Fusion colour model for photovoltaic (PV) segmentation

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ABSTRACT
The degradation of photovoltaic (PV) module output is influenced by various factors. Among these factors are elevated temperatures of the PV module, shading of certain cells, the presence of conducting or shortened bypass diodes, and the accumulation of soil and degradation in the PV array. However, ensuring that PV installations remain a profitable investment relies significantly on conducting effective as well as regular inspections to identify any existing defects. In this context, unmanned aerial vehicles (UAVs) have gained increasing popularity as a means of inspection in a variety of fields, including Large Scale Solar (LSS) installations. These days, hotspot detection is frequently accomplished using infrared thermography (IRT) technology. In large-scale PV facilities, the deployment of UAVs can significantly increase labour efficiency when compared to manual inspection. For the purpose of detecting hotspots, PV module IRT image processing is crucial. The hotspot location cannot be identified without segmenting the PV modules. In this study, we presented a technique for acquiring segmentation by integrating mask images with IRT images. Computer vision and image processing utilizing MATLAB are employed. Thirty PV module experimental results are presented in this research. There are five PV modules with a poor segment out of thirty total PV modules. The color, as well as temperature with respect to the IR image, cannot be simply segmented. The hotspot cell could develop as a result of the PV receiving reflections from the sun. In order to evaluate our quality process, quantitative analysis is employed. The approach works effectively in segmentation as seen by the output mask's average quality of 83.3%.

KEYWORDS
Photovoltaic (PV); Hotspot; image processing; Large Scale Solar (LSS)

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