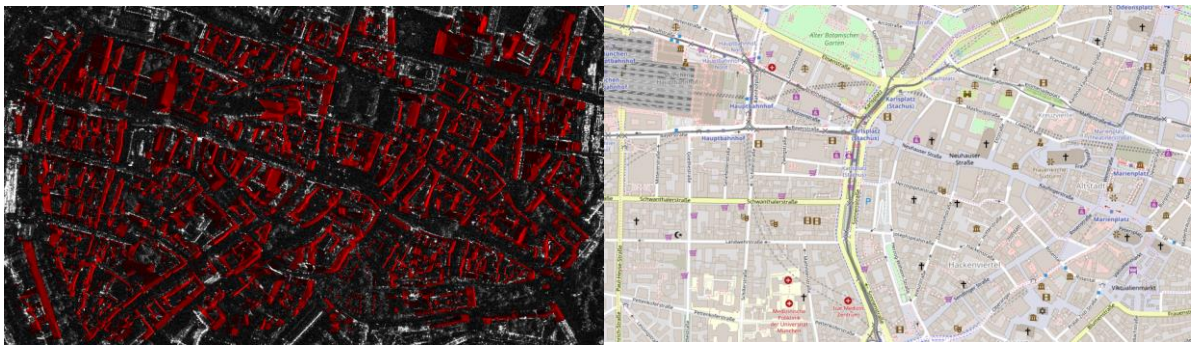
Master Thesis

OpenStreetMap Boosting using Remote Sensing Data

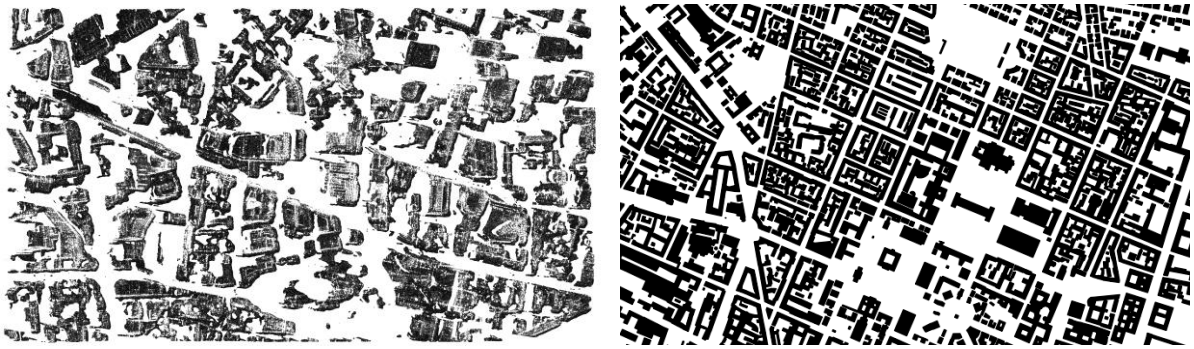


a) b)

Figure 1: a) Simulation of building extents (marked in red) in TerraSAR-X image for Munich test site using GeoRaySAR; input to simulator: CityGML model; b) Open Street Map.

Objective:
The objective of this research is to improve OpenStreetMap (OSM) quality, e.g., building footprints, using remote sensing data.

Keywords:
Data fusion, OSM, geospatial data uncertainty



b) b)

Figure 2: a) Automatic interpretation of TerraSAR-X images with SimGeoI for test site of London (Auer et al., 2017); b) OSM building footprint example.

Description:

The OpenStreetMap (OSM, openstreetmap.org) is, without any doubt, one of the most wide spread and well recognized Volunteered Geographic Information project. As OSM is fully based on the contributions of individual map-makers, the OSM data is heterogeneous in terms of quantity and quality. The OSM database comprises vector data, which is attributed with a great variety of labels and can serve as a source for various cartographic products such as mobile navigation, bicycle routing, building footprint validation, and emergency response. Improving the coverage and accuracy of the OSM is, therefore, an essential task to facility the scientific usage of this data source. At the same time, the rapid development of remote sensing techniques and data processing algorithms has led to the availability of large amounts of Earth Observation data at regular intervals. However, the usage of this data is limited to a small community of experts.

Even though building footprints are relatively easy to detect from the optical images that are often used by the OSM community as no local knowledge is required, this data is both inconsistent and imprecise. This thesis aims at alternative approach to map the missing pieces of OSM using data fusion techniques and provide a basis for further work of volunteers. Data fusion techniques have been extensively employed on various fields with the aim of fusing and aggregating data from different sources. The suggested thesis approaches the problem of missing data in OSM by combining the existing information with data from auxiliary sources acquired based on Simulation-Based Remote Sensing Data.

This thesis address four objectives: (1) to identify relevant study cases with high urbanization level and incomplete data in OSM, (2) to explore the potential of building footprint data generated using SimGeoI towards producing a more accurate cartographic products, (3) to compare simulated building locations with real ones in the images and perform uncertainty analysis and visualization on the outcomes of the simulated data against the data available in OSM, and (4) to develop interface between OSM and simulation environment.

This topic requires good programming skills in Python and basic knowledge on remote sensing.

References:

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