

Addendum to "Detecting Photovoltaic Panels in Aerial Images by Means of Characterising Colours"

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In this addendum we provide a further example of the application of our proposed approach. Using google maps, we acquired three images, having photovoltaic panels, from the same geographical areas indicated by the authors of the PV panels dataset. The three images are named based on the type of land they depict: *green_bg* (bg=background), *water_bg* and *rocky_bg*. Table 1 shows the coordinates of the images.

Image	Latitude	Longitude
green_bg	33.1926	118.0222
water_bg	33.2296	117.9829
rocky_bg	33.1879	118.0231

Table 1: Geographical coordinates of the three PV images.

To perform the panel detection, we employed the characterising PV colour set that we had previously collected for the corresponding geographical area. I.e., characterising colours were gathered beforehand using the dataset of images discussed in the paper. Table 2 shows the evaluation metrics for the PVs area detection task. Table 3 shows the metrics for the PV panels' surface detection task. The high degree of precision and recall shows that the set of characterising colours need not be tuned for new images to be processed, hence the proposed approach is highly robust.

Image	Precision	Recall	F1 Score
green_bg	0.960	0.899	0.928
water_bg	0.948	0.943	0.945
rocky_bg	0.937	0.946	0.941

Table 2: Evaluation metrics for the PVs area detection.

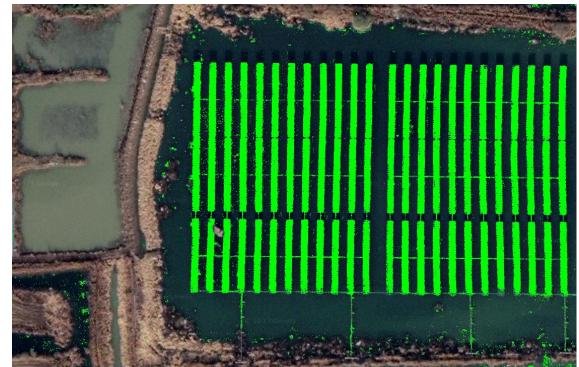
Image	Precision	Recall	F1 Score
green_bg	0.872	0.945	0.907
water_bg	0.829	0.980	0.898
rocky_bg	0.829	0.917	0.870

Table 3: Evaluation metrics for the PV Panels' surface detection.

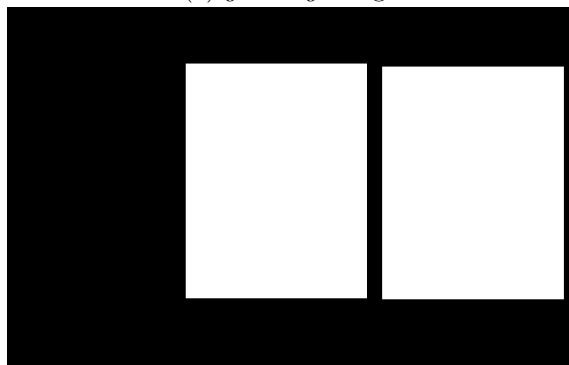
The collected images, and labels are shown below. Labels were manually added only for the validation purpose, i.e. for computing true positive, false positive, true negative, and false negative, and then precision and recall.



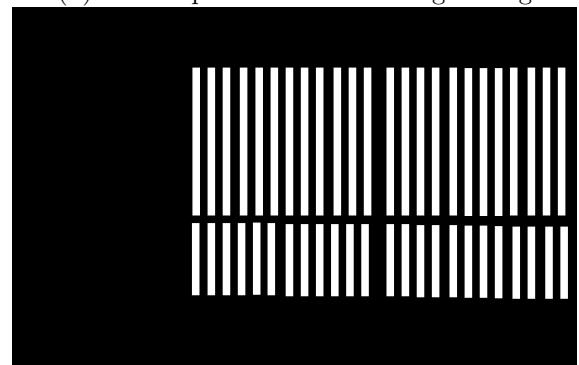
(a) *green_bg* image



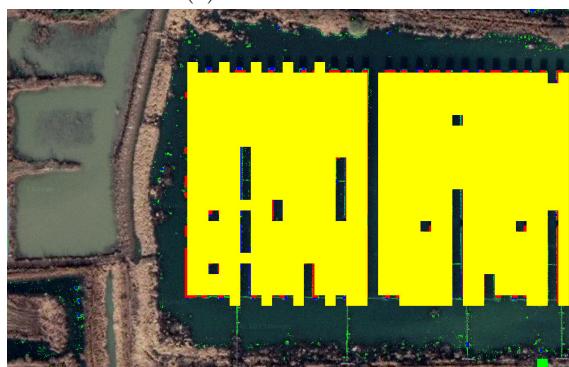
(b) Pixel replacement result for *green_bg*



