World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:18, No:10, 2024

Open-Source YOLO CV For Detection of Dust on Solar PV Surface

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Abstract : Accumulation of dust on solar panels impacts the overall efficiency and the amount of energy they produce. While various techniques exist for detecting dust to schedule cleaning, many of these methods use MATLAB image processing tools and other licensed software, which can be financially burdensome. This study will investigate the efficiency of a free open-source computer vision library using the YOLO algorithm. The proposed approach has been tested on images of solar panels with varying dust levels through an experiment setup. The experimental findings illustrated the effectiveness of using the YOLO-based image classification method and the overall dust detection approach with an accuracy of 90% in distinguishing between clean and dusty panels. This open-source solution provides a cost effective and accessible alternative to commercial image processing tools, offering solutions for optimizing solar panel maintenance and enhancing energy production.

Keywords : YOLO, openCV, dust detection, solar panels, computer vision, image processing
Conference Title : ICIAP 2024 : International Conference on Image Analysis and Processing
Conference Location : Paris, France
Conference Dates : October 28-29, 2024