

# CherryPicker: Semantic Skeletonization and Topological Reconstruction of Cherry Trees

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## 1. Appendix

See the next pages for Fig. 1 and Fig. 2.

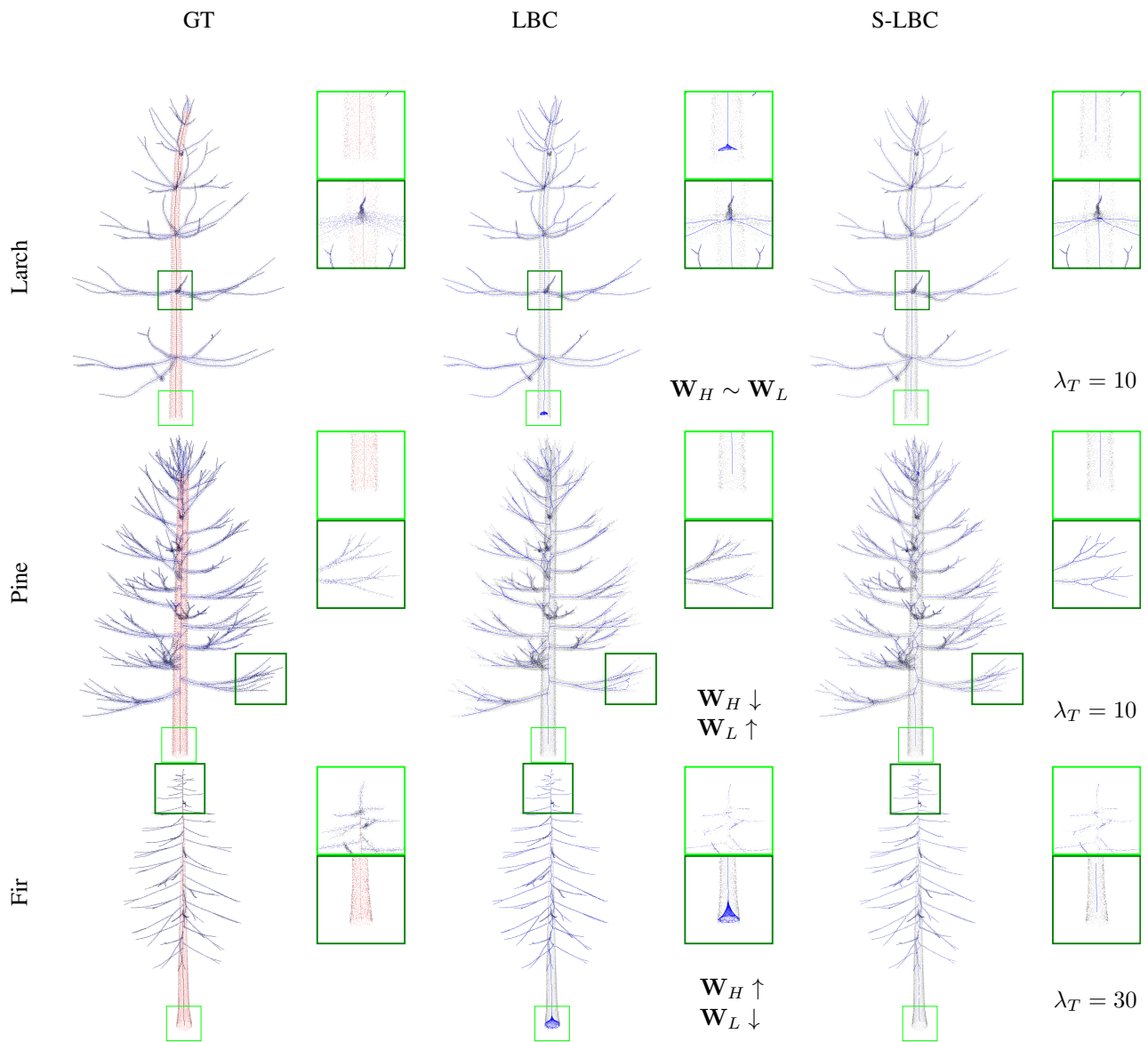


Figure 1. For the visualization of the advantages of semantic Laplacian-based contraction (S-LBC) over standard Laplacian-based contraction (LBC) we show different cases. With the larch, we chose balanced contraction  $W_L$  and attraction weights  $W_H$  for LBC. It is a compromise for a good reconstruction of thin branches and thick trunks. Nevertheless, LBC struggles to properly reconstruct the bottom of the trunk. S-LBC achieves the same results for the branches but tackles the artifact of the trunk. In the pine example, we increased the contraction weights and decreased the positional weighting to tackle the trunk artifact within LBC. It can be seen that LBC eliminates the trunk artifacts but introduces over-smoothing at the branches. For S-LBC the skeleton benefits from different weighting and has no artifacts. At the last example executed at a fir, LBC weighting for  $W_H$  increased and decreased for  $W_L$ . At the branches, the topological results are similar to the ground truth but the trunk suffers from an incorrect trunk skeleton. On the other side, S-LBC keeps the details of the branch and additionally contracts the trunk properly.

