Contribution ID: **3**   Type: **Session 2**

Fine-tuning and evaluating deep learning models for tree crown segmentation

The DeepTree project uses deep learning models to segment tree crowns in orthoimages. Building on pre-trained models [1], we fine tune them with labeled orthoimages from the city of Halle (Saale), Germany. We present a deep learning model that is optimized for segmenting tree crowns in orthoimages from this region. The deep learning model is evaluated based on the city's registry of trees [2] and hand-drawn polygons provided by UFZ. We discuss the model's ability to identify tree crowns correctly. Furthermore, we show that fine-tuning on the specific dataset can improve performance over the out-of-the-box pretrained model.

Gathering labeled data requires substantial human effort. These ground truth labels are essential to train and evaluate the deep learning models.

In order to direct the labeling efforts most efficiently, we implement active learning. The deep learning model estimates how certain it is in segmenting a given tile. We then select the tiles with the highest uncertainty, create ground truth labels, and fine-tune the model. This iterative approach can substantially speed up model fine tuning.

[1] M. Freudenberg et al, TreeCrownDelineation, https://github.com/AWF-GAUG/TreeCrownDelineation/releases/tag/v0.1.0.

[2] Baumkataster. Open Data Halle. https://webapp.halle.de/komgis30.hal.opendata/fa3930b7-b3ed-b3fc-20d9-2fc8fd054b0e.html

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