



ABBY-NET E³-Systems Research Project Update 2019: #1c: The Edmonton Tree Project

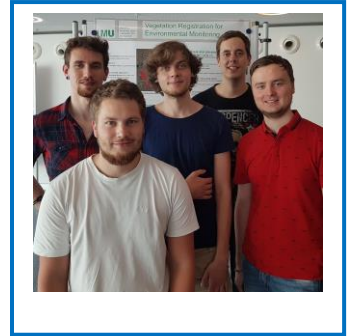
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Project summary

The city of Edmonton maintains the Edmonton Tree Database (ETdb) containing locations and meta information on trees on public grounds. For many applications, it would be desirable to include trees on private ground. For example, to counter pest infestation on certain tree species. The goal of this project is to develop a method for automatically extracting the location and the genus of trees from aerial imagery. In this case, a 10 cm, RGB aerial orthophotomosaic of the City of Edmonton is provided. For annotation, 4500 bounding boxes on a stratified sample of trees are provided in addition to the location information of the ETdb. Within the projects students develop various preprocessing steps and train convolutional neural networks for object detection as well as Genus classification. The final results are transformed into a new polygon layer to make it accessible via common GIS systems.

Progress to date

The majority of the project goals are realized during this summer. The students developed an interface between the provided spatial GIS layers to the more low-level representations which are required to process the data with deep learning frameworks. A major effort was spent in cleaning the data as the annotation and the imagery are from different points in time and thus, are inconsistent in several regions. Furthermore, students generated completely labeled areas containing only public trees. This, was done in an semiautomatic way, automatically labeling candidates and the manually readjusting boxes. The results led at reasonable method for detecting trees with a Sensitivity of 78% on test sets. A first approach to predict the genus of the trees shows promising results for some trees species. However, classification in general is not reliable yet.

Contribution to E3-system and Implications

The project is a collaboration between geographers in the area of remote sensing and computer scientist in area of imaging and artificial intelligence. Though the project itself does not have a direct relation to Energy and Socio-Economics, the techniques being developed here can be extended and employed to measure the impact of energy installations on the environment for larger areas.

Geographic location

Data collection and selection has been done in Edmonton, Alberta. Data preparation, method development and training the models are done at the LMU Munich.

Final Outcomes

The current project outcome is runnable code for tree detection on orthomosaic layers which was developed by a group in the Big Data Science practical course at LMU. The results are documented in a poster and a presentation of the student group. Given further progress, it is intended to publish the results at a remote sensing or geo-information system venue.

