# Instance Segmentation for Digital Elevation Models

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**Abstract**

There has been immense progress in applications of deep learning and computer vision for images. Convolutional Neural Networks (CNNs) prove to achieve state of the art performance in image classification, image captioning, face and gesture recognition, and semantic and instance segmentation. Although the tasks of object recognition in products of laser scanning data such as Digital Elevation Models (DEMs) are intensively tackled by classical machine learning methods, there is comparably less research done on applications of deep learning techniques in this field. DEM data has a similar format to that of RGB images with a difference in the number of channels. DEM data usually contains one channel compared to three channels in RGB data. This property facilitates deep learning techniques, which are designed for RGB data, to be used for DEM data. However, due to the inherent differences in DEM and RGB data in terms of spatial relations and range of values among pixel elements, DEM data require different pre-processing steps before applying deep learning techniques. In our research, we explore CNNs for instance segmentation in DEM data. Instance segmentation is the task of identifying object instance of each pixel in an input image for every object in an image. The DEM data in our research collected from Harz mining region in Lower Saxony, Germany and the goal is to detect archaeological objects and historical man-made structures in the region.

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