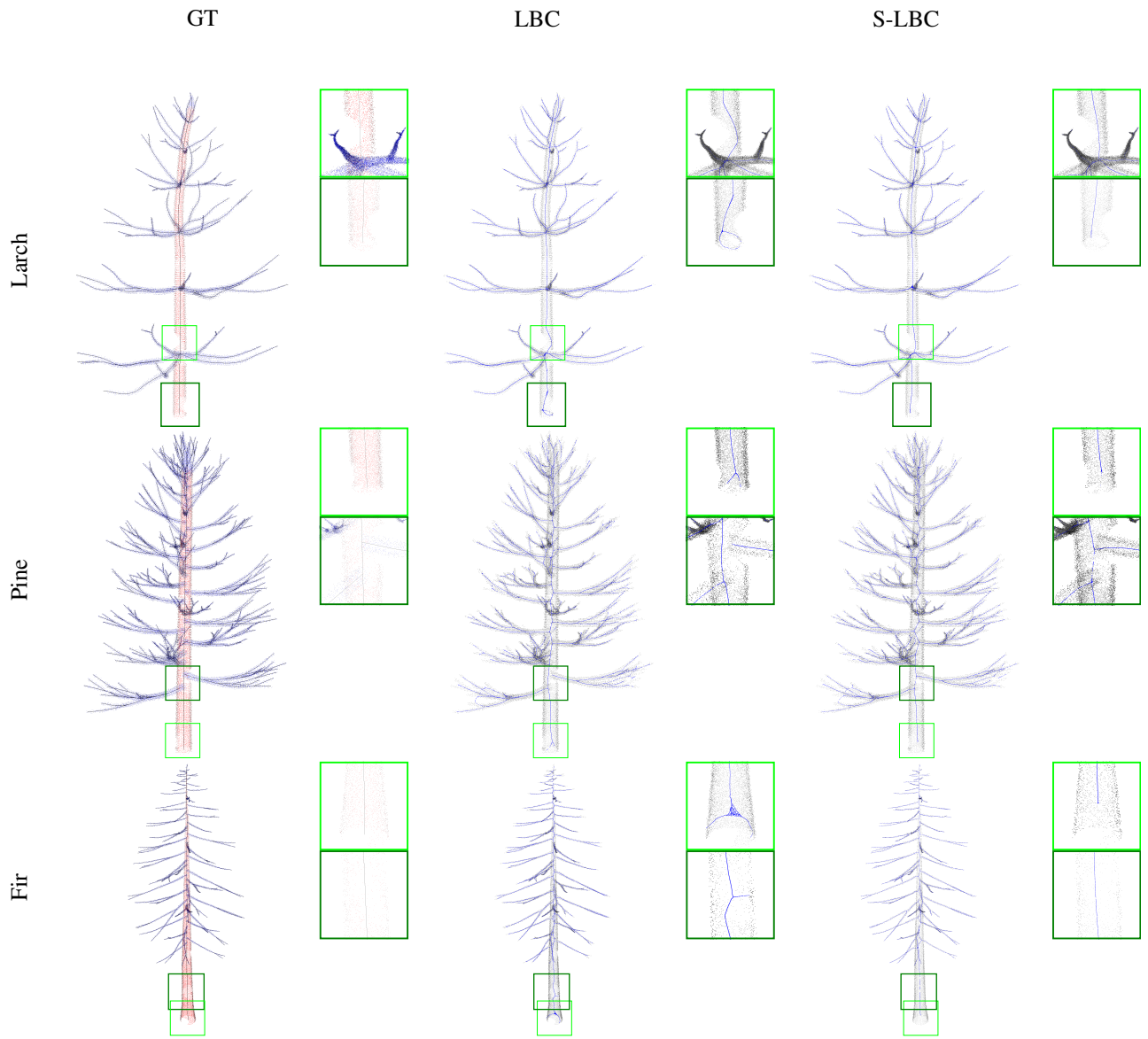


Figure 2. Visualization of the skeleton algorithms LBC and S-LBC on noisy and occluded tree point cloud data. In the region of holes, the Laplacian-based contraction (LBC) shows circular artifacts. For the different tree types, we choose similar contraction  $\mathbf{W}_L$  and attraction weights  $\mathbf{W}_H$ . At the top row with the larch example, it can be seen LBC shows elliptical errors at the bottom tree trunk. The green area shows a curved skeleton for LBC and for S-LBC it is a straight line due to the additional trunk weighting. In the pine example, it can be seen LBC shows erroneous skeletons in the trunk and additionally missing links appear. S-LBC is able to counteract these artifacts. Lastly, in the Fir example, the holes produce different artifacts for LBC. The S-LBC is able to overcome these artifacts by enforcing stronger contractions due to semantic weighting.