FFT based airborne LIDAR classification with Open3D and numpy/scipy

Péter Szutor[a]

[a]University of Debrecen
szppaks@gmail.com

Abstract

The classification of the airborne LIDAR (also referred to ALS) point clouds is a frequently used operation. The recently used algorythms use machine algorythms (like SVM), but teaching this algorythms often may be involved. In many instances we need to write a special application for working with our data. For the fast developing we need a very useful programming language (python+numpy is the best), and a C based point cloud library, for the fast execution.

Open3d is a modern library for 3D data processing, including point clouds, meshes, RGBD pictures, it has good highly optimized algorythms, data types, IO functions and supports visualisation; and it has integration with numpy arrays, so we can easily use scipy and scikit modules.

We present a new method for point cloud classification, with two clustering methods and Fast Fourier Transform. The idea is based on that the elevation in the point cloud clusters has different frequency domain depending on the surface; the buildings shows wider spectrum then the vegetation, and the ground has a very small spectrum. To make contiguous parts from the entire point cloud, we use DBSCAN clustering (Open3D), and BIRCH clustering (scikit-learn). Williams–Linder–Kindermann method.

Keywords: Open3d, LIDAR, point cloud classification