Individual tree recognition using LIDAR and aerial images: preliminary results

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Abstract

A comparative study of three individual tree recognition methods is presented with a view to its application on forest inventory. It was tested on a mixed Mediterranean forest using aerial images from a DMC photogrametric camera, LIDAR airborne data (ALTM 3025E) with a density of 0.85 pulses/m^2 and a combination of both. DMC orthorectified images are composed of RGB channels having a spatial resolution of 10 cm. We performed a Minimum Noise Fraction rotation transform (MNF) on the RGB data in order to segregate the noise in the data. The LIDAR data product that we used was the Tree Canopy Model (TCM) image obtained by substracting a Digital Terrain Model (DTM) from the Digital Surface Model (DSM). The DTM was generated from last echo points while the DSM was generated from first echo points.
The field data was collected at tree level and geolocated with differential GPS techniques.
An image segmentation method and an object-oriented classification were performed using eCognition Professional 4.0 software. This method allowed us to measure canopy cover and to identify individual trees, *via* trial-error processing by iterating weight, scale, colour and shape parameters at different levels.

The first tested results using DMC image interpretation and field data, present accuracies close to 70 % for tree density assessment with LIDAR data.

Keywords: LIDAR, aerial image, individual tree identification