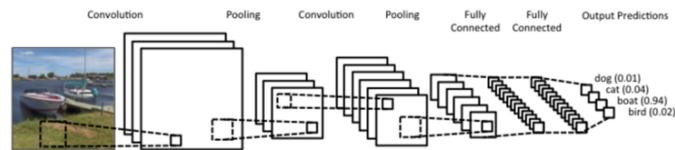

Mapping of solar photovoltaic deployment and evolution using Machine Learning

Background

Current climate and environmental policies in Switzerland and worldwide aim at a strong reduction of CO₂ emissions in the next decades by transitioning from fossil fuels to renewable energy. Harvesting solar energy using photovoltaic (PV) technologies is one promising approach to achieve the ambitious emission targets. The recent fast pace deployment of solar PV in Switzerland and worldwide calls for a comprehensive database with locations and sizes of solar installations in urban areas. Voluntary surveys and self-reports are one possibility but often they are incomplete or they can become quickly obsolete at the moment in which they are made accessible. Machine Learning (ML) techniques combined with satellite imagery can be used to overcome this and other limitations.

The Swiss Federal Office of Topography (SwissTopo) provides access to a unique aerial photo map of Switzerland, in the form of thousands of digital color orthophoto mosaics. Leveraging their high spatial resolution (up to 25 cm) in combination with the most advanced convolution neural networks (CNN) is possible to build a precise and efficient model for an automatic classification of solar PV installations on rooftops and measurement of their sizes. Furthermore, bringing together the extracted map of solar PV installation with environmental and socio economic factors will allow to discover and model trends and correlations, helping policymakers to get a deeper understanding of future solar PV deployment.



Objectives

- Estimate of existing solar PV installation in residential areas using SwissTopo aerial photos and ML techniques for image classification and regression. The study will be initially performed at the city scale (e.g. Geneva) with the idea of extending it to the national scale, if time permits.
- Correlate derived solar deployment data with local environmental and socio economic factors and extract interesting trends (and models) for helping future solar technology adoption

Desired profile

We are looking for a highly motivated Master student having a background in civil, electrical engineering or applied physics willing to expand his/her knowledge to the data science domain, particularly in the quickly evolving field of ML algorithm applications. Basic notions of Python language and familiarity with ML concepts are envisaged.

The candidate will find an exciting international research environment at LESO-PB (<https://leso.epfl.ch>), where researchers work on various topics related to energy efficiency and the implementation of renewable energies in buildings and cities.

Contacts

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