

The proposed method considers geometric, textural, and regional attributes of features in order to detect buildings in LiDAR data:

- Geometrical properties are obtained by applying differential morphological profiles and estimating the features widths and heights from them,
- Textural properties are obtained by observing the square-errors when fitting surfaces to the local neighbourhoods of the buildings,
- Regional attributes consider a so-called spill-analysis where region spilling is defined by the area of regions where non-ground and ground regions are connected by a planar region (a set of points close to the fitted plane where low square errors are obtained).

In order to estimate these characteristics, three steps are proposed:

- First, the method arranges the input point-clouds into a grid
- Differential morphological profiles are then constructed over a grid and digital terrain model is generated,
- Locally fitted surfaces are constructed and square-errors introduced by the fitting are estimated,
- Finally, a spilling analysis is performed.

Although the method uses differentially morphological profiles (DMPs) similar to the one presented in [1], only the grid construction step is actually the same. Here, DMP is constructed here only for the estimation of geometric properties of features whilst the method proposed in [1] uses them for the removal of outliers. The most fundamental difference is in the estimation of planar regions where [1] uses differential morphological profiles, whilst the proposed method introduces a new concept of surface fitting.

[1] Mongus, D., Luka, N., Obrul, D., Žalik, B., 2013. Detection of planar points for building extraction from LiDAR data based on differential morphological and attribute profiles. *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences* II-3/W1, 21–26.