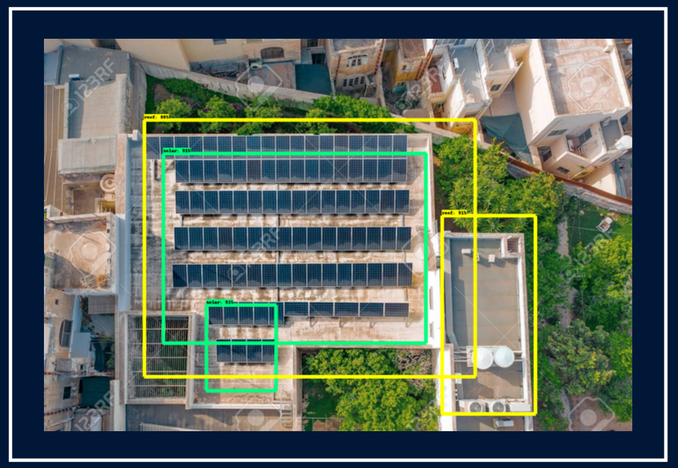
SERGIO AIZCORBE

Solar Panel Detection in Satellite Images

ATOS | UC3M

Introduction



OBJECTIVES

- Coordinates
- Rectangle identifying the solar panels
- Rectangle identifying the building
- Estimated area of the solar panel
- Number of solar modules
- Degree of confidence of the prediction

CHALLENGES

- Low contrast
- Low resolution
- Panel reflections
- Hidden parts
- Connected roofs
- Small obstacles

ACCURACY vs SPEED

Problem Approach I

DATA COLLECTION → IMAGE PRE-PROCESING → [IMAGE FILTERING, IMAGE SEGMENTATION] → FEATURE EXTRACTION ↓ CLASSIFICATION

- Histogram equalization
- Gaussian filter

→

- Edge-based segmentation
- Region-based segmentation

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- Parameter tuning for the classifier

Computer Vision Algorithms

Problem Approach II

DATA COLLECTION → IMAGE PRE-PROCESING → OBJECT DETECTION → [FEATURE EXTRACTION, CLASSIFICATION]

CNN

Custom neural network?

- Specifically search for solar panels
- Training data needed

ARCHITECTURES

- R-CNN (Dectectron2)
- SSD
- YOLO

Convolutional Neural Networks

Solution

Mix and Conquer!

Computer Vision Algorithms

- Algorithms are less comp. expensive
- Training data of solar panel images needed
- More sensitive to noise, contrast
- Slower feature selection and model tuning

Convolutional Neural Networks

- Slower to evaluate but generalizes better
- Less sensitive to image noise
- More adequate to the project requirements

Bibliography

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Convolutional Neural Network Based Solar Photovoltaic Panel Detection in Satellite Photos

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Large-Scale Solar Panel Mapping from Aerial Images Using Deep Convolutional Networks

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