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Estimation of wood volume through image interpretation and photogrammetry.

Francesco Pirotti and Erico Kutchartt
University of Padova, CIRGEO, TESAF, Legnaro, Italy (francesco.pirotti@unipd.it)

The importance of determining tree volume spatial distribution in forest environment is quite relevant for estimating carbon stocks and forest dynamics. In normal circumstances it supports forest management, but in case of extreme events – such as recent windthrow in the past years in Italy – it can also significantly support damage assessment. Remote sensing methods can be a very valid tool to decrease costs of field samples and to upscale volume estimation to larger areas. Field measurements are notably expensive and time consuming. Fundamental parameters for tree volume calculations, tree diameter at breast height – 1.3 m - DBH, tree height HT and canopy height HC, can be measured using photogrammetric techniques, providing certain conditions are met. Experiences from past investigations show that manual methods and unsupervised interpretation of aerial RGB images with a ground sampling distance of 0.2 m over felled trees after windthrow can be applied to extract valid aggregated data at plot level. Comparison of diameter measured in the field with Line Intersect Sampling (LIS) with measurements from operator's photointerpretation of imagery, provided plot-level mean diameters not significantly different (t-test). Automatic estimation of volume using normalized cross correlation of a linear kernel over imagery of felled trees also provided significant correlation.
This method will be applied to standing trees of Araucaria araucana, which are commonly in sparse distribution, thus providing feasible baselines for photogrammetric methods. In the future these close-range remote sensing methodologies to estimate biomass in forest, under specific conditions, can reduce time and cost, returning accurate data.