research on segmentation networks, i.e., SolarCells, SolarCells-S, and PVEL-S. SolarCells and SolarCells-S are monocrystalline silicon panel datasets, while PVEL-S is a ...

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 YO ... and can identify and locate a variety of common defects in the PVEL-AD dataset, while the mAP can reach 87.4%, an improvement of 10.38% compared with the original YOLOv5 model ...

Solar cells can exhbit various types of degradation caused by inappropriate transportation, installation, or bad weather conditions such as wind or hail. The model implemented here, focuses on the classification of two different types of ...

The results obtained by existing methods on public solar cell dataset (same used in our study) are compared with our results in this section. The comparison is shown in Table 5. Deitsch S. et al. [3] used convolutional Neural Network (CNN) and SVM on public solar cell dataset. For SVM, they obtained best results using KAZE/VGG features; and for ...

significant advancement in solar cell defect detection. The author in [5] introduce a non-contact and nondestructive automated visual inspection system aimed at detecting ... goal of creating an extensive dataset of solar cell images from various sources, making sure that undamaged, cracked, and corroded cells are all included. The module ...

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 ...

solar cell defect datasets. The first dataset is ELPV [30]created and made public by Buerhop et al, This. dataset contains 2624 samples of 300x300 pixel 8-bit. grayscale images extracted from 44 ...

detection methods is still very small. These datasets have few defect categories and defect data. As far as we know, there still not exist a comprehensive, large-scale, and number-increasing solar-cell dataset for open-world practical scene, such as our PVEL-AD dataset. Song et al. [8] provided a steel surface defect dataset, which

This paper presents a benchmark dataset and results for automatic detection and classification using deep learning models trained on 24 defects and features in EL images ...

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.

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