Extracting road geometry attributes from satellite images for traffic flow simulation

Background

Traffic simulation are essential tools for a wide range of traffic engineering applications. They are generally composed of a demand and supply component. The latter is basically the road network that is in most cases imported from OpenStreetMap (OSM). However, OSM is a crowed-sourced platform in which the quality of the available maps for each region significantly relies on the users and are not always very accurate. Hence, a major part of creating a traffic simulation is to modify the road network manually by comparing it to satellite images.

Recently, advances in image processing techniques has created opportunities to extract some features of the road from satellite images. This would help to reduce the workload for creating traffic simulation networks. The main geometric attributes of roads e.g. shape, length, speed limit, road type etc. can be imported from OSM. Other attributes namely number of lanes and turning movements at intersections are often inaccurate and need to be modified.

![Figure 1. An example of road boundary extraction from satellite images [Zang et al. 2017]](image)

Goal

The main goal of this project is to develop a framework to extract these attributes from publically available satellite images. A schematic workflow of the project is illustrated in the following figure:

![Figure 2. Schematic workflow of the project](image)
Within the scope of the project the student is expected to accomplish the following tasks:

1- A literature review on the existing studies on extracting geometric data from satellite images
2- Development of a framework to extract number of lanes and connections from such images
3- Linking the extracted data with other features exported from OSM
4- Case study for the city of Munich to evaluate the effectiveness of the developed framework

Requirements

5- Strong Python programming skills
6- Hands-on experience with geospatial data and relevant tools such as QGIS and/or JOSM as well as PostgreSQL data base
7- Understanding of traffic simulations is a plus

Contact

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