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Procedure of building extraction

Building extraction is an active research task of Light Detection and Range (LiDAR). The extracted buildings could contribute to urban modelling, economic and population census, urban planning and so on. At present, there are many reported methods (Mongus et al., 2014; Vu et al., 2009). However, methods of ALS-based are still difficult for separating building points from vegetation and other points, and to extract a complete building with roof elements and annex structures. Therefore, our method fuses morphological scale space and point cloud segmentation for creating scale space, and constructing the topological relationships of patches between different scales, and then extracting the complete building with details.

The four main steps of the proposed method are following.

- Employ a filtering method to separate ground points and non-ground points, and divide non-ground points into different candidate building regions by some local geometric characteristics (e.g. normal, curvature and others)
- Construct scale space by morphological reconstruction for point clouds in each candidate building region (Vincent, 1993), and partitioning non-ground points of each candidate building points into several patches by point cloud segmentation for each scale;
- Construct topological relationships of patches from different scales for each candidate building region;
- Remove vegetation and other objects from each candidate building region by some characteristics, such as area change of segments between different scales, ratio of segmented points between different scales, height, width and others.

Reference

Mongus, D., Lukač, N., Žalik, B., 2014. Ground and building extraction from LiDAR data based on differential morphological profiles and locally fitted surfaces. *ISPRS Journal of Photogrammetry and Remote Sensing* 93, 145-156.

Vincent, L., 1993. Morphological Grayscale Reconstruction in Image Analysis: Applications and Efficient Algorithms. *IEEE Transactions on Image Processing* 2, 176 - 201.

Vu, T.T., Yamazaki, F., Matsuoka, M., 2009. Multi-scale solution for building extraction from LiDAR and image data. *International Journal of Applied Earth Observation and Geoinformation* 11, 281-289.

