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Tree segmentation and classification of deciduous park trees in Sanssouci Park, Potsdam, Germany, using airborne and terrestrial lidar point clouds

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While automated, lidar-based tree delineation has proven successful for conifer-dominated forests, deciduous tree stands remain a challenge. But automatic and reliable segmentation of trees at large spatial scales is a prerequisite for a supervised classification into tree species. We propose an aspect driven tree segmentation that clusters local elevation minima across different aspects. These clusters define tree outlines that respect tree inherent local elevation minima. We validate this approach with more than 25.000 mapped trees of the Sanssouci Park, Potsdam, using an airborne lidar point cloud collected in 2018, and various terrestrial lidar scans for a large fraction of the same park. Further, we demonstrate the tree segmentation by supervised tree species classifications for the most common tree species using random forests and Gaussian process classifiers with geometric parameters derived from individual tree crowns.