

## Instance Segmentation of Aerial Images

### Proposal for a Master thesis topic (EN)

Aerial images contain terrestrial objects, e.g. buildings, cars, roads, which are important and interested to many applications. Most researches of aerial images focus on pixel-wise semantic segmentation, and few studies focus on detecting different instances of the objects in aerial images. The potential problem in semantic segmentation is that individual terrestrial objects are not separated. However, the separation of different objects, namely finding out different instances, is critical to many applications, e.g., automatic map generation. Figure 1 is an example of semantic segmentation and instance segmentation from an aerial image.

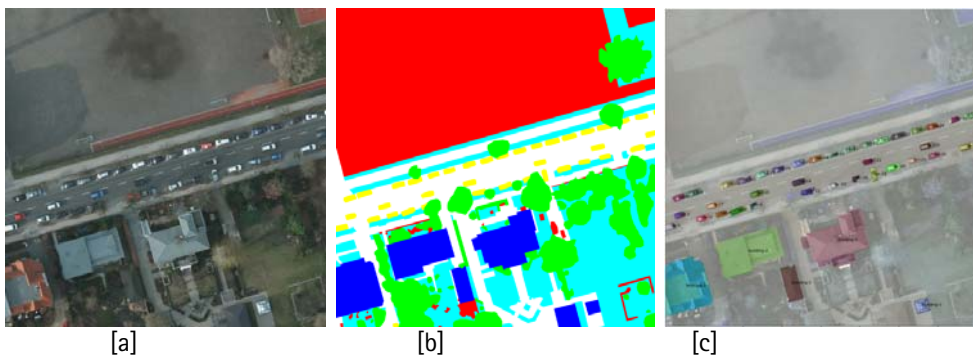


figure 1: [a]: input aerial image; [b] semantic segmentation label of the input image, here different classes are indicated by different colors; [c] instance segmentation for class car and building, different cars and buildings are separated and indexed.

In this thesis, an instance segmentation of building and car in the aerial images is expected. Also, road extracted within large bounding box is expected to be vectorized using deep neural network. The output map contains different instances of cars, buildings and vectorized road. To evaluate the performance, precision defined based on intersection over union thresholds will be used.

#### Requirements:

- Strong programming skills in python
- Background knowledge of machine learning and computer vision
- Good communication and writing skill in English
- Experience with usage of deep learning packages (e.g. tensorflow, pytorch)

#### Potential output:

- 1) An adapted bounding box presentation considering rotation for building and car
- 2) An method for vectorization of road segmented out from large size of bounding boxes
- 3) Modified network based on Mask-RCNN to incorporate road

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