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Effects of the representation of input images on the semantic segmentation of aerial images

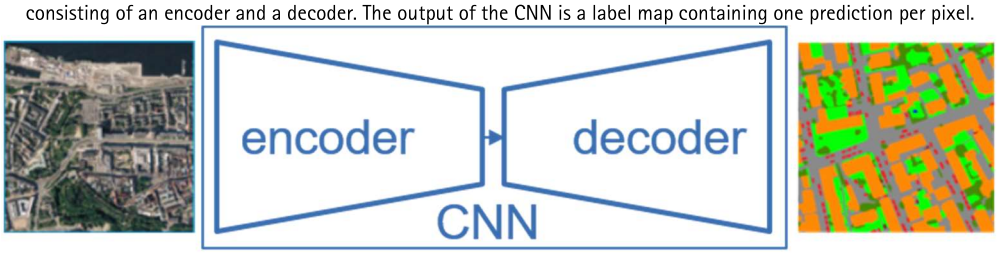
Proposal for a Bachelor thesis topic (DE/EN)

Pixel-wise classification of land use based on remote sensing images is of interest in the context of several applications, e.g. for determining the development of cities or open spaces and for planning future land use. Training such a classifier requires images with known reference labels for all land use classes to be differentiated. In this context, the geometrical resolution of the input images, i.e. the ground sampling distance, as well as the spectral resolution, i.e. whether color information is available or gray values only as well as the availability of an infrared channel, can be assumed to have an impact on the classification performance.

In the context of a bachelor thesis, a systematic analysis of the impact of different input resolutions on the classification performance has to be investigated. To do so, a neural network for semantic segmentation (see Figure 1) should be trained for varying resolutions and the resulting classification performances should be compared. Thus, the effects of the resolution on the performance should be identified and in particular, an analysis on the level of individual classes is of interest. In the context of training, it might be required to modify some of the training hyperparameters to adapt the network to the modified input.

The bachelor student can start from an existing implementation of a neural network for semantic segmentation and will be provided with a dataset, consisting of aerial images and a manually generated reference for land cover. Furthermore, software for generating a dataset with another geometrical resolution and spectral resolution, respectively, is available.

Figure 1: Basic principle of semantic segmentation. An input image is provided to a convolutional neural network (CNN) consisting of an encoder and a decoder. The output of the CNN is a label map containing one prediction per pixel.



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