

Segmentation in Tree Diameter Measurement via 3D Methods

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Abstract

Tree trunk diameter measurement, particularly Diameter at Breast Height (DBH) is a critical task for foresters, indispensable for both the health assessment and market valuation of trees. Traditionally, this measurement has been performed using diameter tapes, a method which is both labor-intensive and time-consuming. In extreme cases where trees are inaccessible, obtaining accurate diameter data becomes particularly challenging. While mobile technology offers a convenient avenue for data collection, most existing algorithms for diameter calculation are not optimized for mobile applications. Wang, et al. has developed a method for diameter calculation utilizing 3D data and tree trunk mask, but it requires clean segmentation of the tree trunk for precise measurement. Advanced AI solutions like SAM exist, but their adaptation for mobile platforms is not yet feasible. In this study, we introduce an efficient method for tree trunk segmentation using 3D Lidar data captured via iPhone devices. Crucially, our approach mitigates issues arising from tilted camera angles and maintains stability in complex background environments. Moreover, we have released an iOS application to facilitate field-testing of this innovative approach. Our method not only simplifies the process but also significantly enhances the accuracy and accessibility of diameter measurements, bridging the gap between advanced algorithms and real-world mobile applications.

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