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YOLO Application on Portuguese Highways for Photovoltaic Energy Potential Evaluation

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The world is facing an urgent challenge: the need for sustainable and clean energy solutions. Highways, with their vast and underutilised infrastructure, present an innovative opportunity through the integration of photovoltaic panels.

In this work, I employed **YOLO**, a state-of-the-art computer vision algorithm, to automatically detect and identify highway structures and evaluate their potential for solar energy generation. As a first step in detecting sound barriers, I applied data augmentation techniques to artificially expand my dataset, which was then used to train a YOLOv10n model. The model achieved impressive results, with a **precision of 86%**, a **recall of 89%**, and a **mean average precision (mAP) of 91%**, which demonstrates strong performance and highlight the effectiveness of this approach.

This research contributes to the development of **smarter** and **greener** highways.

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