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Various approaches for vegetation filtering of terrestrial laser scans

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Rock cliffs analysis from terrestrial Lidar data requires frequently to merge multiple scans or to compare successive scans to detect cm changes or displacements. This processing step is known by the name of alignment. The presence of vegetation in between the sensor and the rock face may strongly impair the accuracy of alignment. It is then recommended to remove the points backscattered by the vegetation from the original point cloud before to proceed to the alignment. This procedure, also known as scan cleaning, can be very tedious and time consuming (and may stupidly increase the overall processing cost). We propose here to compare preliminary semi-automatic methods to remove vegetation points in terrestrial Lidar dataset. Two types of methods were tested: 1) spatial methods based on the geometrical arrangement of points in the lidar point cloud, 2) spectral methods using information collected by an extra sensor coupled to the Lidar.

For the spatial methods, vegetation and non-vegetation points are classified through a curvature index. Points on vegetation show a high curvature index, as the points captured by foliage do not show a clear structure. Curvature is computed by means of eigen values analysis of the local covariance matrix. Segmentation of the dataset based on Gaussian Mixture Modeling of eigenvectors distribution is also investigated.

For the spectral methods, various camera were tested. A mixed visible-near infrared (600-900 nm) camera with a three bands sensor appeared to be the most efficient, chlorophyll reflectivity having a very specific signature in this range of wavelength. Moreover a standard SLR camera can be quite easily transformed for this purpose.

As the type of vegetation and/or the light condition may vary a lot between datasets, semi-automatic methods (with user defined thresholds) appears to be the most efficient. Further works will include the coupling of both spatial and spectral information.