OBJECTED-BASED CLASSIFICATION FOR LIDAR POINT CLOUDS

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Abstract: Recently, image classification methods have transferred from pixel-based to object-based. Under the consideration of specific spatial features of objects, such as spectral, shape, texture, or the subordinative relations among them, object-based image analysis (OBIA) could improve the efficiency of image classification. As the development of geomatic technology, using LiDAR (Light Detection And Ranging) system to rapidly acquire a large number of 3D point clouds has gradually become a crucial manner of obtaining spatial data. In contrast with images, LiDAR point clouds, which possess distinctive 3D geometric properties, provide another kind of interpreting information for land feature classification. In terms of data characteristics about images and LiDAR data, images provide plentiful spectral information as classification bases, and establish subordinative relations among pixels to improve classification efficiency after adding the object-based concept. On the contrary, LiDAR data provide ample geometric information. Supposing one can further build up subordinative relations among these point clouds, utilizing spatial distributive properties that point clouds possess, application efficiency should be largely improved. In order to raise the capability of automatic recognition of land features from LiDAR data, 2D object-based image classification method is extended for 3D point cloud classification of LiDAR data in this study, namely object-based point cloud analysis (OBPCA). First, point cloud is segmented to independent 3D objects by various methods. Second, object features designed by this study are calculated. At last, the point clouds are classified automatically according to the object features. This study applies airborne LiDAR and ground-based LiDAR to automatic land feature classification. The results show that utilizing the object-based concept to classify LiDAR point cloud can give assistance to point cloud recognition by means of depicting the spatial characters of these objects. The classification results then, therefore, improve not only the completeness, but also the quality.

Keyword: LiDAR, segmentation, feature extraction, objected-based point cloud analysis,