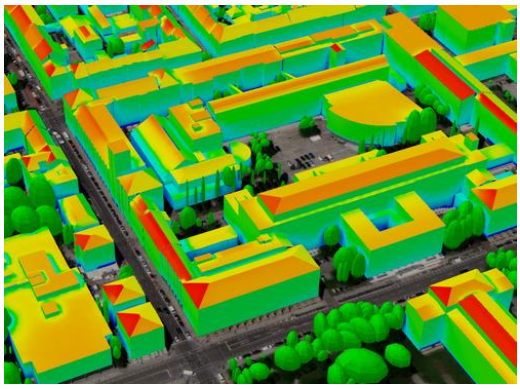
Lehrsthul für Geoinfromatik

Lehrstuhl für Fahrzeugtechnik

Master's Thesis

Deep Learning for photovoltaic potential – impact of dataset extension

To tackle the global climate problem, the German government has adopted measures and targets for Germany, especially in the energy and transport sectors. To reach the so far missed targets faster, sector coupling offers synergies that compensate for the disadvantages of individual solutions (grid stability, costs, etc.). For site specific synergy analysis, a range of information is needed, such as mobility behavior, building dimensions, and energy requirements. Then, synergies can be estimated for an area (e.g., a city) using GIS and image recognition methods to extract the relevant information from publicly available sources.



In this thesis, the topic of PV potential analysis with image recognition will be investigated in more detail. The current deep neural network is based on two hand-labeled datasets for semantic segmentation of roof segments with a few thousand roofs. It is the goal to extend the training of the network using a dataset with labels from semantic 3D city models provided by the Bavarian land surveying office. The 3D dataset contains several hundred thousand roofs. The goal is to investigate the applicability of the dataset and the effects on the training results.

The thesis includes the following work packages:

- Familiarization and literature research: Semantic segmentation of roof structures
- Implementation of a program for the use of labels from semantic 3D city models as training data
- Training of Deep Neural Networks
- Analysis of the improvement by larger dataset, chosen aerial images, regional characteristics and optionally network architectures
- Evaluation and discussion of the results

Requirements: Sound programming skills in Python, basic knowledge of geodatabases (PostgreSQL/PostGIS). First experiences with Deep Learning and GIS software are beneficial. Willingness to work in a team (cooperation possibility with a thematically related master thesis).

Contact

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