

Automated identification and geometrical features extraction of individual trees from Mobile Laser Scanning data in Budapest

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Mobile Laser Scanning (MLS) is an evolving operational measurement technique for urban environment providing large amounts of high resolution information about trees, street features, pole-like objects on the street sides or near to motorways. In this study we investigate a robust segmentation method to extract the individual trees automatically in order to build an object-based tree database system.

We focused on the large urban parks in Budapest (Margitsziget and Városliget; KARESZ project) which contained large diversity of different kind of tree species. The MLS data contained high density point cloud data with 1-8 cm mean absolute accuracy 80-100 meter distance from streets.

The robust segmentation method contained following steps: The ground points are determined first. As a second step cylinders are fitted in vertical slice 1-1.5 meter relative height above ground, which is used to determine the potential location of each single trees trunk and cylinder-like object. Finally, residual values are calculated as deviation of each point from a vertically expanded fitted cylinder; these residual values are used to separate cylinder-like object from individual trees.

After successful parameterization, the model parameters and the corresponding residual values of the fitted object are extracted and imported into the tree database. Additionally, geometric features are calculated for each segmented individual tree like crown base, crown width, crown length, diameter of trunk, volume of the individual trees. In case of incompletely scanned trees, the extraction of geometric features is based on fitted circles.

The result of the study is a tree database containing detailed information about urban trees, which can be a valuable dataset for ecologist, city planners, planting and mapping purposes. Furthermore, the established database will be the initial point for classification trees into single species.

MLS data used in this project had been measured in the framework of KARESZ project for whole Budapest. BSz contributed as an Alexander von Humboldt Research Fellow.