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TOPOLOGY EXTRACTION USING DEPTH FIRST SEARCH ON VOXEL REPRESENTATIONS OF TREE POINT CLOUDS

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Abstract. The three-dimensional reconstruction of the vegetation structure is a requirement for the analysis of interaction between biosphere and atmosphere. Information about the 3D structure of plants enables the modeling of crucial processes, like water interception or absorption of light. Terrestrial laser scanners have proven to be a valuable tool to rapidly and accurately capture the geometry of plants as point clouds, which provide the foundation for analyzing their structure. Based on a very dense but unstructured, noisy point cloud, we have presented a method to extract the topology of a tree in form of a tree graph, demonstrated on a test set of single birches. In a first step we have applied a variation of the Circular Hough Transform to detect a set of 3D points, which represent the tree trunk. Subsequently, the point cloud is transformed onto a voxel space and filtered to a connected component representation of only the main object. In the second step, the residual voxels are interpreted as a connected graph and the Depth First Search algorithm is employed to retrieve the topology of the scanned tree.

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