



Master Thesis within the BigDAPESI Project

Applied Machine Learning - Predicting the Type and Age of Buildings

As part of the BigDAPESI project, the Chair of Information Systems and Sustainable IT Management and the Project Group Business and Information System Engineering of the Fraunhofer FIT tender final papers for master students. The BigDAPESI project aims at developing a big data concept for energy consumption and refurbishment cost analysis and forecast of residential buildings. Nevertheless, sensitive user data should stay protected in order to ensure a high privacy level.

Energy consumption analysis and forecast is based on processing large amounts of building physics and consumption-oriented data. The data can be present as structured as well as unstructured data. Thus, a major part of the working capacity focuses - apart from data processing and visualization - on the actual data storage and access. For the purpose of privacy preservation, existing data mining algorithms have to be adapted accordingly.

Summarizing, the innovation lies in the data-driven approach of energy consumption forecasting. The final goal is to clearly outperform established building physics methods in terms of speed, accuracy, and costs. This offers an entirely new type of prediction methods in the property sector.

Type and age of buildings are two of the most important influencing factors on energy consumption and indicators for building retrofit potential. Established Machine Learning algorithms like Artificial Neural Networks can be used to predict type and age of buildings. "A picture is worth a thousand words" - true to this motto, an important research question is if and how well Machine Learning algorithms perform on classifying buildings from images and 3D models. Those images can for example be retrieved from Google Maps or OpenStreetMap through the respective APIs.

Recommended Literature:

- Gilbert Fridgen, Florian Guggenmos, Christian Regal and Marco Schmidt. Big Data Beats Engineering in Residential Energy Performance Assessment - A Case Study, 2017.
- F. Biljecki and M. Sindram. Estimating Building Age with 3D GIS, 2017.
- Alexander C. Berg, Floraine Grabler and Jitendra Malik. Parsing Images of Architectural Scenes, 2010.
- Marco Conti. A Framework for Visual Features Database Creation for Building Recognition on Mobile Devices, 2010.

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