

Detection Buildings from Airborne LiDAR data based on PCA method

1. Filtering ground points using adaptive TIN method proposed by Peter Axelsson in 2000. (Axelsson P. DEM generation from laser scanner data using adaptive TIN models [J]. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, 2000,33(Part B4/1):110-117.)
2. For non-ground points including buildings, vegetation, et al., building points are distinguished using Principal Component Analysis (PCA) according to Minimum eigenvalue and roof normal vector gained from point clouds' [covariance matrix](#). [Covariance matrix](#) of clustered non-ground point clouds is expressed as follows:

$$C_i = \frac{1}{|N_i|} \sum_{p \in N_i} (p - \bar{p})(p - \bar{p})^T \quad (1)$$

where N_i signifies number of clustered non-ground point clouds; any laser point can be represented by $p = (p_x, p_y, p_z)^T$.

3. Building points would be recognized by height and area thresholds of candidate building region.