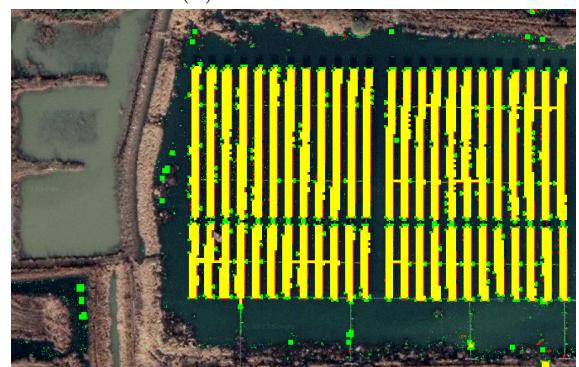
(c) PVs area label



(d) PVs surface label



(e) PVs area detection result



(f) PVs surface detection result

Figure 1: Results of the PVs detection performed on the *green_bg* image



Maps Data: Google, ©2023 CNES/Airbus, Maxar Technologies

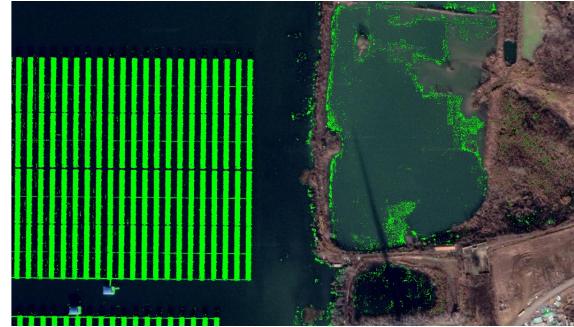
(a) *water_bg* image



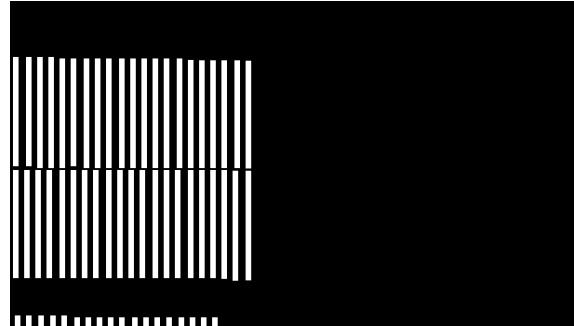
(c) PVs area label



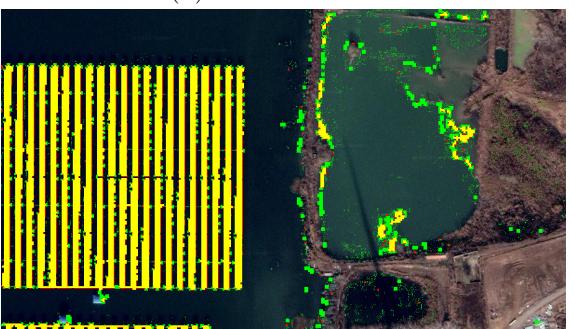
(e) PVs area detection result



(b) Pixel replacement result for *water_bg*



(d) PVs surface label



(f) PVs surface detection result

Figure 2: Results of the PVs detection performed on the *water_bg* image



(a) *rocky_bg* image

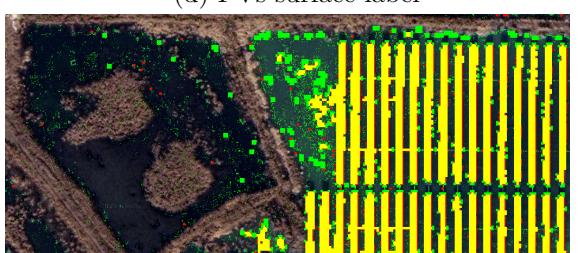
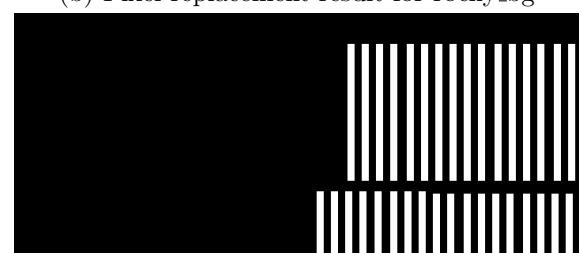
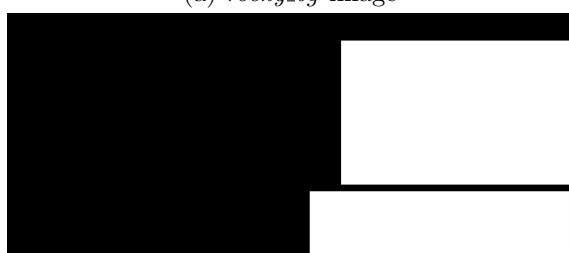
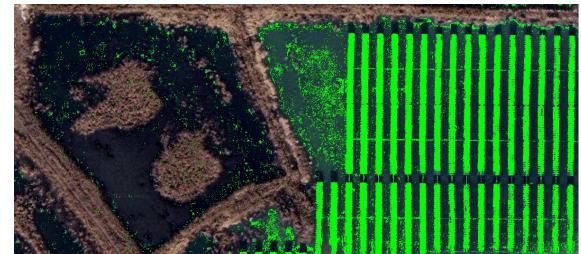


Figure 3: Results of the PVs detection performed on the *rocky_bg* image