3D Building Model Retrieval System Based on LiDAR Point Cloud Filling and Encoding

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ABSTRACT: Airborne Light Detection and Ranging (LiDAR) has the ability of acquiring huge and highly accurate point cloud. Therefore, the processing of huge point clouds has become an important research topic and has drawn increasing attention in the fields of remote sensing. In this paper, an automatic three-dimensional (3D) model retrieval system is introduced to retrieve building models by using point clouds. The proposed system includes a novel point cloud encoding approach and a 3D building model database acquired from Internet. The encoding approach is based on low frequency spherical-harmonic basis functions which provide compact representation of 3D data and has properties of noise insensitivity and rotation invariance. To ease the problem of inconsistent encoding of point cloud and building models, three steps, namely, *datum detection*, *model resampling*, and *data filling*, are introduced in the preprocessing. The origins of input point cloud and model are aligned in the step of datum detection, and the aliasing problems caused by sparse and incomplete sampling of point clouds are eased in the steps of model sampling and data filling. The experimental results show that the proposed method which consistently encodes a point cloud and a model can yield accurate retrieval results.

Keywords: Airborne LiDAR, Model Retrieval, Point Cloud Encoding, Data filling.