Solar cell segmentation

What is a benchmark dataset for semantic segmentation of solar cell images?
A benchmark dataset for semantic segmentation of solar cell images is published. Twelve deep learning models are trained for defect detection in EL images. Benchmark IoU and recall metrics are provided for 5 of the 24 labelled classes.

What are the performance metrics for solar cell segmentation?
The second set of performance metrics are precision,recall,and the \(F_1\) score. These metrics are computed by considering cell segmentation as a multiclass pixelwise classification into background and active area of individual solar cells.

How is segmentation of PV modules related to calibration patterns?
Finally,the conclusions are given in Sect. 5. The segmentation of PV modules into individual solar cells is related to the detectionof calibration patterns,such as checkerboard patterns commonly used for calibrating intrinsic camera and lens parameters [29,36,41,69,79].

What is the resolution of imaged solar cells?
The solar cells in imaged PV modules have a square aspect ratio (i.e.,are quadratic). The average resolution of the EL images is \(2779.63\times {2087.35}\) pixelswith a standard deviation of image width and height of 576.42 and 198.30 pixels,respectively. The median resolution is \(3152\times 2046 \) pixels.

How accurate is solar segmentation based on a Jaccard index?
The segmentation is highly accurate,which allows to use its output for further inspection tasks,such as automatic classification of defective solar cells and the prediction of power loss. We evaluated the segmentation with the Jaccard index on eight different PV modules consisting of 408 hand-labeled solar cells.

How do we exclude repetitive patterns in the El image of solar cells?
To further exclude repetitive patterns in the EL image of a solar cell,e.g.,due to low passivation efficiency in the contact region (see Fig. 8 d),we combine the initial binary mask and the augmented mask via bitwise XOR. We note that solar cells are usually symmetric about both axes.

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Through various hyper-parameter tuning and experimentation, we seek to optimize a model for the task of PV segmentation and classification. 1. Introduction. Unprecedented levels of carbon dioxide in the Earth"s atmosphere have resulted in detrimental climate and envi-ronmental impacts that threaten planetary extinction.

A novel cell-level anomaly segmentation pipeline for solar panels is proposed. Several cutting-edge deep

learning techniques are used to achieve robust performance. ...

This site hosts benchmark datasets for multi-class semantic segmentation of electroluminescence (EL) imagess of silicon wafer-based solar cells. Labelled and unlabelled images are provided. ...

In this work, we propose a robust automated segmentation method for extraction of individual solar cells from EL images of PV modules. This enables controlled studies on large amounts of data...

Anwar, S. A. & Abdullah, M. Z. Micro-crack detection of multicrystalline solar cells featuring an improved anisotropic diffusion filter and image segmentation technique. EURASIP J. Image Video ...

To overcome these issues, algorithm ASSC(Automatic Segmentation of Solar Cells) is proposed. Concretely, a combination of Image processing techniques and convolutional network is employed to address these problem. Additionally, image deformation is tackled by implementing perspective correction, which transforms the PV panel into a front view ...

First, in solar cell segmentation, we assume that the size of solar cell is in a typical range, e.g., about ? pixels in cell width, given a fixed camera capturing setting. Such typical parameters of cell size in width and height are applied to the selections of cell corner points in Algorithm 4. Furthermore, the panel structure consisting of gridlines and busbars is ...

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